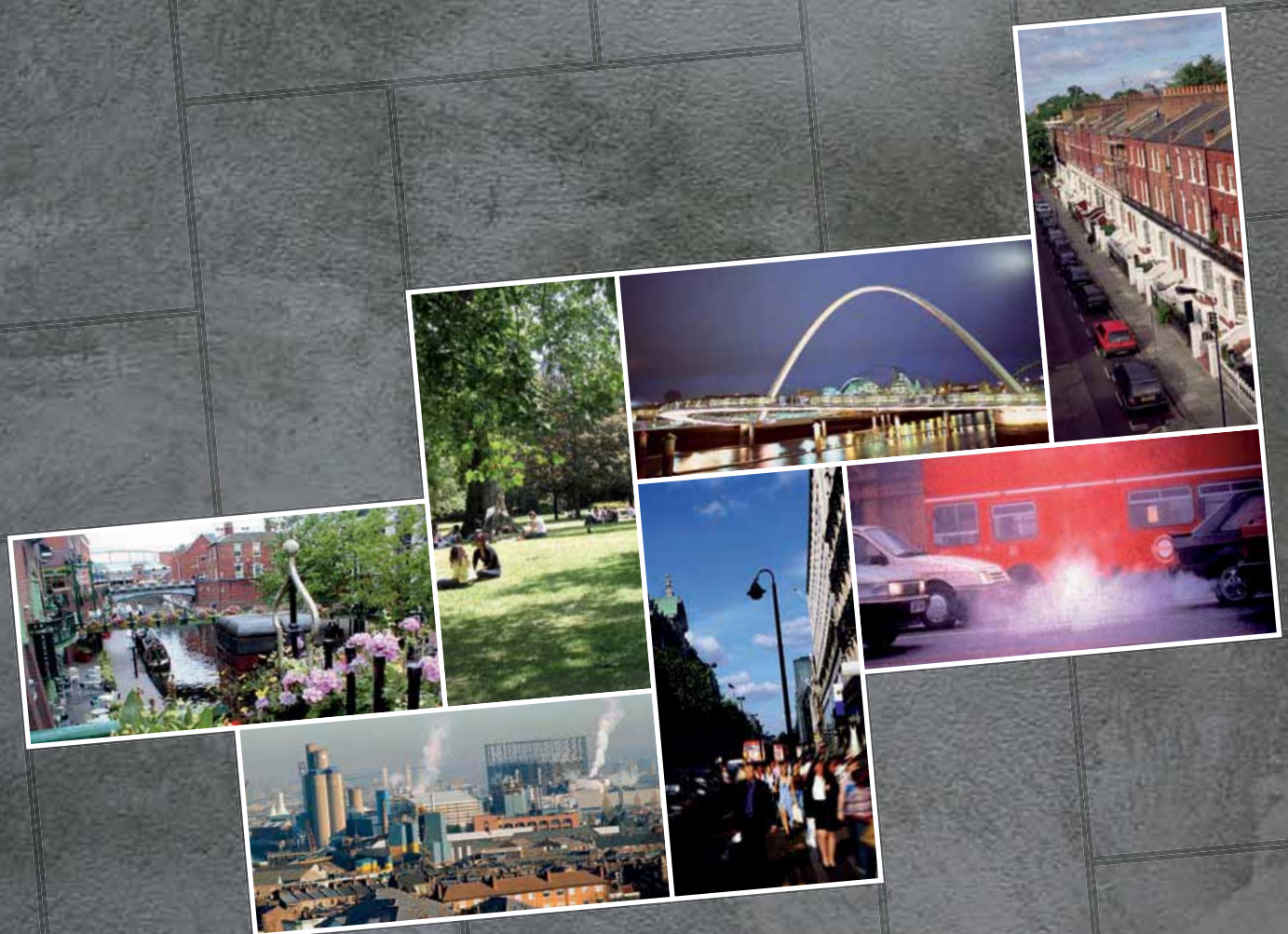




ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

# The Urban Environment



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## ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

CHAIRMAN: SIR JOHN LAWTON CBE, FRS

Twenty-sixth Report

# The Urban Environment

Presented to Parliament by Command of Her Majesty  
March 2007

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	First Report . . . . .	Cmnd 4585, February 1971

# ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION

## Twenty-sixth Report

*To the Queen's Most Excellent Majesty*

MAY IT PLEASE YOUR MAJESTY

We, the undersigned Commissioners, having been appointed 'to advise on matters, both national and international, concerning the pollution of the environment; on the adequacy of research in this field; and the future possibilities of danger to the environment';

And to enquire into any such matters referred to us by one of Your Majesty's Secretaries of State or by one of Your Majesty's Ministers, or any other such matters on which we ourselves shall deem it expedient to advise:

HUMBLY SUBMIT TO YOUR MAJESTY THE FOLLOWING REPORT.

*“... vital cities are not helpless to combat even the most difficult of problems. They are not passive victims of chains of circumstances, any more than they are the malignant opposite of nature.”*

*“But look what we have built ... low-income projects that become worse centers of delinquency, vandalism and general social hopelessness than the slums they were supposed to replace ... Cultural centers that are unable to support a good bookstore. Civic centers that are avoided by everyone but bums ... Promenades that go from no place to nowhere and have no promenaders. Expressways that eviscerate great cities. This is not the rebuilding of cities. This is the sacking of cities.”*

Jane Jacobs, *The Death and Life of Great American Cities*, 1961

More information about the current work of the Royal Commission can be obtained from its website at <http://www.rcep.org.uk> or from the Secretariat at Third Floor, 5-8 The Sanctuary, Westminster, London SW1P 3JS.

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# Chapter 1

## THE URBAN ENVIRONMENT

### INTRODUCTION

- 1.1 Cities are synonymous with civilization. In classical times to be civilized meant being a townsman. Historically, cities are centres of commerce and culture, celebrations of innovation, knowledge creation and education. They are expressions of political and moral authority and symbols of stability. They offer diversity and they can be wonderful places in which to live. Even when they are not, they can still be fonts of opportunity and magnets to population.
- 1.2 Life in cities and, by extension, in towns and more modern urban forms has preoccupied social reformers, town planners, public health officials and social scientists for more than a century and a half. Millions of words have been written on the topic and, until recently, they have focused overwhelmingly on public health concerns, the social conditions of the poor, and proposals to ameliorate these through planning and redevelopment.<sup>1</sup> Over the last thirty years these traditional issues have been supplemented by a veritable explosion of new studies exploring broader environmental perspectives, including urban nature, the impacts of cities and towns on the wider environment and the sustainability of modern urban life.<sup>2</sup>
- 1.3 While much of this work raises concern about the ‘environmental footprint’ of towns and cities, other studies point out that high human population densities can provide citizens with access to a wide range of services with low personal transport requirements. Urban areas also have the potential to release land for nature and there is widespread appreciation of the social, economic and cultural benefits that life there can offer.<sup>3</sup> The urban environment has thus become a compelling subject for researchers as well as a significant political issue. Urban areas have been recast as key arenas in which the concept of sustainable development should be interpreted and applied.<sup>4</sup> Indeed, in the words of a recent government document, “Cities are high on the British policy agenda. After two decades of economic and demographic decline, the idea that cities are not basket cases – but the dynamos of the UK national economy – has seized the imagination of politicians, researchers and business.”<sup>5</sup>
- 1.4 In England, major urban growth is envisaged as part of the government’s Regional Spatial Strategies and the Sustainable Communities Plan (2.15), including in some regions that are already heavily developed. Urban growth and regeneration are also important priorities for the devolved administrations in other parts of the UK. Clearly, we require a vision of what our future towns and cities should deliver. More problematically we have to translate this vision into

our existing urban areas, as more than 70% of the homes of 2050 already exist and we are about to enter a building boom that will shape the UK's built environment for centuries to come.

- 1.5 It is therefore important that new housing and the supporting infrastructure reflect potential future needs, especially as it takes many years before these new structures are fully in place. The needs and constraints of tomorrow's society are hard to predict, so the plans implemented today need to incorporate a degree of flexibility, and a proper balance between the needs of the current and future generations. This is challenging, as present concerns are often prioritised over future ones and ecological limits threatened by current development.
- 1.6 Looking more widely, cities only encompass 2% of the world's land surface, yet they are responsible for consuming over 75% of the planet's resources and produce 75% of the world's waste.<sup>6</sup> Many of the cities of tomorrow are more likely to be mega or super cities, with single mega-cities spawning sprawling urban regions representing "the largest, most complex man-made structures ever created".<sup>7</sup> For all of these reasons, we view the urban environment as a pressing issue requiring prompt attention. The opportunities are immense, but the problems are acute and the time to deal with them is already upon us.
- 1.7 The urban environment therefore demands urgent attention as huge commitments are currently being made for the future in the absence of a coherent urban environmental policy framework. This is occurring at a time when the majority of the UK's population lives in cities and other urban areas, many of which are already experiencing difficulty in meeting the demand for good air quality, adequate water availability, affordable housing and a sense of place. These problems are made all the more critical by the threat posed by climate change.

## TWO KINDS OF URBAN ENVIRONMENTAL ISSUES

- 1.8 Our study has convinced us that policy actors who formulate and/or implement policy confront two broad categories of environmental issues relating to urban areas. We call these 'cumulative' and 'systemic'. Cumulative issues are those that can arise in any human settlement and place, but which can be exacerbated in towns and cities by the agglomeration and density of population and activities. For example, energy consumption in buildings is as much a concern for households and businesses in the Outer Hebrides as it is for those in inner London. The technologies for improving energy efficiency may be identical. But the opportunities for action will differ, not least because of the potential for improvement in urban regeneration and growth areas. In other words, carbon dioxide emissions are not a problem of urban areas *per se* – but urban expansion and regeneration offer important opportunities to curb their growth.
- 1.9 By contrast, systemic issues arise from the unique social, economic and environmental characteristics of urban settlements. Thus, the urban heat island effect may result in the ambient temperatures of towns and cities being 1° to 6°C higher than those in the surrounding

countryside, with consequent impacts on human health, energy consumption to cool buildings and biodiversity. Patterns of urban living also typically require specific infrastructure such as extensive storm and sewerage systems. They offer different opportunities for Combined Heat and Power (CHP). Green spaces in our towns and cities (from parks to gardens and allotments) have many artificial characteristics, but provide important environmental health and social benefits.

- 1.10 Although we sought initially to focus on uniquely systemic issues, we found ourselves consistently returning to the cumulative sort. Indeed, without them our study would have seemed lop-sided to anyone familiar with the environmental management of towns and cities. Furthermore, we recognise that although the distinction between cumulative and systemic issues is analytically useful, in practice they may overlap. Both may have impacts on the quality of the environment outside the city as well as within it.
- 1.11 Table 1.1 identifies some cumulative and systemic issues in terms of the three main themes which we address in this report – the built environment; the natural environment; and health and wellbeing. Struggling with whether issues are specifically urban or not, we arrived at the conclusion that there is a spectrum of interactions operating on numerous levels. The table therefore emphasises that we are not identifying distinct categories of issue, but more usefully a broad spectrum. For example, it is evident that location matters in terms of environmental capacities. Thus, urban development in a water-scarce area or in the green belt could have distinctive environmental implications at the local level. There is also a distinction between where effects can be felt, for example, air pollutants can be released locally, but their impact may be evident nationally and globally as well as at the point of release. Urban areas also have a funnelling effect;<sup>8</sup> with the concentration of people and infrastructure intensifying certain environmental problems with consequent pressures on environmental capacities in the urban hinterland. What seems to us to be important is recognition of the differences between the impacts and opportunities of agglomeration *per se* and the distinctive environmental characteristics generated by urban areas, large cities and city regions. There is an urgent need to understand a spectrum of urban–environment interactions, and not least the complex connectivities being generated in city regions.

**TABLE 1.1**  
**Examples of cumulative and systemic urban environmental issues**

	<b>Cumulative</b>	<b>Systemic</b>
<b>Built urban environment</b>	Building energy and water use and efficiency Building flexibility Urban density Municipal, commercial and industrial waste Construction waste Regional housing growth	Urban form and function Urban heat island Connectivity – transport, infrastructure, Combined Heat and Power Drainage – sewerage; storm water Sustainable drainage systems Green roofs Sense of place
<b>Natural urban environment</b>	Brownfield land Contaminated land	Urban rivers/hydrology Flooding – particularly pluvial Urban green space – parks, gardens, allotments; green corridors Urban biodiversity
<b>Health and wellbeing</b>	Vehicle emissions – respiratory and cardiac health Social deprivation Noise – impact on hearing/stress ‘Sick buildings’ Infection/spread of disease	Air pollution hot spots Heat stress-related illness/death Some aspects of mental illness Sense of place

## THE URBAN ENVIRONMENT IS A COMPLEX SYSTEM

- 1.12 There have been notable improvements in urban areas over the past 150 years. The major milestones of the past – the Victorians’ creation of parks, railways and water and sewerage systems, the Clean Air Act of 1950, the decontamination of rivers during the 1980s and 1990s – show that it is possible to bring about radical environmental improvements in urban areas, and few would dispute that these have also had major social and economic benefits. The improvements and innovations of past generations are in large part responsible for making many parts of today’s cities attractive and exciting places in which to live and work.
- 1.13 While the basic challenges of the urban environment appear to us to be remarkably persistent, the cities of today also face a set of less visible, but equally difficult challenges, such as the threat of climate change, the wasteful use of natural resources, the health impacts of airborne particles and exposure to a vast array of chemicals. These problems are intimately bound up with modern lifestyles and at the same time require the attention and action of many different parts of society.



- 1.14 We observe that many of the same challenges and problems have been diagnosed repeatedly by specialists in the field and that a broadly similar range of solutions has been proposed by experts over decades. Overall, progress in managing the urban environment cannot be said to be proportionate to the analytic effort expended on the topic. Urban environmental management presents a classic case of what people in the field have described as a ‘wicked problem’.
- 1.15 The idea of a wicked problem was originally advanced in the 1960s by Professor Horst Rittel to describe the experience of American urban planners (box 1A).<sup>9</sup> Rittel suggested that by the middle of the twentieth century the low-hanging fruit of obvious public health measures had been harvested, leaving urban planners with much more intractable problems. These are often symptoms of deeper or more endemic problems, such as social inequality. They allow little room for trial-and-error learning since once communities are demolished, they cannot be restored. Wicked problems are persistent precisely because they lack a clear set of alternative solutions. They cannot be solved definitively, but rather must be managed for better or worse.
- 1.16 In the course of our inquiries it became clear to us that urban environmental issues owe much of their wickedness to the nature of towns and cities as complex systems. Although the discipline of urban planning has been widely practised throughout most of the twentieth century, urban settlements are, for the most part, better understood as emergent rather than planned systems. They have evolved in particular ways as agglomerations of people; accretions of buildings and roads; infrastructures for water and energy supply and the removal of sewage and waste; public and private spaces; places of business and residence; locations for the production and consumption of goods and services; facilities for entertainment, education and health; and so forth.<sup>10</sup> The behaviour of urban systems, of which urban environments are a vital part, is therefore shaped by the trial-and-error accumulation of factors and forces that survive because they fit into and reinforce other aspects of the system.<sup>11</sup>
- 1.17 The very term ‘urban environment’ is redolent with wickedness in the sense that Rittel intended. Both scholarly and policy writings tend to interchange the words ‘city’ and ‘urban’ with barely a pause to consider the variety of forms of settlement that they can encompass. The city of Lichfield (population 28,000) cannot always usefully be considered in the same breath as London (population 7.5 million). We hear more and more about city regions, but it remains unclear what they are and how they should operate, as they often include suburbs and city centres in the same single category. The UK Research Councils support research programmes on both urban and rural environments,<sup>12</sup> yet they shy away from a clear definition of either. Regardless of size, it is rarely possible to identify the specifically urban dimensions of a whole host of environmental problems in terms of official statistics and indicators, in part no doubt because the urban environment has failed as yet to gain a discernible and coherent policy agenda.

## BOX 1A

## WICKED PROBLEMS

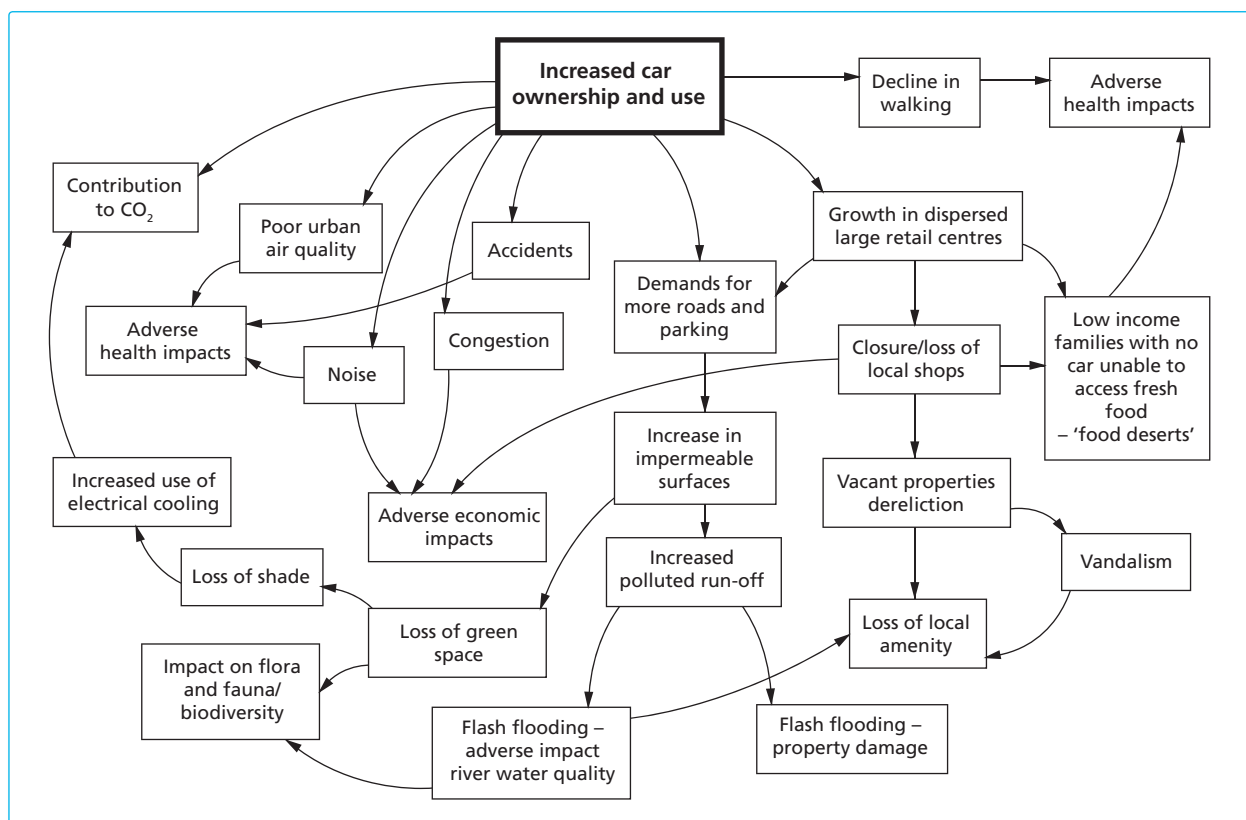
According to Rittel and Webber (1973), wicked problems have ten characteristics:

1. **There is no definitive formulation of a wicked problem.** Formulating the problem and the solution is essentially the same task. Each attempt at creating a solution changes your understanding of the problem.
2. **Wicked problems have no stopping rule.** Since you can't define the problem, it's difficult to tell when it's resolved. The problem-solving process ends when resources are depleted, stakeholders lose interest or political realities change.
3. **Solutions to wicked problems are not true-or-false, but good-or-bad.** Since there are no unambiguous criteria for deciding if the problem is resolved, getting all stakeholders to agree that a resolution is "good enough" can be a challenge.
4. **There is no immediate and no ultimate test of a solution to a wicked problem.**
5. **Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.** Once a neighbourhood has been demolished and the inhabitants relocated, it cannot be restored.
6. **Wicked problems don't have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.** Various stakeholders have differing views of acceptable solutions. It's a matter of judgment as to when enough potential solutions have emerged and which should be pursued.
7. **Every wicked problem is essentially unique.** There are no "classes" of solutions that can be applied to a specific case. "Part of the art of dealing with wicked problems is the art of not knowing too early what type of solution to apply."
8. **Each wicked problem can be considered a symptom of another problem.**
9. **The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.** There are many stakeholders who will have various and changing ideas about what might be a problem, what might be causing it and how to resolve it.
10. **The planner has no right to be wrong.** Scientists are expected to formulate hypotheses, which may or may not be supportable by evidence. Planners don't have such a luxury – they're expected to get things right.

- 1.18 The urban system has long been understood in the academic literature as a ‘socio-physical’ system in which the physical features are inseparable from social organisation and are influenced by historical, economic and cultural factors.<sup>13</sup> The concept seems to us to be broadly consistent with the sustainable development strategies developed for the UK, and especially the overarching framework stressing living within environmental limits and ensuring a strong, healthy and just society.<sup>14</sup> However, there is little evidence that government at any level is tackling the quality of the urban environment and the quality of life in an integrated way. Most environmental and urban policies focus on different media (air, soil and water) or problem areas (biodiversity, waste and transport). While there has been an increasing emphasis on Healthy Cities (prompted by the World Health Organization), there is as yet no comprehensive means for systematically integrating health and planning in all urban areas within the UK.
- 1.19 Take as an example the complex web of connections (figure 1-I) between increased car ownership and use in urban areas and a whole range of environmental and social outcomes (from air pollution and flash floods to congestion and noise, from growth of retail centres to closure of local shops and formation of food deserts). We are far from understanding the nature and extent of such connections or developing an approach to planning that provides both flexibility and the capacity to integrate relevant responses.

FIGURE 1-I

Part of the web of connections between increased car ownership and use and environmental and social outcomes in urban areas<sup>15</sup>



- 1.20 Indeed, it would seem to us that we are some way from understanding how our cities function in everyday life. Jane Jacobs in her seminal work on American cities argued that city planners and designers, while focused on the city as a laboratory, had overlooked the study of successes and failures in real life.<sup>16</sup> If we add to this inherently social view the complexities and interrelated elements of the biophysical environment then it soon becomes evident that we have a great deal to learn about how cities work. The available statistics and indicators do not always help us in this regard. Take for example the issue of domestic waste recycling. In 2003/04, some rural local authorities in England achieved recycling rates above 45%. The average in non-metropolitan boroughs was 23%, while the average metropolitan borough achieved only 14%.<sup>17</sup> However, the undoubtedly complex reasons for these differences in performance remain unclear. Similarly, we do not fully understand how the morphology, ecology and hydrology of urban rivers differ from rural catchments, and how they function in the city as a part of an integrated drainage system – largely unplanned, fragmented and unseen until there is a storm. In relation to health, we need to develop a greater understanding of links between urban living and psychotic illness as revealed by a large study in Sweden.<sup>18</sup>
- 1.21 The actors whose behaviour shapes the urban environment and who, in turn, are affected by it are many and diverse. The urban system is managed by households, communities, businesses, and non-governmental and voluntary organisations as much as by local and national government. The result is a highly complex interactive socio-physical system, shaped by many players with competing expectations and priorities as well as by physical and technical infrastructure. Such a complex system is particularly prone to the law of unintended consequences. It is likely to be unresponsive to one-size-fits-all policy interventions.
- 1.22 The principal reason for the lack of satisfactory progress in many areas of urban environmental policy appears to have been the mismatch between complex problems and simplistic policy prescriptions. Hence, in this report we have resisted the temptation to elaborate the entire catalogue of urban environmental issues or to refine their technical details, indeed this has been done by others. Rather, we have chosen to focus our attention on key environmental matters and the governance arrangements by which the urban environment is managed by a diverse range of actors.

## A NEW GOVERNANCE FRAMEWORK

- 1.23 When it comes to improving the urban environment, we repeatedly found ourselves revisiting the idea that much of what is conventional wisdom has not been implemented effectively. Innovation and change depend on complex interactions driven by a variety of forces embedded in institutions, markets, regulations and technologies.<sup>19</sup> The development of new technologies is unlikely to be sufficient on its own to shift our cities onto a more environmentally sustainable trajectory. Despite numerous prestigious and small-scale examples of good news stories, there is clearly a lack of progress in terms of creating environmentally sustainable cities, largely

because of a ‘web of constraints’ related to the adequacy of institutional arrangements, existing infrastructure commitments, appropriateness of policy instruments, consumer preferences and the availability of information and skills (box 6A). In our view, many of the past failures to get a grip on the challenges of the urban environment arise from well-meaning, but misguided, attempts to impose simple solutions on complex problems.

- 1.24 We cannot produce a robust vision of what urban areas will look like in 2050, just as the city planners of the 1950s were not able to fully visualise the cities and lifestyles of today, though they thought they could. Although it is evident that early planners got some aspects right (for example, we still rely heavily on Victorian infrastructure), it is also true that there were failures. Of course, we could readily list a number of desirable and indeed important deliverables for the city of 2050 – such as enabling inhabitants to enjoy healthy and productive lives, and respecting environmental constraints through the efficient use of resources. But if we are to respond to the environmental and social challenges that our urban ecosystems face, while avoiding the short-term solutions of the past, then we contend that the most urgent need is for integrated policies that take as long-term a view as possible and build in flexibility.
- 1.25 Despite the difficulties we remain optimistic. Recognising the complexity and interdependence of urban environmental issues is a necessary first step to dealing with them effectively. Some aspects of wicked problems can be broken down into simpler ones, others require a subtler approach. Often it is a question of getting the starting conditions for a solution right – in other words assembling the appropriate mix of institutions, actors, resources and incentives, setting the direction of travel and allowing self-organising communities of action to take their course. In almost all cases, we believe that multiple policies are required, constituting a portfolio of actions for a variety of players.
- 1.26 As we lay down or reinforce the architecture of urban areas, thinking ahead requires pluralism of viewpoints to ensure that our urban areas in the future are sufficiently flexible in their physical and institutional arrangements to accommodate the radical social and technological changes that we might expect in half a century.
- 1.27 Many of our specific findings converge with those of other bodies. We agree with the House of Lords Science and Technology Committee on the need for integrated water management plans that take account of climate change; for action by Ofwat to make water efficiency a priority; for widespread extension of and consideration of rising block tariffs; and for the removal of institutional barriers to the adoption of sustainable drainage systems (SuDS).<sup>20</sup> We share with the above House of Lords Committee the recommendations that water companies need to reduce leakage to environmentally sustainable (rather than so-called economic) levels and that water suppliers should be consulted early in the planning process for major developments.<sup>21</sup> We agree with the Sustainable Development Commission on the need for water and electricity metering and billing that provides accessible information to householders that would enable them to make more efficient use of these resources.<sup>22</sup>

- 1.28 With respect to buildings, we concur with the recommendations of the House of Commons Environmental Audit Committee and the Sustainable Development Commission that homes built or refurbished to high environmental standards should receive favourable treatment with respect to stamp duty land tax and/or council tax.<sup>23</sup> All three bodies also agree that VAT should be equalised for refurbishment and new construction that meets high environmental standards. We also join these two bodies in calling for improved building codes and regulations as well as their enforcement.<sup>24</sup>
- 1.29 On renewables, our own recommendation that the government sets Merton-style targets (box 5A) is consistent with the recommendation of the Sustainable Development Commission that a microgeneration commitment should be placed on energy suppliers.<sup>25</sup> Our report calls for provision of environmentally sustainable infrastructure (especially in transport), which echoes the findings of the House of Commons Environmental Audit Committee, and we both clearly call for urban planning and development to explicitly recognise environmental limits.<sup>26</sup>
- 1.30 We believe that the convergence on these points by various bodies acting independently of one another is compelling evidence of their importance and urgency. In our view they represent the absolute minimum set of responses that the UK government and devolved administrations ought to pursue without need for further inquiry or delay. Our own report goes beyond this with additional recommendations regarding health, the natural environment, green space, urban design and transport, and governance issues, all of which require urgent consideration and implementation.
- 1.31 However, our main concern is that there is no coherent government policy on the urban environment as a whole in the UK. There are urban policies and environmental policies, but no policy framework that acknowledges the particular characteristics, demands and impacts of the urban environment (Chapter 6). Furthermore, despite the fact that most of us live in towns and cities, there is no specific policy for reducing the detrimental impact of the urban environment on human health. Despite the Urban White Paper of 2000, the urban environment still appears to be missing from the sustainability agenda.<sup>27</sup> For example, the current policy on city regions examines the functional connections between urban centres, suburbs and rural hinterlands in terms of employment, housing and transport. However, it has so far not done enough to identify how these connections operate on environmental issues or, importantly, across administrative boundaries.
- 1.32 We conclude that effective management of the urban environment requires a new approach to the governance of our urban areas. This would connect fragmented planning systems while retaining a diversity of actors and viewpoints. The concept of environmental constraints has to be made operational and implemented in policies for urban areas, based on as robust as possible an understanding of the capacity of the environment to support development and of the environmental constraints on social and economic aspirations. What we have called cumulative issues may be amenable to national policy intervention, but systemic issues are likely to require

significant local powers and duties in terms of planning and design, with related and not insignificant implications for skills and leadership. The urban environment presents a challenge to both national and local governments, which is why we call for a new environmental contract that engages both, and requires the participation of business and civil society organisations.

## STRUCTURE OF THE REPORT

- 1.33 Chapter 2 of this report sets the scene by documenting current conditions and trends in urban areas, highlighting their environmental problems and benefits. In particular, it examines how urban areas are affected by climate change, road traffic, air quality, waste management, water quality and resources, and flood risks. Other concerns associated with the natural and built environments are highlighted.
- 1.34 Chapter 3 addresses the way that the urban environment affects the health and wellbeing of those who live and work there. An effort is made to identify those key environmental factors that most influence health and wellbeing and ways of improving them.
- 1.35 Chapter 4 devotes attention to the natural environment within our urban areas. The concept of the urban natural environment is expanded to include not just green spaces, such as parks, but urban ecosystems within which animals, plants and humans interact with air, water and soil. An overview is provided of how these features might be improved through a more integrated approach, and how the use of green infrastructure can be promoted in new and existing developments.
- 1.36 Chapter 5 considers the built environment. The importance of buildings and their relationship with the wider infrastructures of transport, services and places of work are explored. The challenge of ensuring that new buildings use resources efficiently and reduce carbon dioxide emissions is also examined. The planning tools needed to create a better urban environment are discussed.
- 1.37 In Chapter 6, detailed attention is paid to the potential drivers enabling or preventing improvements to urban areas. In many respects it is the key chapter of the report. An evaluation of the extent to which policy has captured aspects of the environment and health in an integrated fashion is presented. The chapter also comments on the existing policy framework in relation to the requirements of the urban environment, and recommends development of an explicit urban environmental policy and an environmental contract to strengthen the relationship between central and local government.
- 1.38 Chapter 7 presents the report's main conclusions and brings together the recommendations that appear throughout the chapters, stressing the importance of urban policies in delivering environmental sustainability.

# Chapter 2

## CURRENT CONTEXT

*We provide an overview of the environmental issues associated with the UK's urban areas, and describe current conditions and trends. We leave the question of what solutions will lead us to a more environmentally sustainable future to later chapters.*

### INTRODUCTION

- 2.1 Over the last half century, the UK's towns and cities have become much cleaner as pollution controls have taken effect and heavy industry has been replaced by light manufacturing and the service sector. Nevertheless, pollution continues to detract from the quality of daily life and add to the pressure on the local and global environment. There is also evidence that although generally improving, some aspects of urban air quality are deteriorating once again, and that the impacts on human health are worse than previously recognised (Chapter 3).
- 2.2 Therefore, there is a great deal to be gained from finding more environmentally sustainable forms of urban living. Doing so could contribute to many other desirable qualities of towns and cities, such as healthy communities, a vibrant cultural life and a dynamic economy. However, current trends, such as the growth of road transport, the drive for more housing and rising household consumption of natural resources, place severe pressure on the environment, human health and the quality of life.
- 2.3 These trends are not unique to the UK. They are occurring in many places in Europe, North America, and other parts of the world. In the UK, they result in a clear tension between the government's aims for the environment and its plans for major urban expansion since new developments can exacerbate environmental problems, especially if they fail to take full advantage of opportunities for improving the environment.
- 2.4 In this report, we use the term 'urban' to describe any area with a population of more than 10,000 inhabitants, but we recognise that the urban–rural divide is not always clear-cut and different statistical definitions apply within the UK.<sup>1</sup> We pay particular attention to major urban areas that have a population of over 100,000 people, since these are covered by the European Thematic Strategy on the Urban Environment (box 6B).
- 2.5 Box 2A defines the terms used for urban areas in the report. We recognise that towns and cities are different from one another and from surrounding rural areas. For example, large cities tend to have younger, more ethnically diverse populations, with pockets of great wealth and poverty.<sup>2</sup> Their many contrasts suggest that there is no such thing as a model urban area, and that lessons drawn from one place may not be directly applicable elsewhere.



## BOX 2A

## TYPES OF URBAN AREA

**Urban** We use this word to describe any area in the UK with a population of more than 10,000 people, roughly equivalent to a small town. This reflects the Office of National Statistics definition of urban areas for England and Wales. In Scotland and Northern Ireland, which have more dispersed populations, urban areas are usually defined as those with 3,000 inhabitants or more.

**Cities** Small cities have populations below 50,000 (for example, Lichfield, Canterbury, Durham, Winchester, Ripon, Inverness, Bangor and St Davids). Medium-sized cities range from 50,000 to 250,000 (for example, Aberdeen, Cambridge, Derry, Exeter, Gravesham, Lincoln, Portsmouth, Stevenage, Worcester and Wrexham). Large cities with a population greater than 250,000 include Belfast, Birmingham, Bradford, Bristol, Cardiff, Edinburgh, Glasgow, Leeds, Leicester, Liverpool, London, Manchester, Newcastle and Sheffield.<sup>3</sup> The ten largest of these account for 21% of the UK's total population.<sup>4</sup>

**City region** Many urban areas are closely connected to a wider conurbation. These city regions are organised around centres of employment and services, to which people commute for work and leisure, and from which services and information are disseminated.<sup>5</sup> A clear example of a city region is London, which is forecast to grow by nearly 20% by 2029, when it could have a population of over 8.8 million.<sup>6</sup> It is already part of the UK's largest **mega-city region**, South-East England, which has a total population of nearly 19 million people.<sup>7</sup> The way that city regions have developed as large urban agglomerations linked by transport corridors, can be seen in figure 2-I later in this chapter, which also shows that they have a significant environmental footprint (i.e. the impact on the wider environment in terms of resource use, waste generation, land use and physical environmental changes).

TABLE 2.1

Mid-2005 population estimates for the UK<sup>8</sup>

	Population, millions	% of total UK population
England	50.4	84
Wales	2.96	4.9
Scotland	5.09	8.5
Northern Ireland	1.72	2.9
<b>United Kingdom</b>	<b>60.2</b>	<b>100</b>

The percentage of the population residing in urban areas varies depending on how the calculations are made and on which part of the UK is considered, but is about 80-90% for the UK as a whole.<sup>9</sup>

- 2.6 The UK's population is increasing, but at the same time social trends have caused the average household size in Great Britain to fall steadily over the last 30 years, contributing to the number of dwellings rising by a third over this period.<sup>10</sup> The trend in household formation is expected to continue for the foreseeable future.<sup>11</sup>
- 2.7 Demographic trends and housing demand vary across the UK, adding to the diversity of urban areas. The parts of the UK that experienced the greatest population growth over the period 1981-

2004 include the south-east, south-west and east of England, London and the East Midlands.<sup>12</sup> The government expects this trend to continue for the next 20 years and its house building plans reflect this. However, population projections also indicate that there will be growth in the West Midlands, north-west and north-east of England, albeit at a slower rate. On top of this, after years of decline, large metropolitan cities in these areas,<sup>13</sup> and in Scotland are beginning to see their populations rise again.

- 2.8 Further increases in the number of people and households are likely to have important environmental consequences, but social and economic failure as well as success can have a knock-on environmental impact. For example, if city centres weaken, population flight can encourage development in suburbs and out-of-town centres, often at relatively low densities. Such developments can lengthen commuting patterns, which often shift more heavily towards the car, leaving run-down inner city cores plagued by derelict land, vacant homes and socio-economic problems.

### CURRENT GOVERNANCE AND POLICIES

- 2.9 At the global level, the United Nations (UN) has developed a number of initiatives relevant to urban areas, including the Agenda 21 process, the UN Habitat conferences, work on an ecosystems approach to urban areas and the World Health Organization's Healthy Cities initiative (Chapter 3). These are often not binding, but they set the direction for discussions around urban areas, the environment and health.
- 2.10 In addition, European legislation has long been an important factor in environmental policies concerning water and air pollution. Its influence on urban policy has, however, been weaker, because spatial planning and housing are generally handled at or below Member State level. Some exceptions to this include the European Community Directives on Environmental Impact Assessment and Strategic Environmental Assessment, and more recently, the European Thematic Strategy on the Urban Environment, which contains voluntary measures to promote best practice on managing larger urban areas.
- 2.11 In the UK, many policies affecting urban areas, such as environmental protection and planning, are largely devolved, which has led to growing differences in approach between different parts of the UK. This trend is likely to become more pronounced now that the Government of Wales Act (2006) enables the National Assembly of Wales to pass primary legislation in a number of areas. These include the environment, and in particular, pollution, nuisances, waste management, land drainage, town and country planning, the water environment, nature conservation and biodiversity and green space. Also included are environmental aspects of economic regeneration and development. Appendix E gives other examples of environmental regulation relevant to the urban environment.

- 2.12 At the strategic level, devolved administrations and authorities sometimes have specific duties to protect the environment. In Wales, the National Assembly has a legal duty to promote sustainable development in exercising all its functions, while the Mayor of London has to have “regard to the achievement of sustainable development in the UK”.<sup>14</sup> Wales, Scotland and Northern Ireland also have 20-year spatial plans providing a framework against which to make planning decisions, and guide policy on transport, waste, water and drainage, and energy.<sup>15</sup> Other differences include Scotland’s broader interpretation of Strategic Environmental Assessment (6.72) and its decision to make sustainable drainage compulsory in new developments (4.80).
- 2.13 However, the picture is not simply one of tougher rules in the devolved administrations and Northern Ireland. In some areas, the legislation is very similar, but in others, like water leakage in Scotland, there is less regulation than in England (2.47). The development and implementation of environmental legislation in Northern Ireland has sometimes lagged behind the rest of the UK because of its specific circumstances.

### *Urban expansion and regeneration*

- 2.14 The sustainable development strategies for each part of the UK recognise that choices about how and where we live have important consequences for the local, regional and global environment. Decisions on house building, urban regeneration, regional development and investment in infrastructure will therefore be crucial in determining the UK’s progress towards environmental sustainability.
- 2.15 Nowhere are these issues more important than in the current drive to create new urban areas and to renew existing towns and cities. In England, key policies include the extra housing foreseen in Regional Spatial Strategies, the Sustainable Communities Plan, focused on four English growth areas, and a recent review for the Treasury, which concludes that further homes are needed to increase the affordability of housing.<sup>16</sup> Together these proposals could result in 3.3 million new homes being built in England by 2016 (an increase of over 15%, table 2.2).<sup>17</sup> Expansion is also planned for Scotland, Wales and Northern Ireland. By 2050, one estimate suggests there may be an extra seven million homes in the UK – an increase of 37% on today’s total.<sup>18</sup>
- 2.16 Substantial funds are also being targeted at regeneration of existing areas through programmes such as Housing Market Renewal. House building and refurbishment will be accompanied by expansion in the services and infrastructure required to support communities, and the industrial and commercial enterprises that provide employment. In total, this represents billions of pounds of investment that must be leveraged in the most environmentally benign way possible. Decisions taken now will influence the environmental performance of new and renewed urban areas for decades, perhaps centuries, to come.
- 2.17 We return to these issues in Chapter 6, where one of our major conclusions is that making a step change in the environmental performance of UK urban areas has less to do with technical fixes,

many of which already exist, and everything to do with human behaviour, institutional inertia, a lack of joined-up government, failure to frame the problems appropriately, and failure to recognise the complexity of the different constraints. Two key areas which we examine are, first, the need for environmental considerations to be central to decision making across government and to be increasingly part of local government's core remit, and second, the need to draw in the private and non-governmental sectors to help deliver flexible and innovative solutions for the urban environment.

## ENVIRONMENTAL OPPORTUNITIES AND PROBLEMS IN URBAN AREAS

- 2.18 As we point out in Chapter 1, some environmental impacts are unique to urban areas. Others are generated by human activities in our homes, factories, offices and cars, whether in urban or rural locations. It is the sheer concentration of people in towns and cities that creates many environmental problems, although urban living can also bring environmental benefits. For example, concentrating the majority of the population in urban areas helps keep towns and cities vital, while reducing total land take and allowing more land to be retained in its natural state or used for agriculture. High density urban communities can also make public transport an economically viable alternative to private car use and reduce the need for travel. This can encourage walking and cycling as the easiest means of making many journeys.
- 2.19 The high densities of many urban areas are also suited to efficient integrated energy systems, such as Combined Heat and Power (CHP), which can generate further savings if combined with forms of thermal treatment such as incineration or gasification as part of a wider strategy to reduce, reuse and recycle waste. Unfortunately, the UK has often failed to grasp the opportunities of technologies like CHP in the way that countries such as Austria or Denmark have done for many years. Poor urban planning has also led to layouts where journeys by foot are unnecessarily lengthened, and access to bus services made more difficult, leading to greater car dependency. We need to exploit the potential benefits of urban living much more effectively, while mitigating its negative impacts (Chapter 5).

## CURRENT STATE OF THE UK'S URBAN ENVIRONMENT

### CLIMATE CHANGE

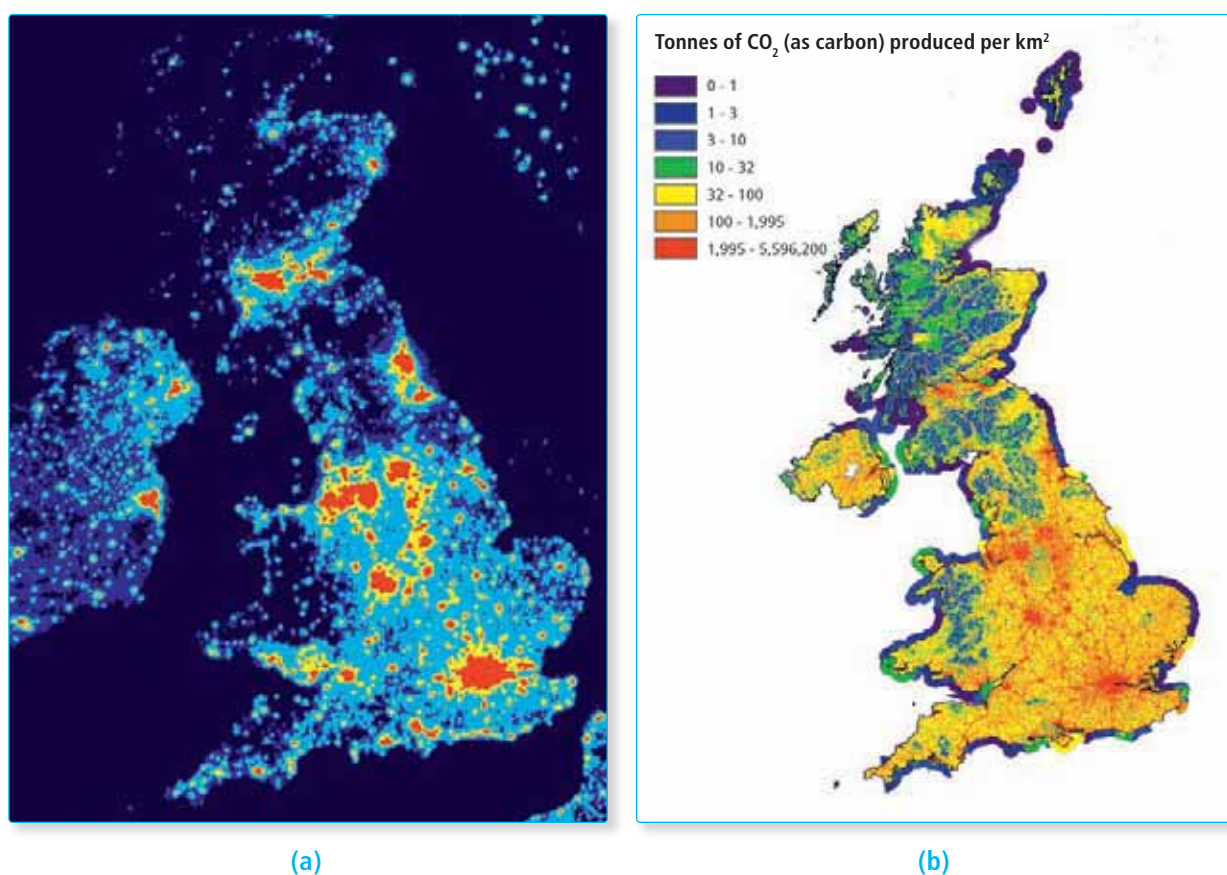
#### *Tackling carbon dioxide emissions from urban areas*

- 2.20 The UK government has the goal of cutting the UK's carbon dioxide (CO<sub>2</sub>) emissions by 20% by 2010 and 60% by 2050. However, recent forecasts suggest that net CO<sub>2</sub> emissions will decline by only 9% in the 30-year period 1990-2020.<sup>19</sup> This means that CO<sub>2</sub> emissions would need to fall five times faster over the following 30-year period (2021-2050) to achieve the remaining 51% reduction. Questions must be asked about how these long-term cuts will be achieved, since this is not evident from the latest Department of Trade and Industry Energy Review.<sup>20</sup> Moreover, the recent Stern Review of the economics of climate change warns of the increased expense associated with delaying emission reductions.<sup>21</sup>

2.21 Much of the UK's climate mitigation policy is concerned with specific sectors and technologies, with less focus on the geographic distribution of emissions. However, information has recently been published on CO<sub>2</sub> emissions from UK local authorities and regions (figure 2-I). This vividly illustrates the pattern of cumulative association with large urban areas, and the importance of considering the local urban situation and the role that local authorities could play in the strategy to cut emissions and to reduce environmental impacts more generally.

**FIGURE 2-I**

**Light pollution map in 2000 (a) and map of CO<sub>2</sub> emissions (by source) in 2004 (b)<sup>22</sup>**



2.22 Although they are the source of a significant proportion of the UK's CO<sub>2</sub> emissions, the density and infrastructure of urban areas helps make them more efficient in terms of per capita energy consumption and emissions, which are lower in many of the UK's major cities than the national average.<sup>23</sup> Understanding the pattern of emissions, and their link with social structures and systems, can offer insights into how to reduce them. For example, some solutions for reducing CO<sub>2</sub> emissions, such as CHP and integrated public transport, are particularly suited to urban areas.

2.23 Another distinctive feature of many urban areas is that buildings account for a major proportion of CO<sub>2</sub> emissions – 70% in the case of London.<sup>24</sup> For the UK as a whole, the energy used in constructing, occupying and operating buildings represents approximately 50% of total

greenhouse gas emissions.<sup>25</sup> Yet significant savings are possible and we consider what can be done to reduce emissions (particularly from housing) in Chapter 5.

### *The climate of urban areas will change*

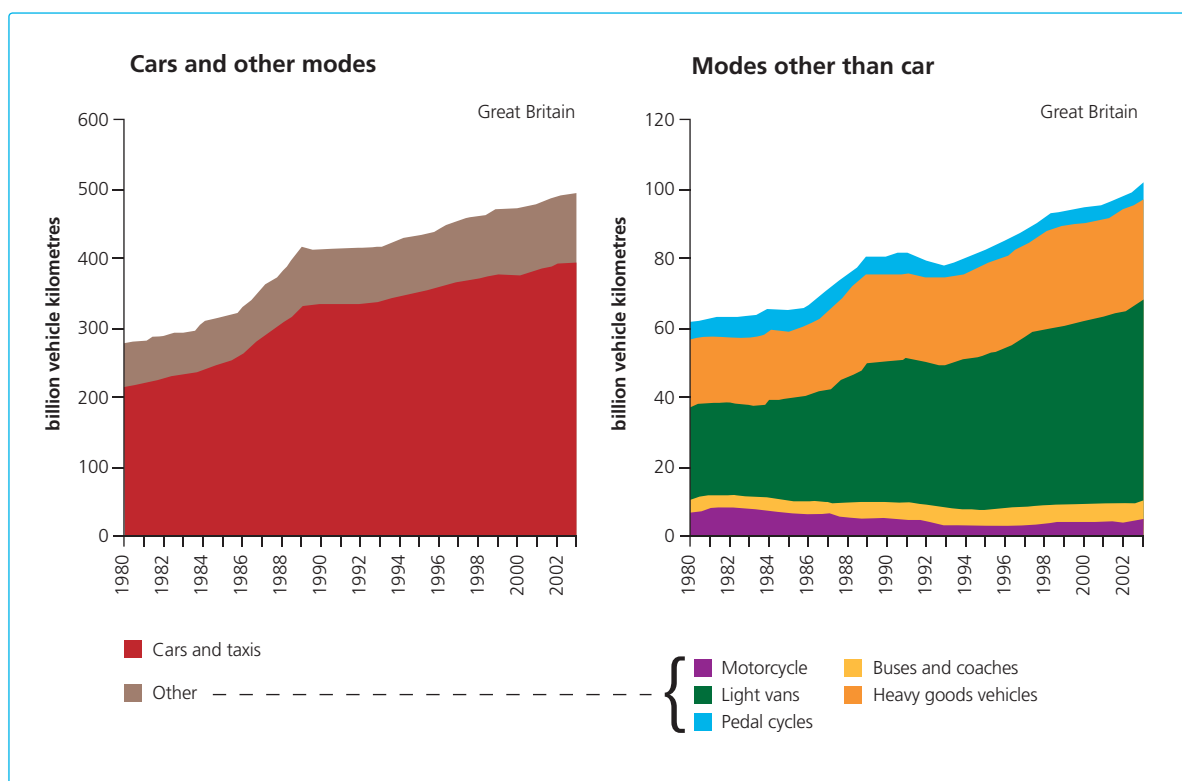
- 2.24 As well as contributing to greenhouse gas emissions, towns and cities will feel the impact of climate change. Indeed, they could be especially vulnerable to climate risks given the concentration of people and assets within them, and their reliance on complex systems to deliver power, water, communications, transport and waste disposal. An example of this complex vulnerability is shown in a recent report which identifies the areas of London where elderly and isolated residents may be most at risk during heatwaves.<sup>26</sup>
- 2.25 Towns and cities already tend to be warmer than the surrounding countryside because they can create their own microclimates or urban heat islands. Urban areas contain more concrete and asphalt than rural locations; these materials have significantly different thermal properties and result in less evaporative cooling than natural surfaces such as trees, grass and water. Other factors like heat from human activities also contribute to the development of the urban heat island effect. Such microclimates may exacerbate the effect of climate change,<sup>27</sup> leading to more demand for air conditioning and hence greater energy use and enhanced CO<sub>2</sub> emissions.
- 2.26 At the moment, it is difficult to know how the climate is changing in urban areas because their size is below the resolution of current climate models. However, there are indications that the climate of the Thames region is changing in a way that is consistent with climate change predictions.<sup>28</sup> Better climate modelling of urban areas and heat islands could help improve understanding of how the climate of these areas will change in future.<sup>29</sup>

### **ROAD TRAFFIC**

- 2.27 Good quality transport systems are critical to the economic and social viability of urban areas and can be positive for the environment if they promote alternatives to the private car and commercial vehicles, together with good urban design for pedestrians and cyclists. However, in areas where there is heavy road traffic, congestion imposes costs on the economy and seriously reduces the quality of life. In many UK towns and cities road traffic dominates the streets, squeezing out other road users and intimidating pedestrians and thereby severing connections between communities. People with cars become more dependent on them, while those without them are cut off from jobs and facilities.
- 2.28 Figure 2-II illustrates the increase in road traffic between 1980 and 2004. This long-term growth has led to a twofold increase in CO<sub>2</sub> emissions from this source since 1970, despite marked increases in engine efficiency. By 2004, road traffic accounted for around 28% of the UK's total CO<sub>2</sub> emissions.<sup>30</sup> Across Great Britain, urban traffic levels have increased by 10% over the period 1994-2004,<sup>31</sup> and forecasts from the Department for Transport suggest that the trend is

set to continue with the volume of motor traffic (excluding motorcycles) expected to grow by approximately 40% in urban areas between 2001 and 2031.<sup>32</sup>

**FIGURE 2-II**  
Traffic growth by mode for the period 1980-2003<sup>33</sup>



2.29 Many places across Europe are experiencing similar problems; but both here and abroad some urban areas have taken bold steps to curtail car use and have reaped the benefits. These include cities like Copenhagen, whose transport policy has helped to increase public transport and bicycle use, while keeping the number of cars coming into the city stable for the last ten years.<sup>34</sup> In Greater London, car ownership and use are lower than in other English metropolitan areas, which are in turn lower than the national average.<sup>35</sup> London has also introduced congestion charging, parking controls and better public transport, which together have helped to reduce car journeys and increase public transport trips by just under 4% a year since the 1990s.<sup>36</sup> Nottingham is another example where a more walkable city centre has been created by pedestrianisation and reduced car access, with the result that 25% of journeys are now by foot and bicycle.<sup>37</sup> These examples suggest that urban areas can tackle unsustainable travel patterns and improve the quality of life for their residents successfully (Chapter 5).

### *Air pollution*

2.30 Road transport is a major source of urban air pollution. It emits pollutants that damage buildings, the natural environment and human health, reducing life expectancy in the UK by an average of eight months.<sup>38</sup> Key pollutants in the urban environment include carbon monoxide, nitrogen

oxides, ozone, sulphur dioxide and particulates. Particulate matter is one of several types of pollutants that come from exhaust gases and includes carbon and metal-based particles with a diameter of 10  $\mu\text{m}$  or less (equal to one millionth of a metre) known as  $\text{PM}_{10}$ . Due to the probable detrimental impact on human health, there is particular concern over ambient levels of ozone and fine particles ( $\text{PM}_{2.5}$  with a diameter of 2.5  $\mu\text{m}$  or less). Moreover, the health effect of air pollution is greater in urban areas than in rural ones because low air quality is often associated with heavy traffic congestion and more people are exposed to pollution in towns and cities (Chapter 3).

- 2.31 UK emissions of some air pollutants have been declining since the 1970s. In part this has been due to the requirement for cleaner engine combustion and the compulsory fitting of catalytic converters to all new petrol-fuelled cars, which have been highly effective, especially for reducing emissions of carbon monoxide and volatile organic compounds.<sup>39</sup> Emissions of nitrogen oxides and particulates from road transport have also fallen by 55% and 42% respectively over the period 1990-2004,<sup>40</sup> although in recent years the rate of improvement has slowed and in some cities levels are rising again. The reasons for this are not fully known, but are likely to include the rising volume of traffic, higher background concentrations of pollutants from sources other than transport, and an increase in diesel vehicles.<sup>41</sup>
- 2.32 We conclude that without major new policy initiatives, air pollution will continue to be a problem in UK urban environments, particularly in city centres. This is especially true as there is “increasing evidence that long-term exposure to even low levels of particulates may have a significant effect on public health” and the same may be true of ozone, although the position is less clear.<sup>42</sup> Air pollution problems may also be exacerbated by climate change and rising global and regional concentrations of pollutants (Chapter 3).

### *Traffic*

- 2.33 Cars and lorries and their associated infrastructure (roads, car parks, road signs, traffic-lights, road markings) all too often dominate towns and cities, blighting urban landscapes and making more sustainable forms of transport, such as walking or cycling, unpleasant and sometimes dangerous. The whole design of many urban areas revolves around one thing: access for cars and delivery vehicles. There are some UK cities where the dominance of the car has been, or is being, successfully challenged (2.29), with the result that such urban areas are now seen as highly desirable places to live and work.
- 2.34 Roads, railways and airports are also the main sources of ambient noise, which can affect the quality of people’s lives (Chapter 3). Around half the UK’s population may be exposed to levels above the World Health Organization (WHO) guideline of 50-55 decibels which aims to protect the majority of people from serious annoyance during the daytime.<sup>43</sup> However, the UK does not have national limits on ambient noise, although there are limits on individual aircraft and road vehicles. Local authorities can also impose local limits. In addition, noise maps are being



developed for the UK and it is possible that the European Union may decide to introduce controls on ambient levels in future.<sup>44</sup>

### LOCAL ENVIRONMENTAL QUALITY

- 2.35 Although ambient noise is a problem, the biggest source of noise complaints is domestic properties. Such neighbourhood noise, along with litter and graffiti can be defined broadly as ‘nuisance’, and shows up as a consistent source of people’s dissatisfaction with where they live. Surveys suggest that in English urban centres over 27% of homes are in an area with a poor local environment compared with 13% of suburban homes and 9% of rural ones.<sup>45</sup> New legislation in the form of the Clean Neighbourhoods and Environment Act (2005) has given local authorities in England and Wales greater powers to deal with local nuisance problems, but they seem set to remain important factors in determining day-to-day environmental quality.
- 2.36 Light pollution is wasteful and can cause a nuisance, as well as obscuring the night sky and affecting the behaviour of wildlife. Over 90% of the UK population lives in areas that are affected to some extent.<sup>46</sup> The problem is increasing and is worst in urban areas, yet few planning or other measures have been taken to combat it, even though excessive levels can constitute a statutory nuisance.<sup>47</sup> We briefly consider aspects of local environment quality in Chapter 3; but although we recognise the importance of noise and light issues, they lie outside the main thrust of this report.
- 2.37 A more subtle influence on our sense of wellbeing is provided by our buildings. The aesthetic appearance of individual buildings and the urban landscape can have a profound and often underappreciated effect on people’s enjoyment and sense of wellbeing.<sup>48</sup> Although there are notable exceptions, many existing urban areas and new developments have been criticised for unimaginative and dreary aesthetic design.<sup>49</sup> We address these and other factors concerning buildings in Chapter 5.

### WASTE

- 2.38 The issues surrounding waste are wide ranging and not necessarily unique to urban areas. We cannot do justice to all of them within this report, so we concentrate on the aspect that fits most closely with the scope of our study: waste from construction and demolition of buildings. This is also the largest source of waste in the UK and is mainly responsible for the 18% rise in the UK’s total arisings of controlled waste over the period 1998/99 to 2002/03.<sup>50</sup> This upward trend is worrying since the planned expansion of urban areas could increase it further, as well as generating more waste from mining and quarrying for building materials (Chapter 5).
- 2.39 Other sources of waste are, in decreasing order of size, mining and quarrying, industry, commerce and households.<sup>51</sup> Although household waste makes up only 9% of total UK arisings by weight, it is the focus of much policy interest since the UK has one of the lowest household recycling rates in Europe.<sup>52</sup>

- 2.40 Household waste, along with some industrial and commercial waste, is collected by local authorities and is known as municipal waste, most of which comes from urban areas. Various targets have been set to increase the recycling of municipal waste. In 2005, municipal recycling in Scotland stood at 17%, with a target of 25% by 2006;<sup>53</sup> in Wales it was almost 22%, with a target of 25% by 2007;<sup>54</sup> and recycling stood at 19% in Northern Ireland.<sup>55</sup>
- 2.41 In England, the recycling rate was 27% in 2005/06 (surpassing the target of 25% for that year).<sup>56</sup> However, rates vary dramatically between local authorities, with some achieving over 50%, while others recycle less than 10%.<sup>57</sup> In general, urban areas have lower recycling rates than rural ones, with figures for England showing that metropolitan boroughs have a lower average recycling rate than non-metropolitan ones (14% recycled or composted in 2003/04 compared with 23%).<sup>58</sup> However, recycling is not the only way to meet targets on diverting waste from landfill, and urban areas may provide particular opportunities to improve the efficiency of collection and treatment, and to produce energy from waste.

## WATER

### *Water quality*

- 2.42 Water quality in the UK has improved as a result of a major clean-up campaign focusing on industrial discharges and sewage treatment works. In general, river quality is better in Scotland and Wales than it is in England and Northern Ireland, but overall 95% of rivers now reach a 'fair' or 'good' standard.<sup>59</sup> However, the quality of urban rivers is mostly much lower than that of rural rivers. Many urban rivers have also been straightened to run through man-made channels or culverts and are often surrounded by relatively impermeable surfaces, which means that surface water can enter the river in sudden bursts, causing peaks and troughs in river flow rates and rapid changes in temperature and chemical loads.
- 2.43 These factors, together with the high pollution burden from population centres, including that from industry and commerce, mean that only about 40% of the urban river network in England and Wales is of good chemical quality and about 30% is of good biological quality. Moreover, around 15% fall into the poor or bad categories.<sup>60</sup>
- 2.44 These problems are exacerbated by the ageing water and sewerage infrastructure, since by the middle of the century some parts of the system will be over 200 years old.<sup>61</sup> This is a particular problem for some urban areas, where it contributes to high water leakage rates and urban flooding. Future house building will place extra demands on existing systems, and is likely to mean that new sewerage infrastructure will have to be built (Chapter 5).<sup>62</sup>

### *Water resources*

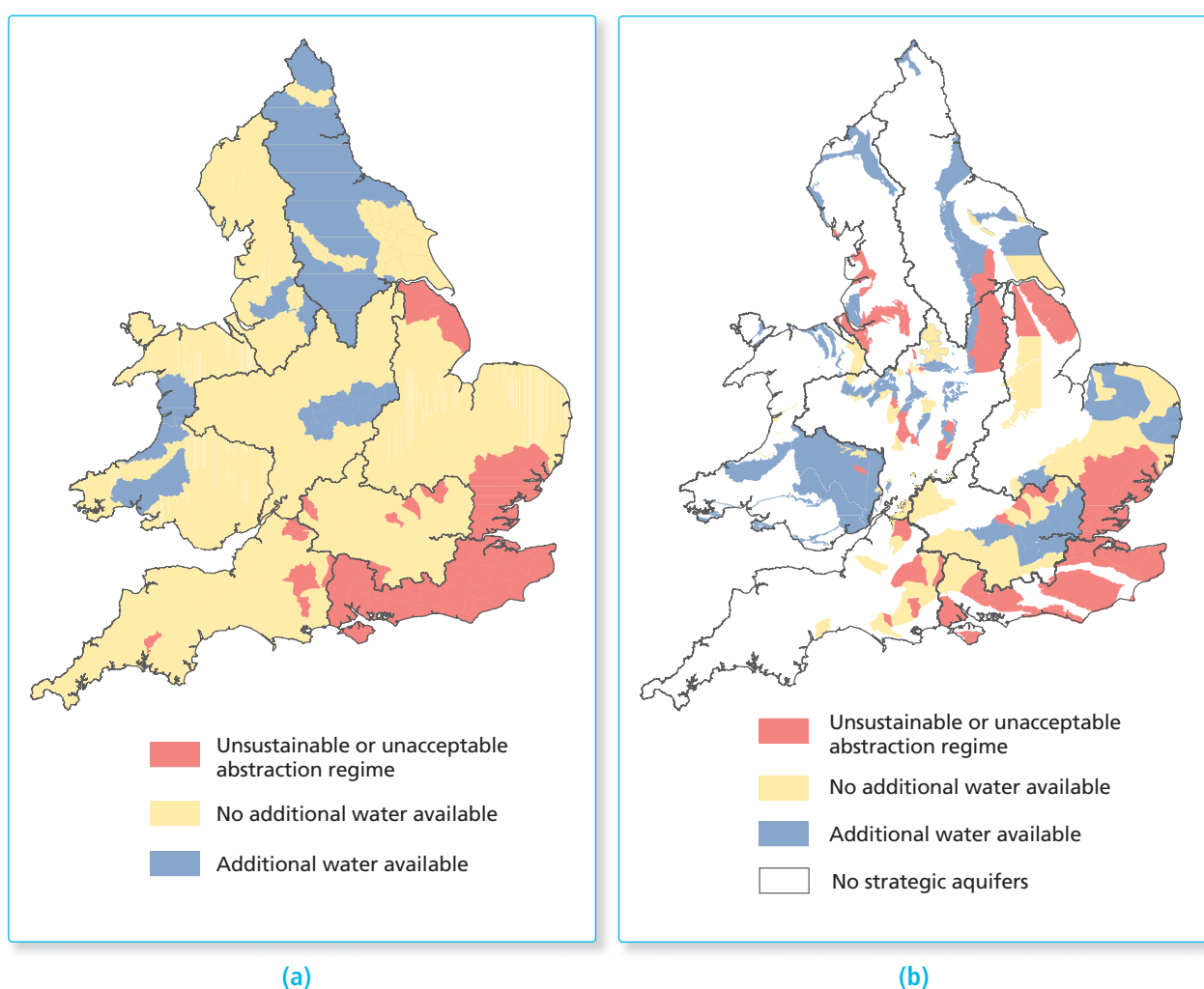
- 2.45 The UK is facing a future of tighter water resources as a result of three trends – an increasing number of households, rising per capita consumption and climate change. The Environment

Agency told us that there is already a shortage of water in some parts of South-East England, including areas targeted for further urban development. Currently “in some areas 10% too much water is being taken from the environment”. In addition “It is not clear that there will be sufficient water resources available in the south-east of England beyond 2025 to meet demand without resorting to new, costly, and sometimes environmentally damaging infrastructure. Climate change will make this worse.”<sup>63</sup>

2.46 Figure 2-III indicates water availability in England and Wales. Water resources are constrained in many places in England and Wales, or will become so without further action. This includes most of the growth areas identified by the Sustainable Communities Plan (2.15). The Environment Agency is concerned that water companies have not made enough provision for “the forecast growth in total household demand and *per capita* consumption” over the next 30 years, despite some companies having already experienced significant deficits in water supplies.<sup>64</sup> There is also the question of how further urban development will affect the permeability of soils and the recharge of rivers and aquifers that feed the public supply.

**FIGURE 2-III**

**Water company catchment areas<sup>65</sup> in England and Wales showing (a) available surface water and (b) available groundwater in 2000<sup>66</sup>**



- 2.47 While Scotland is often perceived as having fewer problems with water resources, periods of scarcity do occur, and drought plans were prepared during the dry autumn of 2003. Urban areas such as Edinburgh and Dundee experience water stress and there are around 2,000 km of dry rivers in Scotland.<sup>67</sup> Leakage rates are also high at around 50%, and there are no targets to tackle them as there are in England and Wales, where the average leakage rate is roughly half that of Scotland.<sup>68</sup>
- 2.48 In all the water-stressed urban areas of the UK, squaring the circle of increasing demand and limited supply means investigating options to increase water efficiency, manage demand and develop new resources (for example, there are plans to develop new reservoir capacity in the Vale of the White Horse). We are convinced that the water companies' response to tighter water resources must avoid any likely detrimental impact on the environment. For example, plans to increase abstraction rates must guard against the potential for reduced river flows, damage to habitats and increased pollutant concentrations.

### *Flood risk*

- 2.49 Nearly two million properties in the UK are at risk of river or coastal flooding. On top of this, there is a particular problem in towns and cities, where 80,000 properties are at risk of flooding caused when heavy rain overwhelms the drains.<sup>69</sup> In Scotland, towns and cities within indicative floodplains, like Perth and Strathclyde, could flood in the absence of defences, and urban areas, like Edinburgh and Glasgow, are prone to flooding during intense periods of rainfall.<sup>70</sup>
- 2.50 Plans for new homes could increase the annual cost of flood damage by 74% in the English growth areas and by 5% nationally unless steps are taken to reduce risk. This could add £55 million to the annual flood bill, and up to ten times this amount once effects of climate change are felt in full.<sup>71</sup>
- 2.51 Flood risk, like water management, raises important questions for government and society, which need to consider how the changing nature of risk will affect the long-term sustainability of new and existing urban areas. In our view, flood risk, along with water resources and water quality, should be considered as environmental constraints that should be respected in the planning process and in government policy generally. There are worrying signs that this principle is being overlooked, particularly in parts of the south-east of England. We make recommendations to address this in Chapter 4.

### **THE NATURAL ENVIRONMENT**

- 2.52 Towns and cities have considerable green space in terms of parks, gardens and vegetation along transport corridors and pathways, and even brownfield and post-industrial landscapes. These can provide opportunities for social interaction, recreation and exercise that make urban areas more attractive and healthier places. However, green spaces vary in their quality and accessibility,

and urban parks lost many of their amenity and recreational features between 1980 and 2000, through lack of funds and poor maintenance.<sup>72,73</sup> Other types of urban green space have also been in decline; for example, over 40% of allotments have been lost since 1970,<sup>74</sup> school playing fields have been sold, and gardens redeveloped or paved over to provide parking (Chapter 4).

- 2.53 Recently, additional funding has been made available from the Lottery, the devolved administrations and the Department for Communities and Local Government's 'Cleaner, safer, greener' agenda. In consequence, more than 80% of local authority green space managers now believe that the quality of their estates is stable or improving. However, further improvements could be made by promoting strategic approaches, better procurement and strengthening capacity and skills.<sup>75</sup>
- 2.54 However, the natural and semi-natural environment in urban areas provides much more than simply local amenity value, important though that is. These areas are part of distinctive urban ecosystems, which although under-recognised by government policy and practice, provide important environmental services, such as drainage, flood mitigation, biodiversity and climate regulation, as well as delivering important social and health benefits for people and communities. We explore ways of protecting urban ecosystems and making the most of the associated 'green infrastructure', to help towns and cities deal with the changing set of environmental pressures which they face and to facilitate a move towards good quality, dense urban developments later in Chapter 4.

### *Brownfield land*

- 2.55 Brownfield land is a significant component of urban green infrastructure. Planning policy across the UK encourages the use of brownfield land to regenerate urban areas and protect valuable parts of the countryside, and in England the government has set a target for 60% of new homes to be built on brownfield land by 2008. The target is being exceeded, with 74% of new homes being built on brownfield sites in 2005.<sup>76</sup> However, this figure masks large variations,<sup>77</sup> which may be partly explained by some areas having relatively little vacant or uncontaminated land.
- 2.56 An assessment by English Partnerships suggests that there are enough brownfield sites for the 60% target to remain feasible in England over the next three to four years, although this could not be guaranteed in the medium term.<sup>78</sup> The report concludes that unless further measures are taken, there could be a shortage of easily developed sites, and a growing backlog of difficult locations. The timescale is important, since the supply of brownfield land could begin to tighten within the planning horizon of the government's Sustainable Communities Plan.
- 2.57 There is also pressure on other types of undeveloped land, for example, there have been calls for parts of the green belt to be used for building. Similarly, gardens and other areas around existing buildings are included in the definition of previously developed land, which means that they count towards the brownfield target, even though these areas are important elements of urban

ecosystems. We are concerned that these pressures could erode the quality of urban green space and reduce the ability of green infrastructure to deliver local ecosystem services.

### **THE BUILT ENVIRONMENT**

- 2.58 Refurbishing or improving existing buildings offsets the need to build new ones. This lessens the pressure on land, and reduces the use of building materials and the production of construction waste.<sup>79</sup> Redevelopment can also reduce the need for new infrastructure and provide social benefits by keeping alive an established community. We consider how refurbishment can be encouraged in Chapter 5.
- 2.59 Higher housing densities have a range of environmental benefits (for example, they can reduce pressures on land, facilitate the use of public transport and promote the use of CHP). To encourage this, planning guidance has raised the desirable density for new build to around 30-50 household units per hectare.<sup>80</sup> This is still low compared with historic housing densities in UK cities and other parts of Europe, but has helped to raise the average figure for new build in England to 41 households per hectare in 2005.<sup>81</sup>
- 2.60 However, there is a tension between the need to encourage higher densities of households and workplaces, and maintaining or creating desirable urban areas with sufficient areas of green infrastructure.<sup>82</sup> For example, privacy can be a concern in high density housing, but can be protected by good quality construction. High densities can also be achieved using familiar building styles such as the Victorian terrace, and in traditional configurations such as Poundbury village in Dorset. There is no reason why density should be synonymous with the unpopular inner city high-rises of the past, or with overcrowding and a lack of space.
- 2.61 The built environment of urban areas consists of much more than households. Shops, offices, factories, retail parks, schools, hospitals, places of worship and other public buildings are an integral part of the built environment, and contribute both to the environmental benefits and disbenefits of urban areas. However, the very diversity of this non-household part of the built urban environment means that it is difficult to summarise crisply their current or future environmental impacts, particularly as we have not found data that address their aggregate environmental effects. Chapter 5 provides information on CO<sub>2</sub> emissions from UK commercial premises. These contribute approximately 20% to overall UK CO<sub>2</sub> emissions, and there is clearly potential for this sector to contribute to a reduction in the environmental impact of urban areas. Despite the obvious potential for energy and other resource savings in public and commercial buildings of many kinds, these opportunities are not being taken up anything like as rapidly or aggressively as they could or should be.

## ENVIRONMENTAL IMPACT OF NEW AND EXPANDING URBAN AREAS

- 2.62 Existing urban areas place a heavy burden on the environment, and current trends suggest that this burden will only grow, making environmental targets more difficult to meet. The government is now planning further urban development, and we look at some of the environmental consequences.
- 2.63 Several factors have influenced the government's policy of more house building. Some are economic and social, and include the desire to increase the affordability of home ownership, sustain economic growth, particularly in the south-east, and bring the UK economy more into line with that of the Eurozone.<sup>83</sup> A second set of issues relates to demographic trends, given that the UK's population is increasing and changing its social composition, leading to a long-term increase in the number of households, each containing fewer people on average than in the past (2.6-2.7).
- 2.64 We have not sought to unpick the rationale behind these forecasts, beyond noting that the predict and provide approach has been found wanting in other areas of policy, and is difficult to reconcile with the idea of respecting environmental limits, embedded in the sustainable development strategies for different parts of the UK. Assuming the new developments go ahead, they will inevitably place an additional burden on the environment. We look at how their impact could be substantially reduced in Chapters 4, 5 and 6.

## ENVIRONMENTAL IMPLICATIONS OF URBAN EXPANSION

- 2.65 Currently, urban areas cover less than 10% of the UK's land surface. Although government's plans for new house building will increase the land cover figure only marginally in percentage terms, they do give rise to at least five key environmental concerns. These are:
- increasing urban coverage by a small amount in national terms can still equate to marked intensification locally. For example, the plan for half a million new homes in the east of England is equivalent to a 20% increase on existing household numbers,<sup>84</sup> and each new house will require access to employment, schools and other local facilities;
  - new urban areas require infrastructure such as roads, railways and utilities;
  - the flow of goods and services through urban areas has a wider environmental impact at the local level, across the neighbouring region, and at the national and global scales;
  - rising household numbers drive up the consumption of natural resources. This is made worse if (as in the UK) household size is decreasing, because, per person, small households generally consume more energy than larger ones, occupy more floor space, produce more waste and make more journeys by car.<sup>85</sup> At the same time changes in lifestyle and growing affluence also tend to increase consumption. For all these reasons, many aspects of UK

domestic consumption have been moving in a less sustainable direction for decades, so that household energy use (but not CO<sub>2</sub> emissions), water consumption, total waste arising and the amount of unrecycled waste were all higher in 2003 than in 1990;<sup>86</sup> and

- the environment's capacity to accommodate development varies across the country. Several of the areas targeted for further development are in the drier, more densely populated parts of the UK where there are already concerns over air quality, water supplies and the ability to deal with sewage, waste and increasing flood risk.

2.66 The result of a government-funded study on the environmental impact of new house building in England is summarised in table 2.2. All the house building projections used in the study led to greater pressure on the environment, even if they assumed building standards and/or housing densities would be higher than today's. Although useful, the work was unable to look at all the possible environmental issues, including the effect of changing regional demographics, sub-regional impacts or the effect of other associated buildings and infrastructure (2.61).

**TABLE 2.2**  
Selected environmental impacts of new homes in England, 2016-2031<sup>87</sup>

Environmental impact	Year	
	2016	2031
No of additional homes,* millions	3.3	5.4
<i>% of current</i>	<i>15.3</i>	<i>25.1</i>
Land take,** thousand hectares	148.9	252.6
<i>% of current</i>	<i>5.7</i>	<i>9.7</i>
Domestic CO <sub>2</sub> emissions, millions of tonnes/year	7.6	13.6
<i>% of current</i>	<i>5</i>	<i>8.8</i>
Household waste arisings, millions of tonnes/year	3.9	6.7
<i>% of current</i>	<i>15.3</i>	<i>26.4</i>
Additional demand for water, million litres/day	756	1,165
<i>% of current</i>	<i>6.3</i>	<i>9.7</i>

\* Estimates are based on a medium-growth scenario. Between 2006 and 2016, the building rate reflects Regional Planning Guidance (RPG) and the Sustainable Communities Plan, plus an additional 0.5 million homes in response to the Barker Review. Between 2016 and 2031, it is assumed that build rates return to those in the RPG.

\*\* Land take is based on an average density of all new development of 37 to 38 dwellings per hectare.

## CONCLUSIONS

2.67 Taken at face value, the figures in table 2.2 imply a contradiction between the government's desire to build more houses, and for instance its targets on CO<sub>2</sub> emissions and waste generation. In addition, the wider impact of the underpinning services and infrastructure required to support these new communities may further strain the environmental wellbeing of future urban areas. If these tensions are to be resolved, the choices are:



- action to reduce the environmental impacts of new and existing homes, their associated public buildings and places of work, and other necessary infrastructure;
- action in other sectors of the economy to offset the increased impact of the domestic sector, although this is likely to provide only limited room for manoeuvre given that other sectors face their own challenges;
- curtailing house building; or
- some combination of these strategies.

Of these choices, we view the need for a vigorous programme to reduce the environmental impact of homes and other associated buildings and infrastructure as a priority. It is a no-regrets policy that will yield a variety of other benefits for society.

2.68 We also believe that government needs to take much more seriously the existence of environmental constraints. The policy of the UK government and devolved administrations is to define these limits and avoid breaching them, and it has already acknowledged two such constraints: climate change and local air pollution levels. However, the evidence suggests that, at the very least, water quality, water resources and flood risk present additional constraints that are critical in determining the scope for further urban development. Such risks will not be avoided unless, as the government suggests, more is done “to make care for the environment an integral part of policymaking from the start rather than dealing with the consequences of neglect down the line”.<sup>88</sup> The rest of this report examines how this might be done to benefit existing and new urban areas.

2.69 Many of the environmental problems in urban areas, and their potential solutions, are closely interlinked. On top of this, environmental impacts are clearly driven in part by societal trends such as affluence, consumption, the desire to travel and to own one’s own home. As a result, partial solutions or narrow theoretical approaches, a reliance on technical solutions which fail to allow for human preferences and behaviour, the emergence of unintended consequences and the extremely complex nature of urban systems create a web of constraints that can greatly weaken or completely negate desired outcomes – as we have seen in the example of growth in emissions from road traffic overwhelming gains in engine efficiency. In the following chapters we examine a range of integrated actions we believe is essential to reduce or eliminate the environmental impacts of UK urban environments. These include the need to:

- enhance the capacity of the natural environment within towns and cities in order to provide environmental services and to offer opportunities for exercise and social interaction that can benefit health, quality of life and the economy (Chapters 3 and 4);

- tackle the dominance of road transport in towns and cities in order to reduce air pollution and greenhouse gas emissions, provide more access for pedestrians and cyclists, and improve the quality of urban living (Chapter 5);
- improve the management of water resources in order to minimise the impact on the environment and protect public supplies (Chapter 5);
- improve the quality of public and private sector buildings in order to improve the efficiency of energy and water use, reduce CO<sub>2</sub> emissions and provide better living and working conditions (Chapter 5);
- address the multiple constraints on environmental progress, which include lack of regulation, incentives, investment in infrastructure, and information, capacity and skills (Chapter 6); and
- tackle institutional problems by putting in place an explicit policy for the urban environment that recognises that environmental issues are central to good urban development, and creating an environmental contract between central and local government that encourages interactions between the public, private and voluntary sectors to produce favourable environmental outcomes (Chapter 6).

# Chapter 3

## HEALTH AND WELLBEING

*Urban areas can provide a healthy setting that protects and promotes both the wellbeing of the inhabitants and environmental sustainability. Urban infrastructure, buildings and amenities should be designed accordingly.*

### INTRODUCTION

- 3.1 In this chapter we consider the influence of the urban environment on the health and wellbeing of those who live and work in towns and cities. We start by examining the concepts of health and wellbeing and the impact of the environment on them in general terms. We then look in more detail at specific issues that are relevant in urban areas: air quality, climate, urban buildings, water and flooding, noise and infectious diseases. We examine the evidence that there is a greater incidence of mental health problems in urban settings, and look at the role of green space in urban layouts. We also consider the World Health Organization's Healthy Cities approach, which is an important initiative in this field.
- 3.2 Traditionally, environmental factors have often been dealt with as single issues. Although this facilitates analysis and policy development, it misses the essential point that individuals and communities are affected by a range of interacting factors. In this chapter we examine the individual elements separately, but we also try to draw attention to the interactions between them.
- 3.3 These interactions can be seen in the example of road transport. Road transport has direct impacts on health in terms of air quality and traffic accidents, but it has also become an important factor in the design of urban areas, and thus leads to indirect effects on the wellbeing of urban residents. Such effects include noise, air pollution, diffuse water pollution, reduced opportunities for exercise, which can contribute to obesity and cardiovascular disease, and impacts on communities and urban landscapes, which can adversely affect wellbeing. As well as tackling these problems purely in an end-of-pipe manner (for example, through the introduction of catalytic converters), more holistic approaches are needed so that urban areas are designed and managed to reduce car use.
- 3.4 We are convinced that government's approach to delivering positive public health outcomes must shift towards urban areas that promote the wellbeing of those using and living in them, rather than simply attempting to ameliorate the negative impacts of existing urban systems. For some urban health issues there is already a new understanding of the need for more integrated solutions in both the design and management of the built environment. Yet achieving positive health outcomes will not be easy and will involve many factors.

- 3.5 For instance, people will be reluctant to walk if they feel that their streets are unsafe. Generating a virtuous circle in urban layout where streets are busy with pedestrians and services are easily accessible without a car is a key component of success. This means creating environments with mixed uses, which give people reasons to be on the streets at different times throughout the day and maximise the significant health benefits of active modes of transport, such as walking and cycling, that living in cities can provide. Achieving this will require changes in the planning process to create flexible urban infrastructures and designs that deliver the appropriate health and environmental outcomes.

## HEALTH AND WELLBEING

- 3.6 The World Health Organization (WHO) defines health as “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity”.<sup>1</sup> Thus good health is defined in much broader terms than simply the prevention of illness. The concept of good health “embraces the life-long physical and mental wellbeing that is essential for people to lead meaningful enjoyable lives ... good health is an essential precursor for economic success. Longer, healthier, more productive human lives deliver concrete economic benefits ... a key condition to enable both economic growth and sustainable development.”<sup>2</sup>
- 3.7 We will consider physical wellbeing in terms of optimal physical health and fitness for an individual. Mental wellbeing is interpreted in terms of a number of positive outcomes represented by factors such as high self-esteem, subjective wellbeing, life satisfaction for an individual and a sense of place. Overall social wellbeing depends upon optimally meeting the needs of people in groups, and is not necessarily the same as the wellbeing of individuals within those groups. In the WHO definition of health, wellbeing is the result of a combination of these factors; this is the sense in which we use the term in the rest of our report.

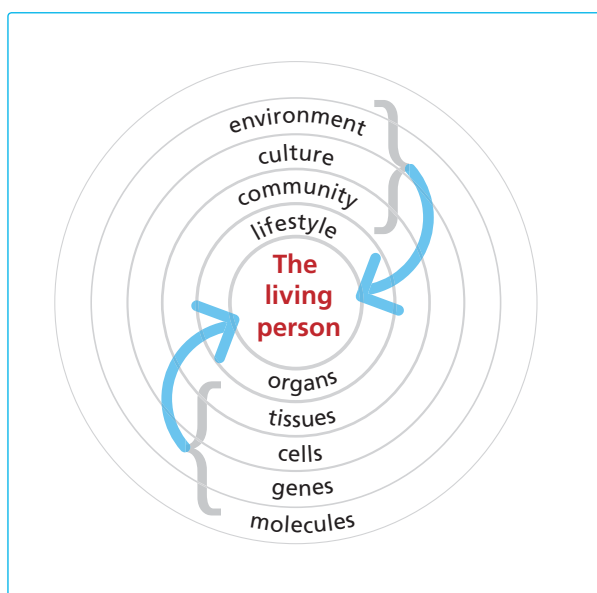
## THE ROLE OF THE ENVIRONMENT IN HEALTH AND WELLBEING

- 3.8 There is a broad consensus that the place in which a person lives or works should not expose them to hazards that could be deleterious to their health. This is, however, insufficient to deliver health and wellbeing in their widest sense as defined above. There is also broad agreement that public policy should help to sustain and improve health and wellbeing in their wider senses. A successful urban area should be one that stimulates those who live and work there and serves to reinforce self-esteem. It should be a place that is welcoming, safe and aesthetically attractive and includes adequate amounts of good quality civic and green space.
- 3.9 Commercial facilities, such as cafes, public houses and shops, and public buildings, such as schools and libraries, that serve the community are responsible for establishing much of the character of an urban area, and provide the opportunities for social interaction. Urban centres are important as the location of such services, and planning for easy access to these (without the need for a car) can improve the experience of the area and physical health of those who live

there. At present, too many urban areas do not provide access to shops with a wide range of food, particularly fresh food,<sup>3</sup> in part due to the decline of local shops and the growth of car-dominated supermarkets and other large retail centres. In Sandwell in the West Midlands, for example, there are areas “where most residents cannot buy a reasonable selection of fruit and vegetables within walking distance at any price” and this includes areas of relatively modern private housing.<sup>4</sup>

- 3.10 Other factors that may affect health outcomes include the social changes that accompany urbanisation, environmental risks from the physical urban environment and the large-scale impact of urbanisation on the biosphere.<sup>5</sup> However, the nature of the relationship between health and place is poorly understood. It is difficult to establish whether and how the urban environment causes unfavourable health outcomes. In addition, the relationship between social characteristics and human health has usually been studied separately from environmental characteristics,<sup>6</sup> despite these facets of urban life being connected and interdependent (figure 3-I). This is another good example of the ‘wicked problems’ described in Chapter 1. Attempts to intervene in any single issue may fail to have the desired impact on health, because the complexity of interactions between different aspects of the urban environment is not taken into account.

**FIGURE 3-I**  
Interacting factors influencing an individual’s health<sup>7</sup>



*The intrinsic characteristics of the individual are placed at the core; surrounding these are layers of different influences on health.*

- 3.11 The urban environment affects the health and wellbeing of everyone who lives and works in cities and towns. However, many problems are concentrated in the most deprived areas where a combination of environmental, social and economic factors leads to poor outcomes and low life expectancy. Box 3A describes this in more detail.

**BOX 3A****INEQUALITY, HEALTH AND ENVIRONMENT**

Deprived areas are defined in the UK using Indices of Multiple Deprivation, a system which reflects health, income, employment, education and skills, barriers to services, crime and living environment to create a single deprivation score and rank. The indicators used by the different UK administrations differ, but the majority of the areas defined as the most deprived are urban.<sup>8</sup>

Living in deprived urban areas increases the risks of poor health outcomes, even after controlling for individual characteristics.<sup>9</sup> In Scotland, for example, mortality rates for those under 75 years of age in the 10% most deprived areas are three times as high as those in the 10% least deprived. The figures for long-term limiting illness are equally striking, with 30% of the population in the 10% most deprived areas being affected compared with 12% in the 10% least deprived.<sup>10</sup> The social inequalities within urban environments are particularly marked, and this has an effect on health outcomes. For example, in different areas within the London Borough of Camden there is a life expectancy difference in the populations of up to 11 years.<sup>11</sup>

For almost every adverse health problem, individuals with low socio-economic status are more likely to experience disease and die younger than the affluent.<sup>12</sup> Factors such as relative poverty, low wages, occupational stress, unemployment, poor housing, poor education, poor diet, limited access to transport and shops, and a lack of recreational facilities all have an impact on people's health.<sup>13</sup> While increased mortality is more closely correlated simply with low socio-economic status, a poor urban environment can also add to the factors that contribute to ill health.<sup>14</sup> Although it is difficult to separate the effects of poor environment from low socio-economic status, concentrations of poverty and disadvantage in an area are likely to have health effects over and above the effects of personal disadvantage.<sup>15</sup> For example, respiratory problems in London are concentrated in the poorest areas and correlate with high traffic levels.<sup>16</sup> Possible reasons for this higher burden of illness include inadequate housing, nutritional status, limited access to health care and greater air pollution exposure.<sup>17</sup>

The concern that economically disadvantaged people may sometimes be exposed to greater environmental health hazards has been investigated as part of the concept of environmental justice. This goes beyond a simple analysis of the distribution of environmental pollution to suggest that issues of participation in environmental decision making and the distribution of environmental benefits, rather than just consideration of risks, are important in order to overcome inequality.

The National Institute for Health and Clinical Excellence told us that "Current health policy is based on the proposition that social, economic, environmental and lifestyle factors, including access to services, interact to influence people's health, and that unequal distribution of these factors contributes to health inequalities."<sup>18</sup> One of the key concepts underpinning these policies is that of the 'healthy neighbourhood', which has led to a number of community-based interventions aimed at deprived areas. These include the New Deal for Communities in England, Social Inclusion in Scotland and Communities First in Wales, as well as initiatives such as Health Action Zones.

## UNRAVELLING THE ENVIRONMENTAL FACTORS SHAPING HEALTH AND WELLBEING

- 3.12 While recognising the importance of the interaction between environmental and lifestyle factors on human health, we also need to understand the effects of the component factors individually. These are considered in the following sections.

### AIR QUALITY

- 3.13 Air pollution has an important impact on human health. Effects range from subtle biochemical and physiological changes to severe illness and even death. Although the situation in the UK is much better than it was 50 years ago, there is still a great deal that needs to be done and we are disappointed by the persistence of the problem.
- 3.14 Air pollution remains a serious, if poorly understood, health issue. It led to an estimated 24,000 premature deaths in Great Britain in 1995/96 (this estimate is due to be updated during 2007).<sup>19</sup> More recent data suggest that the cost in terms of health impacts was an estimated £9.1-21 billion in 2005.<sup>20</sup> The more severe effects of air pollution occur at the highest levels of exposure, but for some pollutants there are no known threshold values below which effects in a population are not observed.<sup>21</sup> This finding is reiterated by the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) in its upcoming report, *Long-term Exposure to Air Pollution: Effects on mortality*.<sup>22</sup>
- 3.15 WHO recently reported on a systematic review of the health effects of transport-related air pollution in Europe.<sup>23</sup> Effects included mortality, non-allergic respiratory morbidity, asthma and rhinitis, cardiovascular morbidity, cancer, adverse pregnancy and birth outcomes, and lowering of male fertility. The majority of studies identified both acute and chronic respiratory and cardiovascular impacts on vulnerable individuals.<sup>24</sup> In a 2006 report,<sup>25</sup> COMEAP concluded that daily variations in concentrations of air pollutants and long-term average concentrations of fine particles, sulphate particles and sulphur dioxide are associated with a range of adverse effects on the cardiovascular system including heart attacks and strokes.
- 3.16 Toxicological studies of industrial pollutants found in urban areas have provided valuable evidence to support the reduction of human exposure limits. However, in real life people are exposed to mixtures of pollutants which may vary hourly, daily and over a longer timescale, as well as from place to place. Individual pollutants within the mixture also have widely differing adverse health effects depending upon the target organ, interactions with other environmental factors (such as allergens and viruses in the case of asthma, and diet in the case of cardiovascular events) and the type of pollutant exposure, whether acute or chronic. Almost nothing is known about the pattern of exposure in relation to adverse health outcomes or the importance of interactions between outdoor pollutants and the indoor environment and total cumulative personal exposure. Individual susceptibility to the effects of air pollution also varies with factors

such as genetic background, age, health status, diet, occupational exposure, housing location and type. For example, a survey of schoolchildren in Boston, US, has shown that during air pollution episodes children who are overweight experience an 11% fall in lung function, compared with a 2% fall in those children of normal weight.<sup>26</sup>

- 3.17 For a number of reasons, the young are one section of the population particularly at risk of pollutant-induced exacerbations of asthma.<sup>27</sup> The developing lung in young children has a reduced capacity to deal with toxic insults, and lung growth and development continues until adolescence. Children also have incomplete metabolic systems and immature innate and adaptive immune defences leading to higher rates of lower respiratory tract infection. There are also differences in activity patterns which mean that children have greater exposure to air pollutants. For example, small children breathe in air closer to vehicle exhausts.
- 3.18 Several recent studies indicate that children living close to busy roads have an approximate 50% increased risk of experiencing respiratory illness including asthma.<sup>28</sup> Control of road traffic flows in and around the city of Oxford was introduced in 1999 and this has been shown to increase lung function and reduce wheezing in asthmatic children, with the greatest improvements in those from less affluent backgrounds.<sup>29</sup> Looking more broadly at childhood asthma levels, a recent international study of asthma and allergy in children has shown that the UK has the highest asthma prevalence in the world with 21% and 25% of 6-7 and 13-14 year-olds respectively having reported asthma symptoms within the past 12 months.<sup>30</sup> This is compounded in urban areas where children have been shown to have a higher prevalence of allergic disorders than, for example, those living on farms.<sup>31</sup>
- 3.19 A number of technical measures have been introduced to reduce air pollution. The diesel vehicle fleet is a substantial contributor to emissions of particulate matter and nitrogen oxides (box 3B). Particle trapping devices are being introduced to reduce particulate emissions, which they do effectively, but they also have some undesirable side-effects since they result in a higher ratio of nitrogen dioxide to nitric oxide in exhaust emissions, which is more damaging to health. In its recent report, the Department for Environment, Food and Rural Affairs' Air Quality Expert Group concluded that the rise in proportion of primary nitrogen dioxide emissions from road transport relates to the increasing numbers of light duty diesel vehicles, especially those fitted with oxidation catalysts and, in the case of heavy-duty vehicles, particle traps.<sup>32</sup> While we recognise the primacy that particulate pollutants have in relation to adverse health effects, reducing one set of pollutants, but at the same time increasing the proportions of others, especially close to busy roads, illustrates the type of problem that vehicle abatement technologies can produce. The time bought by technical fixes, such as improvements in fuel quality and vehicle emission control, has not been used to introduce sustainable long-term solutions to the problem of air pollution from road transport.



**BOX 3B****HEALTH EFFECTS OF PARTICULATE MATTER**

There are particular health concerns about the levels of particulate matter in urban areas. A recent review indicated that in 2005 the levels of airborne particles in the UK would be predicted to reduce average life expectancy by something of the order of eight months.<sup>33</sup> In the case of particulates, the relationship between exposure and adverse health impacts is broadly linear, with increasing exposure correlated to increased frequency and seriousness of effects.<sup>34</sup> Therefore, even at lower exposure levels, a large proportion of the population will still be affected by less serious health effects.<sup>35</sup>

Emissions from older diesel engines are a particular problem as they contain a complex mixture of several hundred different organic and inorganic components in gaseous and particulate form. The particulate matter present in these emissions is formed from a central core of carbon and adsorbed organic compounds, as well as metals (such as copper and zinc) and small amounts of sulphates and nitrates. Particulate matter also arises from re-suspended road dust, brake and tyre wear, sea salt and soil particles, as well as an important contribution from ultrafine secondary particles formed by pollutant-driven chemical reactions in the atmosphere.<sup>36</sup>

The Air Quality Expert Group extensively reviewed the levels and sources of particulate matter in the UK in 2005.<sup>37</sup> Until 2000, there was a steady reduction in concentrations of particulates in UK cities, but since then, concentrations have at best plateaued. The reasons for difficulties in reducing airborne particulates are likely to relate to:<sup>38</sup>

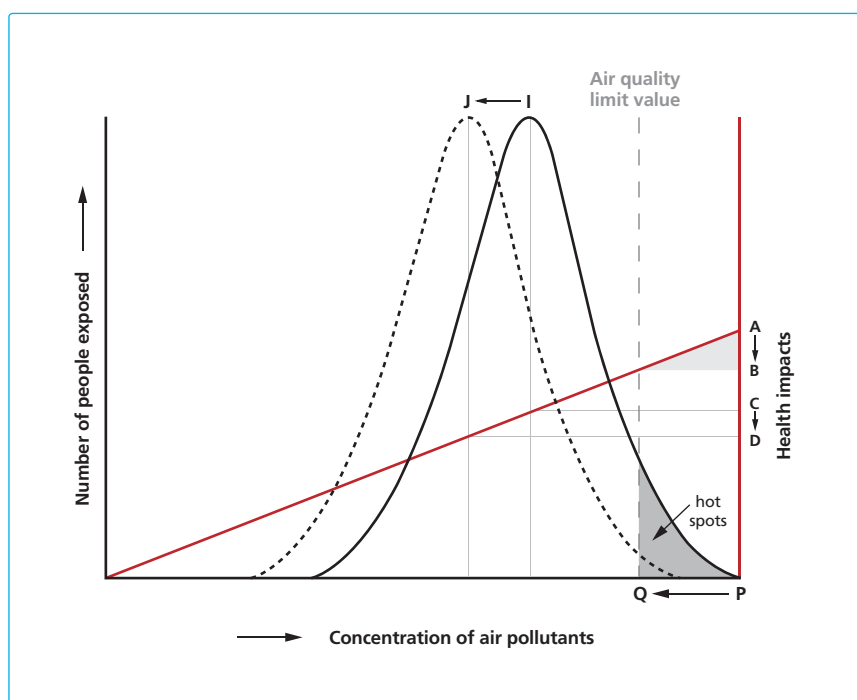
- non-exhaust particles now comprising a substantial proportion of the total emissions from road vehicles;
- exhaust emissions from traffic having fallen less quickly than had been assumed by the emissions inventories. In part, this is because measurements of emissions at the specific engine performance levels used in setting standards underestimate exhaust emissions in actual use;
- climate change, contributing both through changing air circulation patterns, and in increasing emissions of potentially harmful hydrocarbons from vegetation, which leads to particle formation through atmospheric oxidation;
- background regional and international particulates interacting with local sources; and
- complex trends in atmospheric chemistry.

There is also an important debate about the size of the most toxic fraction of particulates. Particulate matter (PM) includes: PM<sub>10</sub>, particles smaller than 10  $\mu\text{m}$  aerodynamic diameter; PM<sub>2.5</sub>, particles less than 2.5  $\mu\text{m}$  diameter, which include most combustion particles, such as those emitted from engine exhaust; and PM<sub>0.1</sub>, ultrafine particles less than 0.1  $\mu\text{m}$  diameter. From the epidemiological evidence available, it is not possible to distinguish with confidence between the effects of the different components of the mixture.<sup>39</sup>

The exact identity of the components and the physical properties of the ambient aerosol that affect health are still largely unknown. However, the smaller the particle the more easily it penetrates the body and the greater its toxicity, which is possibly related to increased particle surface area rather than mass.

- 3.20 There is new evidence that children living close to busy roads, and therefore exposed to high concentrations of pollutants, are at greater risk of adverse health effects than is apparent from city-wide epidemiological surveys.<sup>40</sup> The communities exposed to these high levels are also likely to be the most deprived<sup>41</sup> and this makes it even more important to consider their situation, even if more cost-effective measures can be taken in areas with lower pollutant concentrations. Knowing the deleterious effects that high levels of vehicle-derived pollutants have on human health, we find it unacceptable that large numbers of people of all ages are still at risk of illness caused by air pollution in hot spots.
- 3.21 In urban areas which experience high levels of traffic congestion the maximum recommended levels of some pollutants are often exceeded. Considering the amount of effort that has gone into developing the *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, we find this very disappointing. Continuing exceedences of air quality limit values (mandatory maximum levels) for individual pollutants in the UK make it very difficult to negotiate still lower values at the EU level, even though it is widely recognised that the current limits are above levels at which human health will be affected.
- 3.22 Moreover, when looking at overall health benefits it is the pollutant mix and its combined impact on different health outcomes in children and adults that is important. Thus for cardiovascular disease, primary and secondary particulates dominate, while in the case of wheezing illnesses in children, ozone, sulphur dioxide and oxides of nitrogen are all implicated. Different mixes have been implicated in exacerbating lung disease in the elderly and in risks of cancer. One approach to this issue is to take account of combined toxicity and different exposure patterns of pollutants. For pollutants such as particulate matter and its association with cardiovascular and lung disease in older people, there is a greater benefit in terms of both health and cost effectiveness from reducing the exposure of the population as a whole, rather than only those in particularly bad areas (hot spots), who may comprise only a small fraction of the population. This approach relies on closing the gap between the background level and the level to which the population is actually exposed.
- 3.23 This is illustrated in figure 3-II, which broadly represents the relationship between population exposure, health effects and potential mitigation strategies. The horizontal axis represents pollution concentration, while the left-hand vertical axis represents the number of people exposed to pollution levels. Assuming the number of people exposed to the range of pollution levels follows a normal distribution, curve 'I' can be drawn. If we then include the air quality limit value (dashed vertical line) we can see that a small proportion of people are exposed to higher levels of pollution above the limit value (shaded area). These higher concentrations are normally found in hot spot locations in urban areas (often associated with busy roads).

**FIGURE 3-II**  
**Schematic graph of population exposure to air pollution and associated health impacts<sup>42</sup>**



- 3.24 Another vertical axis is now introduced on the right-hand side to represent health impacts. The sloping red line represents health impacts increasing as air pollution concentrations increase. This line assumes that there are health impacts associated with even very low concentrations of pollutants. This is usually considered to be the case only for ‘non-threshold’ pollutants such as particulates. However, even for ‘threshold’ pollutants, which are considered only to be harmful above a certain concentration, this assumption will still apply if thresholds lie significantly below normal urban exposures.
- 3.25 Figure 3-II illustrates the effects of different air pollution control measures. Introducing policies designed to reduce air pollution in hot spots to below the air quality limit value (from P to Q), but with no air quality improvements at other points on the spectrum, will improve the health of those exposed above the air quality limit value (in the shaded hot spots area). This will provide health gains of A to B for this relatively small population, but will not improve the health of others who experience lower, but still harmful, concentrations.
- 3.26 If policies are introduced to reduce exposure in the general population, this will shift the whole curve to the left (from curve I to curve J) and will produce the health gains C to D, with these gains affecting the whole of the population. Those previously living in hot spots will still experience some gains, but crucially, under this approach, the whole population experiences some health improvement. Recognising that our current knowledge informs us that all concentrations of many air pollutants have an adverse effect on health, that we do not have clear mechanism-based toxicology models for acute, subacute and chronic exposures and

that the individual air pollutants are likely to interact in creating different health outcomes, we strongly endorse this more holistic exposure reduction approach for protecting human health. We note that this approach has also been recommended by the Air Quality Expert Group in their reports on both nitrogen dioxide and particular matter.<sup>43</sup> Lack of knowledge of the precise biological mechanisms through which observed adverse health outcomes occur should not be used as an excuse to avoid action to reduce air pollution levels.

3.27 It is important to recognise that hot spots of pollution affect different subpopulations (for example, children with asthma) than background levels, which have a greater influence on the more chronic outcomes in older people (for example, heart disease and stroke). Thus, air pollution policy directed at one health outcome may not be as beneficial for a different health outcome.

3.28 Finally, we are concerned about the focus of information provision on air quality. We note the asymmetry of the current advice in which people with lung problems are advised to alter their behaviour, for example, to stay indoors during episodes of poor air quality. Targeting information intended to change behaviour towards those whose health is adversely affected by air pollution, rather than towards all those who contribute to it, seems to us to illustrate at best a partial and at worst an inequitable approach. Currently evidence suggests that people do not engage with air pollution as a problem directly impacting on health.<sup>44</sup>

3.29 Urgent action is needed to reduce pollutant levels at the worst end of the exposure spectrum, to reduce overall exposure and to reverse the burden of responsibility from those who are affected to those causing the problem.

3.30 **We recommend that:**

- **the UK government, devolved administrations and local government implement further measures to reduce traffic levels in the air pollution hot spots of towns and cities and, in particular, to bear down heavily on the most polluting vehicles. We commend for wider adoption the recent proposal in London for a Low Emission Zone;**
- **the UK government promotes the concept of exposure reduction for reducing the overall health impacts of outdoor air pollutants and actively pursues such measures in domestic, EU and international policy on air quality; and**
- **central and local government raise awareness of air pollution levels, including their effects on health, among all those who contribute to them, not just those who are at particular risk from detrimental health effects.**

## CLIMATE

- 3.31 Although the UK has a temperate climate, changes in the external temperature have an important impact on health. Cold is believed to be the main factor underlying the extra deaths which occur in the period between December and March compared with the death rate for other months of the year. In 2005, there were 27,500 additional deaths in this period across the UK.<sup>45</sup> The elderly are subject to the greatest increase in deaths in winter, with 20,200 more deaths in the UK among those aged over 75 years during the winter of 2005/06 compared with levels in the non-winter period.<sup>46</sup> Other groups are also vulnerable, including children and people with long-term illness.
- 3.32 Although not entirely an urban problem, one of the major adverse factors contributing to winter deaths is the failure to maintain residential properties at an adequate temperature. This is a particular problem for less active and elderly people and in substandard homes, the latter are more common in urban areas.<sup>47</sup> The government aims to tackle these problems through programmes to combat fuel poverty, such as the Warm Front Scheme, the Decent Homes Standard (to which all council owned and managed properties should conform by 2010), and the Energy Efficiency Commitment, which focuses largely on low income groups.
- 3.33 The balance of seasonal deaths, however, may change in the future. Climate change is likely to lead to higher average winter temperatures and fewer extremely cold periods, improving the situation in the winter. But climate change is also likely to lead to hotter summers, and an increase in the frequency of extremely hot days which can lead to heat stress. It is anticipated that the problem will be particularly pronounced in urban settings, that is, it is systemic (1.8-1.9), since these are already hotter than surrounding rural areas due to the urban heat island effect (2.25). The hottest zones in the city are those with the tallest buildings, the highest density of buildings without green spaces and with the most intense generation of heat from human sources. The urban heat island effect is more pronounced at night than during the day, with high night-time temperatures making it difficult for people to sleep.<sup>48</sup>
- 3.34 It is difficult to generalise about how mortality rates are increased by exposure to continuous hot days. It is known that older people are more vulnerable to heat as the body's regulatory systems change with age, making processes such as perspiration less effective.<sup>49</sup> Prolonged exposure to extreme heat causes heat exhaustion and heat stroke which, if not treated, can be fatal. Excess heat in those unaccustomed to it exacerbates heart or respiratory problems. Children, infants and older people are especially susceptible because they are less able to compensate. The adverse effects of heatwaves and cold are also increased in those living in areas characterised by low social capital.<sup>50</sup>
- 3.35 There were an estimated 27,000 heat-related mortalities across Europe during the summer of 2003, including over 2,000 in the UK.<sup>51</sup> The year 2003 was thought to be one of Europe's hottest summers in over 500 years, with average temperatures 3.5°C above normal.<sup>52</sup> Such

summers could become more typical by the 2040s. Furthermore, the situation is complicated because future levels of ozone (which impacts negatively on health) in the lower atmosphere must also be considered. Although controls on precursor emissions have generally reduced peak ozone levels over the last 20 years, mean levels are increasing over wide areas of the northern hemisphere to levels that are close to the threshold for effects on vegetation and human health. This situation is likely to get worse, driven in part by projected increases in precursor emissions from developing countries, but also by the effect of higher temperatures on ozone chemistry and, indirectly, on the release from vegetation of ozone precursors such as isoprene.<sup>53</sup> For the excess deaths in Europe in the summer of 2003, evidence suggests that about one third were attributable to air pollution.<sup>54</sup>

- 3.36 In other European countries, high ozone concentrations in the lower atmosphere have been so serious that temporary traffic bans have been introduced. In the UK, more stringent measures, such as enforced reduction of vehicle traffic levels or reduction of speed limits, might also need to be considered in the future as the effects of climate change and worsening air quality combine.
- 3.37 Finally, there are a range of other health effects related to climate change. These include likely increases in food poisoning and the greater spread of vector-borne and waterborne disease.<sup>55</sup> Increases in anthropogenic carbon dioxide itself are also predicted to cause health problems. When atmospheric concentrations of carbon dioxide exceed 426 parts per million, which could occur within two generations based on current predictions, health will be directly and adversely affected through altered metabolism and acidosis.<sup>56</sup>

### URBAN BUILDINGS

- 3.38 Good quality housing with adequate space, ventilation, warmth and light is important for health and a sense of wellbeing. It also protects against climate extremes. A major public health consideration is whether housing is built to a sufficient standard to minimise cold and heat stress for occupants.
- 3.39 Indoor air pollution, originating from both outdoor and indoor pollutants, is also an under-recognised factor when assessing the effects of the breathed environment on human health. The quality of indoor air also greatly affects individual perceptions of personal wellbeing.<sup>57</sup> Indoor fine particulate concentrations are highly correlated with outdoor concentrations because outdoor pollution also enters buildings.<sup>58</sup> As a consequence, indoor air problems are greater in urban buildings where exterior air quality is poor.
- 3.40 In the indoor environment, interactions between air pollutants, household chemicals and airborne biological agents (such as viruses, bacteria, fungi, and allergens from mites and animals) contribute to childhood asthma and possibly other forms of lung disease.<sup>59</sup> With allergy now affecting up to one third of the population, it is important to encourage low allergen dwellings.<sup>60</sup>

Other factors in the indoor environment also influence health and wellbeing giving rise to a heterogeneous group of disorders referred to as Sick Building Syndrome (appendix F).

- 3.41 Homes in poor condition are damaging to the health of those who live in them, particularly older people and children.<sup>61</sup> As we have learnt repeatedly from history, improving housing reduces negative health impacts.<sup>62</sup> Many of the modifications to housing required to improve the health of occupants would also markedly improve the environmental performance of buildings, yet in policy terms we remain disappointed that the links between these two benefits have not surfaced as prominently in policy and behaviour as we believe they deserve. We look at the energy efficiency of buildings in Chapter 5.

### WATER AND FLOODING

- 3.42 Generally, the UK's urban environment experiences only occasional health problems relating to water quality or the quantity of clean water made available to consumers. The main issue of concern is flooding, with flood damage costing an estimated average of £1,400 million a year in the UK.<sup>63</sup> This figure is predicted to increase with the effects of climate change. Flood-blighted properties clearly have major short- and long-term effects on an individual's health and wellbeing, as well as having major effects on families and communities. The health impacts of flooding range from premature death and clinical problems requiring hospitalisation or consultation with health professionals, to an increase in the use of non-prescription drugs or alcohol, depression, insomnia, low self-esteem and general feelings of ill health. Psychological distress may explain some of the excess physical illness reported.<sup>64</sup> Flooding is not uniquely an urban problem, but when it happens in an urban area the cumulative effects can be serious.

### NOISE

- 3.43 Noise lies outside the main thrust of this report. However, it is a problem for one in three households in the UK and has a major impact on the wellbeing of one in a hundred people.<sup>65</sup> Environmental noise, defined as that emitted from all sources except the industrial workplace, has been shown to have both direct and indirect health effects. Sources of environmental noise include road, rail and air traffic, industries, construction and public work, and neighbourhood noise. Opinion poll research conducted in 2003 found that problems are worse in areas of high density housing, rented accommodation (both social and private sectors), areas of deprivation and areas which are highly urbanised.<sup>66</sup> Persistent environmental noise above 40-55 dBA Leq (time-weighted average noise exposure in decibels) causes annoyance, levels of 40-60 dBA Leq disturb sleep, while levels of 65-70 dBA Leq increase the risk of ischaemic heart disease. Noise levels above 75 dBA contribute to acquired hearing impairment. Studies have also reported adverse effects of aircraft and traffic noise on mental health.<sup>67</sup>

### INFECTIOUS DISEASES

- 3.44 The high density of people in cities (compared with rural and suburban areas) is associated with increased airborne transmission of infectious diseases, including tuberculosis, measles,

influenza, pneumonia, pertussis and meningitis.<sup>68</sup> Emerging diseases such as SARS (Severe Acute Respiratory Syndrome) and avian flu may pose a particular threat to city dwellers. An epidemiological analysis of 1,755 cases of SARS from the urban environment of Hong Kong revealed that most cases were clustered in densely populated residential buildings and hospitals. Close human contact and spread by the urban sewage system were important factors in the clustering.<sup>69</sup> The transmission of infectious diseases from one city to another is also of concern. The 2002/03 SARS epidemic highlighted how an infectious disease can emerge in one city (Beijing), but then very rapidly be disseminated to others (Taipei, Singapore, Hong Kong and Toronto). This reflects the extensive movements of people from one urban area to another as a result of business and cultural activities. In general, the urban areas of the UK and indeed, those throughout the world, need to be well prepared or equipped to deal with major epidemics of infectious diseases.

### URBANISATION AS MENTAL HEALTH RISK FACTOR

- 3.45 Despite the significant environmental and other advantages of urban living, we have been presented with strong evidence that in some circumstances the urban environment can lead to impaired mental health. Mental health risk factors for a given individual increase the likelihood of psychiatric and psychological disorders.<sup>70</sup> Risk factors can be grouped under a number of categories including biological (for example, genetic predisposition), environmental (for example, exposure to air pollution) or psychosocial (for example, poor social support networks). For any given individual, these different risk factors will interact.<sup>71</sup>
- 3.46 A recent study of 4.4 million adults in Sweden found that the incidence rates of psychosis and depression rose in proportion with increasing levels of urbanisation. Those living in the most densely populated areas had a 68-77% and 12-20% greater risk of developing any psychotic illness and depression respectively when compared to a reference group in rural areas.<sup>72</sup> Studies in Denmark confirm that the risk of schizophrenia is greater in those born and brought up in urban environments. Not only were the rates higher in towns compared with rural areas, but higher in larger towns and highest in Copenhagen. These studies have also shown that the degree to which an area is urbanised (urbanicity) reinforces the known risk-increasing effect of a positive family history of psychoses.<sup>73</sup>
- 3.47 Within urban areas, rates of psychiatric illness are greatest in the most deprived areas and the rates for psychoses map closely those for deprivation.<sup>74</sup> Previous studies in the UK have found an association between urban residence and the prevalence of psychiatric disorders, which persists after adjustment for confounding factors.<sup>75</sup> The size of a city also matters; schizophrenia rates in London are about twice those in Bristol or Nottingham.<sup>76</sup>
- 3.48 The difference in prevalence of common psychiatric disorders (excluding schizophrenia) between rural and urban areas in the UK is less striking than in continental Europe. In a study of 7,695 adults in the UK comparing rates for anxiety and depression, rural residents had only



slightly better mental health. The effects of geographical location were neither significantly confounded nor modified by socio-economic status or household income.<sup>77</sup>

- 3.49 Statistical studies alone cannot determine which key variables in urban environments constitute mental health risk factors nor can they separate cause and effect. Low employment rates, low income and the perceived difficulty in providing social housing for some who may be seen by their neighbours as problematic residents in an area, all encourage a gradual drift of some of those with severe mental health problems to the poorest areas because they cannot afford to live anywhere else. This almost certainly explains the phenomenon of higher rates of psychiatric illness near the major railway stations in London.<sup>78</sup> But it is equally clear that the higher rates of psychiatric illness in deprived areas are not solely the result of movement of population. There is a significant increase in risk of psychiatric illness for those resident in the most deprived urban areas.<sup>79</sup>
- 3.50 Stressful and poor quality urban environments also influence people's physical health through complex pathways, as demonstrated in brain imaging studies. These show that higher levels of activity in the regions of the brain associated with negative emotions due to mental stress result in clinically important rises in blood pressure and a greater risk of cardiovascular diseases.<sup>80</sup> Adverse mental health (including stress) also has a profound influence on susceptibility to complex diseases by altering immunity and increasing the risk of infection, cancer, autoimmunity, asthma and metabolic disturbances.<sup>81</sup> Intervention such as improved housing during adolescence has been shown to have a beneficial effect on immunity in an animal study.<sup>82</sup>
- 3.51 A basic model of how psychosocial stress can lead to poor health depicts a pathway starting with factors such as crime, unemployment and a poor environment leading to chronic anxiety, insecurity, low self-esteem and social isolation, on to chronic distress, the eventual outcome of which is depression, diabetes and hypertension (appendix G).<sup>83</sup> This model recognises the interactive roles of chronic environmental stressors such as noise, crowding, transport and air pollution as important, but neglected, research areas.
- 3.52 The way in which urban living affects mental health and wellbeing is poorly understood, sparsely researched and perhaps unexpected.<sup>84</sup> Inevitably this report concentrates on environmental issues, but there is no avoiding the conclusion that urban living can damage the mental health of some people. This is likely to relate to a lack of social capital – “the social networks, shared norms and co-operative relationships that help us get along together as a society”.<sup>85</sup> So while urban living has significant benefits, such as improved access to services, we must not lose sight of the potentially considerable price paid by those whose mental health suffers. One way of helping to mitigate these effects would be the provision of good quality green spaces, as discussed in the next section.

## GREEN SPACES

- 3.53 In the UK, 33 million people make 2.5 billion visits to urban green spaces each year,<sup>86</sup> and for city dwellers without cars, these urban spaces represent significant sources of regular contact with nature. However, there remains a legacy of inadequate resources for design, planning and management of such public spaces, a lack of emphasis on their role in promoting good health, and a concentration of the lowest quality public space in the poorest areas.<sup>87</sup>
- 3.54 The presence of good quality urban green space can counter a significant number of the negative aspects of urban living and modern lifestyles by providing a range of benefits for human health. Such benefits include improved physical health, physical comfort and psychiatric wellbeing, and opportunities to improve people's quality of life and social interaction, which we consider in greater detail below. While these different dimensions are important in their own right they also interact to contribute to overall health.
- 3.55 The existence of safe and attractive green space designed to encourage physical exercise and play is of increasing importance for public health.<sup>88</sup> Physical inactivity is a major preventable health risk and tackling it should be a public health priority. Current data show that only 32% of UK adults take 30 minutes of moderate exercise five times a week, which is the threshold for improving cardiovascular health.<sup>89</sup> The issue is particularly important for children, where inactivity is helping to create a new generation who are more likely to become inactive and obese adults.<sup>90</sup> For example, over 30% of children in England are overweight and nearly 20% are obese.<sup>91</sup> The rising trend in obesity results from a variety of factors, but one element may be less access to recreation and exercise. Parents and children may not feel safe using car-dominated streets, and evidence shows "that children and young people do not play out as much as they used to and that their opportunities for free play are restricted".<sup>92</sup> At the same time, the number of children travelling to school by car has doubled over the last twenty years, while the number walking and cycling has fallen,<sup>93</sup> and it has been argued that "We have 'designed' a lot of incidental exercise out of our lives."<sup>94</sup>
- 3.56 Projects that seek to maximise the health benefits of green space include the Walking for Health Initiative, the Active Woods Campaign, and the Green Gym scheme run by the British Trust for Conservation Volunteers, which offers the opportunity to work in the open air by carrying out practical environmental work locally. There are over 60 Green Gyms in England and several in Scotland and Wales, many of which are in the most deprived areas.<sup>95</sup>
- 3.57 Green spaces also provide elements of physical comfort such as shading, cooling, fresh air and places to rest, and provide opportunities for formal and informal social interactions. Furthermore, research suggests that "humans have an innate sensitivity to and need for other living things – as we have co-existed for thousands of generations"<sup>96</sup> and that many people have emotional responses to the natural environment.<sup>97</sup> There is convincing evidence of the positive

benefits to be gained from both active and passive involvement with natural areas in towns and cities.<sup>98</sup> For example, hospital patients with views of nature recovered more rapidly than those with views of other buildings.<sup>99</sup>

- 3.58 A review of empirical, theoretical and anecdotal evidence has also shown that contact with nature has positive impacts on blood pressure, cholesterol, outlook on life and stress reduction.<sup>100</sup> These outcomes have particular relevance to the areas of mental health and cardiovascular disease discussed above. The study concluded that “Whilst the extent to which contact with nature can contribute to human health and wellbeing is in need of further investigation, the strength of this evidence alone is sufficient to warrant inclusion of contact with nature within population health strategies, and for parks to be considered a fundamental health resource in disease prevention for urban populations worldwide.”<sup>101</sup> More details of similar studies can be found in the review of green infrastructure commissioned for this report.<sup>102</sup>
- 3.59 From our evaluation of the evidence, we are strongly persuaded that access to good quality green space provides an effective, population-wide strategy for the promotion of good health, wellbeing and quality of life. We do also realise that these benefits will only be achieved through collaborative strategies developed between those working on community health, social services, urban planning and environmental management. Overall, we are convinced that the evidence is sufficiently strong to warrant amending planning guidance to recognise the health benefits of green space and to build green space into new and existing developments. We return to this issue in Chapter 4.
- 3.60 In table 3.1 we summarise the effects of different aspects of the urban environment on health and wellbeing. Note that this is a table of UK and Great Britain figures and is therefore not specific to the urban environment. Nevertheless, since 80% of the UK is classified as urban, the figures can be seen as illustrative of the urban situation. Note the relatively small mortality rates associated with road traffic accidents (albeit likely to affect younger people) compared with other issues. Given this, we suggest that not enough policy attention is being given to combating the other issues explored in this chapter.

**TABLE 3.1**  
**Summary of aspects of the urban environment that affect health and wellbeing**

Issue	Scale of health effects (all figures are approximate)
Air pollution	<b>24,000</b> premature deaths per year in Great Britain; <sup>103</sup> reduced average life expectancy by around eight months in 2005 <sup>104</sup>
Climate	Winter <b>25,700</b> extra deaths occurred in the period December 2005 to March 2006 in the UK, compared with the death rate for other months of the year <sup>105</sup>
	Summer at least <b>2,000</b> excess deaths in UK in heatwave of summer 2003 <sup>106</sup>
Mental health <sup>107</sup>	association between urban residence and the prevalence of psychiatric disorders in the UK, which persists after adjustment for confounding factors
Infectious diseases	some disease transmission rates are higher in urban areas; this could also be the case for pandemic influenza or exotic infectious diseases
Obesity	<b>34,000</b> premature deaths and about 16 million attributable days of certified incapacity per year in England <sup>108</sup>
Traffic accidents	<b>3,300</b> deaths and <b>29,000</b> serious injuries per year in Great Britain <sup>109</sup>

## IMPROVING URBAN HEALTH AND WELLBEING

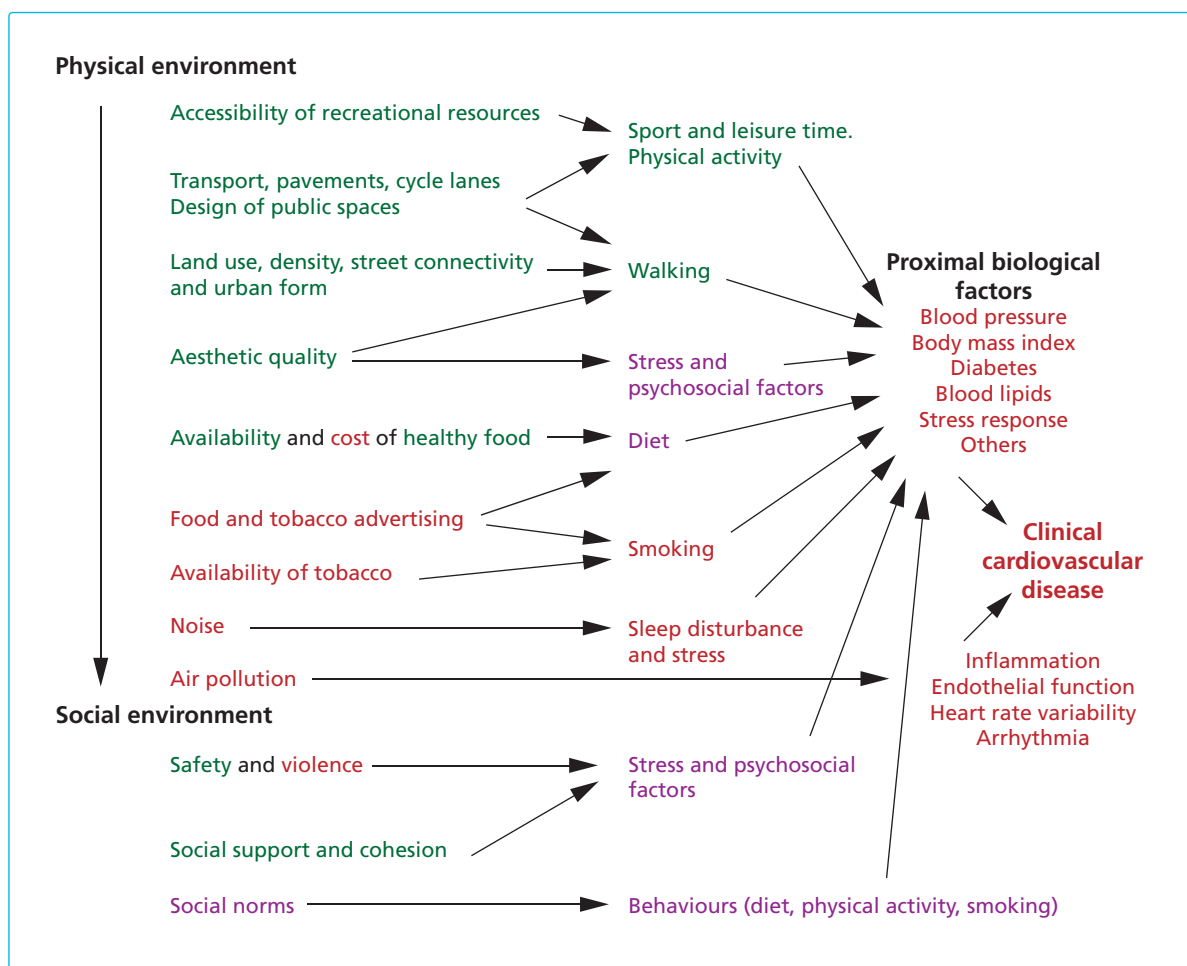
- 3.61 While accepting the complexity of the relationship, health can clearly be influenced by urban design. The different physical, environmental and social factors that can interact in residential environments to change cardiovascular risk are shown in figure 3-III.
- 3.62 A recent report by the Chief Medical Officer, Professor Sir Liam Donaldson, indicated that to improve public health:

“A mass shift in current activity levels is needed. This will only be achieved if people see and want the benefits but also if opportunities are created by changing the physical and cultural landscape – and building an environment that supports people in more active lifestyles. If people of all ages can become engaged in a new way of thinking about active lifestyles, better health can be a realistic goal for all.”<sup>110</sup>

Urban environments which are dense, mixed use, easily accessible on foot or by bicycle and with a high quality green infrastructure could deliver such positive health outcomes, promoting active lifestyles whilst making prudent use of resources. Improved links between planners and health professionals could help to achieve this.

**FIGURE 3-III**  
**The pathways that can link residential environments to cardiovascular risk<sup>111</sup>**

*Green = positive effects Red = negative effects Purple = mixed/intermediate effects*



3.63 However, complex systems like cities have so many interacting influences that the application of any measure intended to modify one aspect can have secondary effects throughout the system. Lifestyle choices can also offset environmental or health gains made through such measures by, for example, increasing car use. While these unintended consequences should not be used as an excuse for doing nothing, they do mean that intervention by government to improve the environment needs to be carefully thought through and equally carefully implemented.

### HEALTHY CITIES MOVEMENT

3.64 The WHO Healthy Cities project was established in 1987. WHO defines a healthy city as “... one that is continually creating and improving those physical and social environments and expanding those community resources that enable people to mutually support each other in performing all the functions of life and in developing to their maximum potential”.<sup>112</sup> The project is intended to facilitate actions that improve, maintain and promote health in urban areas. The characteristics of a healthy urban area as envisaged by WHO are set out in box 3C.

#### BOX 3C

#### CHARACTERISTICS OF A HEALTHY URBAN AREA<sup>113</sup>

- A clean, safe physical environment of high quality;
- Stable and sustainable ecosystems;
- A strong, mutually supportive, integrated and non-exploitative community;
- A high degree of participation and control by inhabitants over decisions affecting their lives, health and wellbeing;
- Basic needs of all inhabitants met (in terms of food, water, shelter, income, safety and employment);
- Access to a wide variety of experiences and social and cultural resources;
- A diverse, vital and innovative urban economy;
- Enabling connections with the cultural and biological heritage of the various urban inhabitants;
- An urban form that is compatible with enhancement of all the other specified characteristics;
- An optimum level of appropriate public health and care services accessible to all; and
- High levels of positive health outcomes and low levels of morbidity.

3.65 As part of this project, the WHO Regional Office for Europe launched the Healthy Urban Planning Initiative in 1997 to integrate the agenda for health with that of sustainable development. In the UK, Belfast, Brighton and Hove, Glasgow, Stoke-on-Trent, Liverpool, Manchester, Newcastle, Sheffield, Stirling and Sunderland are all participating in this programme which runs from 2003 to 2008. The aim is to make health and wellbeing concerns a prime goal of urban planning, and to provide a coherent and evidence-based foundation for policy making. The programme is founded on the conviction that urban spatial and transport planning are significant determinants of health, together with a recognition that attempts to change personal behaviour without changing basic social, economic and environmental conditions are likely to have little success.<sup>114</sup> Much of this work has been led for WHO (Europe) from the collaborating Centre for Healthy Cities and Urban Policy at the University of the West of England, Bristol.

- 3.66 We believe that there should be a consistent policy approach to ensure that health is given due consideration at all levels of the planning system. Some urban areas in Europe, such as Gothenburg in Sweden, Sandnes in Norway and Belfast in Northern Ireland, have risen to the challenge and are already implementing these principles.<sup>115</sup> However, in the UK some of these health objectives do not fall directly within the remit of the planning sector and will require much closer collaboration across a wide variety of sectors. Box 3D provides some examples of how this can be achieved.

**BOX 3D****APPROACHES TO INTEGRATING PLANNING AND HEALTH**

Gothenburg in Sweden has achieved integration of planning and health by establishing a group on healthy planning which seeks to use opportunities to promote health at every level of the planning process, and also participates in a variety of local groups related to health and wellbeing to identify and co-operate on key issues. By contrast, Sandnes in Norway has implemented a more central approach of implementing health objectives through its comprehensive municipal plan.<sup>116</sup> We visited Belfast, where the Belfast Healthy Cities partnership operates across various public health areas. This includes working with planning authorities to integrate Health Impact Assessment into spatial planning policies, and developing a healthy urban planning programme,<sup>117</sup> the principles of which will be embedded in the Belfast Metropolitan Area Plan.<sup>118</sup>

In Scotland, every local authority has a health improvement officer. The officer is given the task of supporting the development of a joint health improvement plan through the community planning process, which places a statutory duty on core partners such as NHS boards to participate in the planning process. The powers of local authorities elsewhere in the UK are more limited, particularly in England, but health issues can be incorporated in regional strategies and local development documents, and working partnerships between relevant bodies created.

In some urban areas in England, health issues have been integrated at the strategic level, as in the London Health Strategy. The Regional Public Health Group for London has created the Healthy Urban Development Unit. This develops partnerships for health organisations to engage planners at an early stage, to influence the plan-making process and affect the outcomes of planning applications. A key part of influencing urban development across London is building relationships between NHS Primary Care Trusts and borough councils.<sup>119</sup> In Brighton and Hove, the planning department is also working closely with the local Primary Care Trust to deliver health objectives. In other urban areas, such as Stoke-on-Trent, health objectives are being tackled at the local authority level through Local Strategic Partnerships and other community-based initiatives.<sup>120</sup>

The WHO Healthy Urban Planning objectives require a wide-ranging programme entailing a large amount of commitment from local government and a determination to pursue goals that may lack clarity and require intersectoral collaboration.

### PLANNING HEALTHY URBAN ENVIRONMENTS

- 3.67 The planning system offers an important opportunity for a more coherent effort to develop our cities to affect positively the health and wellbeing of urban inhabitants. The present system, however, is still unable to deal adequately with complex public health issues. Planning applications for large-scale developments often require an Environmental Impact Assessment (EIA). These assessments can include data on environmental problems like air pollution that can cause health effects, but while they may predict environmental emissions from future developments to compare with relevant standards, they do not always look at health impacts in terms of a population's vulnerability and exposure to health risks.<sup>121</sup> Thus EIAs tend not to consider health and wellbeing issues in a systematic manner, nor recognise the complex interrelations between social and environmental factors.<sup>122</sup>
- 3.68 Our Twenty-third Report on Environmental Planning recommended that health issues should be incorporated explicitly in the EIA process. One way would be through a Health Impact Assessment (HIA) which could ensure a more systematic assessment not only of direct health exposures and risks, but also of the impacts on mental health and wellbeing from modern developments (for example, the effect on mental health of anti-social behaviour).<sup>123</sup> HIAs could also check whether a proposal might reinforce health inequalities.
- 3.69 Over 120 HIAs have been undertaken in the UK, largely in the assessment of public sector policies, and local planning authorities are beginning to request them for significant developments within their area.<sup>124</sup> The National Institute for Health and Clinical Excellence has produced a number of publications on the integration of health concerns into planning, while the Welsh Health Impact Assessment Support Unit is exploring opportunities for HIAs in land use planning in Wales, and the Wales Centre for Health is undertaking research on integrating health into EIAs.<sup>125</sup>
- 3.70 An important consideration in bringing the two types of assessment together is tackling institutional constraints, and in particular the need for closer working between health and planning professionals, and greater interdisciplinary, interagency and intersectoral collaboration. We recognise that this is easier said than done, since this type of cross-sectoral working is repeatedly stated as important but seems notably difficult to achieve. Nevertheless, Canada has introduced project-level HIAs as part of its framework of integrated environmental assessment to try to overcome these constraints.
- 3.71 In its response to our Twenty-third Report, the government recognised the benefits of HIAs, but stated that it was “not persuaded that detailed Health Impact Assessments, which require different expertise and methodologies, should form an integral part of Environmental Impact Assessment at individual project level”.<sup>126</sup> However, in its more recent evidence to us, the Department of Health supported the inclusion of HIAs within the EIA process as the best means



of considering health issues in the planning process,<sup>127</sup> and we strongly concur with this view. Such a move should apply to all UK environments, urban and rural, but would be particularly beneficial in dealing with cumulative health and environment issues in urban areas.

- 3.72 We recommend that Health Impact Assessments be incorporated explicitly in Sustainability Appraisals, Strategic Environmental Assessments and Environmental Impact Assessments. In order to implement this, we recommend that the UK government and devolved administrations develop a statutory framework for including Health Impact Assessments in the planning process, accompanied by appropriate guidance.**

## CONCLUSIONS

- 3.73 The effects of the urban environment upon health and wellbeing are profound and are likely to change in the face of future environmental challenges such as climate change. These impacts are substantial, as table 3.1 makes clear, yet the efforts to tackle them seem relatively puny by comparison with the effort made to tackle the much smaller number of road traffic accident deaths. Many of the issues covered in this chapter are significant in their own right; mortality and morbidity rates associated with urban air pollution, obesity and serious mental health problems are issues that must not be ignored. Yet, as we have highlighted, despite the clear recognition of the importance of these individual factors within the urban environment on human health, it is the interaction between them that is the key to understanding the full picture of the effects of urbanicity.
- 3.74 Despite overwhelming evidence of serious acute and chronic health effects of air pollutants from traffic emissions, the number of cars shows every sign of continuing to grow. With the direct health effects of transport emissions being seen across all age groups, as well as their contribution to climate change, no further evidence should be needed to stimulate major action. While we recognise that the car is now an extension of people's living space as well as an index of prosperity and status in society, there must come a time when its proliferation becomes a public health issue. With the upturn in pollution trends we firmly believe that the time has arrived for serious concerted action that must include greater emphasis on alternative modes of transport in the form of walking, cycling and efficient and accessible public transport. Thus, our first recommendation (3.30) illustrates the considerable importance we attach to tackling the continued health effects of vehicle-derived air pollution in our cities and towns.
- 3.75 The consideration of health and wellbeing has had little influence in urban design and planning and yet it is the people who live in such conurbations who will reap the benefits and disbenefits of the urban environment. In this context, we are especially concerned about those from socio-economically deprived sections of the community and other vulnerable groups such as children and the elderly. Using current knowledge, the adverse health effects of an urban environment can be offset by forethought in planning, to take account of the interactions of environmental

and lifestyle factors that can influence health. Our second recommendation (3.72), therefore, emphasises the need to incorporate health issues more specifically within the Environmental Impact Assessment process, reinforcing our focus on the importance of considering health issues within the planning process.

- 3.76 For local health concerns to feature much more prominently in the planning process for urban areas, the wider community, as well as health professionals, must be involved from the start of the planning process in order to ensure that relevant issues are addressed early on. Furthermore, we recognise that in other activities at a local level, partnerships and networks of planners and health professionals already exist, and it is these links which we would now like to see formalised in the planning process.
- 3.77 There is an urgent need to address the key questions on issues that have so far inhibited progress in delivering healthy urban environments. Of particular importance is a lack of inter-organisational co-operation and the low priority assigned to health in relation to the urban environment. The government's proposals to create new and renewed urban areas provide a major opportunity to put these ideas into practice.

# Chapter 4

## THE NATURAL URBAN ENVIRONMENT

*The natural environment of towns and cities should be protected and enhanced to maximise the benefits for urban ecosystems and people's health and wellbeing.*

### INTRODUCTION

- 4.1 Although the natural environment in urban areas is often thought of in terms of green spaces like parks, it needs to be understood in a wider context. This requires explicit recognition of the different elements of natural and semi-natural environments and of the interactions between them. It is also crucial that there be greater recognition of the role of urban ecosystems and an integrated approach to protecting them that supports the planning, management and regeneration of our cities.
- 4.2 An integrated view of urban ecosystems recognises that they comprise many interdependent species – micro-organisms, plants, animals, humans – together with the environmental media of air, soil and water, habitats and the non-living or built environment (including buildings, services and transport infrastructure), which support and interact with them. Urban ecosystems are not isolated from neighbouring ones; there are significant flows of energy, materials, resources, species, people and pollutants across their boundaries.
- 4.3 Urban ecosystems are characterised by many man-made processes. The degree of human intervention can be measured in terms of the size, frequency and timing of the rates of change in the underlying environmental processes. Thus in large urban areas – particularly our major cities – the rates of change and variability of parameters such as river flow, water quality and air quality, as well as the duration of extreme events, such as high air temperatures, are often greater than those that occur in rural areas. Adapting to these extreme events presents significant problems for species and habitats, as well as for people and their surroundings.
- 4.4 The natural environment provides a great variety of benefits for urban areas. These include important ecosystem services, which have been relatively neglected in policies and approaches to green spaces. Our towns and cities have always relied on the natural environment to provide water, regulate climate and accept waste. Now, the natural environment offers opportunities for increasing flexibility and resilience in the face of new environmental and social challenges, including climate change.
- 4.5 Urban ecosystems also sustain biodiversity, which thrives in outstanding urban nature reserves and semi-natural habitats, as well as in heavily modified, artificial sites such as brownfield land,

traffic islands and road verges. However, while biodiversity is thriving in some areas, there is also strong evidence that many species and habitats are in decline, or just holding on, within urban areas.<sup>1</sup> Some species have particular value as urban specialists and some may be quite rare, but the emphasis of urban wildlife conservation is on the ordinary rather than the special.

- 4.6 Turning to social benefits, urban green spaces such as parks, river and canal walks, gardens, nature trails and allotments have enormous recreational value. They also provide opportunities for exercise (3.55), education and employment, and for improving an area's attractiveness, its sense of place and people's pride in it. These factors are especially important in deprived urban areas and as part of a move to good quality, high density urban living.
- 4.7 Urban areas can be enhanced by better management of existing natural and semi-natural features, and by deliberately creating new ones through well-tested aspects of green infrastructure, such as community parks, urban forestry, sustainable drainage systems (SuDS) and green roofs. Such practices are promoted elsewhere in Europe, especially in Germany, the Netherlands and Sweden. However, in the UK, efforts in this direction have been somewhat sporadic, and often implemented by a combination of community activism and experts from agencies and local authorities. The UK is only just beginning to benefit from more strategic approaches.
- 4.8 The time is ripe for concerted action by government and the public, private and voluntary sectors to protect and make greater use of the natural environment in urban areas, and to do more to accommodate natural systems and green infrastructure within the design of the built environment. More detail can be found in a review of green infrastructure commissioned for this report.<sup>2</sup>

## IMPROVING EXISTING FEATURES OF THE NATURAL URBAN ENVIRONMENT

### RIVERS AND WETLANDS

- 4.9 Rivers are dynamic systems and under natural conditions they continually move and interact within their floodplains. However, over several hundred years, urban rivers have been modified to maximise the amount of land available for development, to reduce the risk of flooding and to separate people from what were once polluted and unhealthy watercourses. As a result, many urban rivers have been straightened, contained or buried underground in culverts, damaging their ecological characteristics, reducing their wildlife value and making them less attractive to people.
- 4.10 Urban rivers often experience sudden changes in flow rate and temperature, partly as a result of the way they have been engineered, but also because surface water run-off is generally 'flashy' in urban areas that have a high proportion of impermeable surfaces. Truly urban rivers (with a significant component of their catchment in the urban area) are subject to significant flow variability, with extremes that are quite different to a rural river, and consequent challenges to

ecology, biodiversity and amenity value. Some are subject to local discharges from industrial sites and occasional inputs of untreated sewage from sewer overflows, sometimes due to incorrectly connected sewers (Chapter 5). High levels of diffuse pollution may also occur where there is run-off of oils, salt and chemicals from roads and other hard surfaces and from groundwater contaminated by old industrial operations and landfill sites. In addition, fertilisers and pesticides may be washed off managed grassland, parks and gardens and rural parts of the catchment.<sup>3</sup>

- 4.11 Once synonymous with urban decline, the quality of the UK's urban rivers has improved significantly since the 1970s, with waterways transformed into important focal points for cities such as Newcastle, Manchester and Leeds.<sup>4</sup> As urban rivers are increasingly appreciated for their amenity value, their protection becomes important for social and economic, as well as environmental, reasons.
- 4.12 Although the overall quality of river water is improving, including in some urban areas, many rivers are considered to be at risk of failing to meet the conditions of the EC Water Framework Directive. This requires Member States to aim to achieve 'good status' by 2015 which is defined as being a state of slight deviation from an undisturbed state. Ideally, rivers ought to be able to support a rich variety of wildlife and plant habitats, as well as recreational activities such as fishing, and be clean enough to create attractive waterside environments for different uses. It is likely, however, that many stretches of urban rivers will be classified as 'heavily modified' under the Directive. The aim of the Directive is for these waters to reach the alternative objective of 'good ecological potential'. The Directive recognises that in these cases there would be no benefit in trying to restore them to natural conditions because this may damage other important environmental features and benefits such as flood defence.
- 4.13 One of the measures that can be used to implement the Water Framework Directive is known as river restoration. It can help to tackle the problems of urban rivers by reintroducing more natural flows, restoring habitats and creating new ones, and improving public access and recreational opportunities. The key to success is the ability to meet several different objectives at once, so that, for example, cleaning up the environment and managing flood risk also deliver further benefits for the local community. Examples of urban restoration sites include the Mersey Basin, Darlington's River Skerne and the Bog Meadows project in Belfast. Projects in Birmingham and Greenwich and a Dutch example are featured in box 4A.

## BOX 4A

## RESTORING URBAN RIVERS AND WETLANDS

**River Tame** During 2002-05, the SMURF project (Sustainable Management of Urban Rivers and Floodplains) received a total of £1.9 million from the Environment Agency, the European Union LIFE Programme and other partners to work on river restoration. This included a demonstration project on the River Tame, the catchment of which contains the West Midlands conurbation including the city of Birmingham. The project aimed to make relatively small-scale changes to improve the physical quality, water quality and amenity value of the river and the floodplain, and to take an integrated approach to managing land use, water quality, ecology and flooding.<sup>5</sup> The local community was closely involved in developing a vision for the ideal urban river, as well as designing and carrying out parts of the restoration.<sup>6</sup> Activity was focused on the Perry Hall playing fields, which is a large area of recreational land originally developed as a Victorian park. Work at the site included:

- creating a low-level riverside terrace planted with reeds;
- landscaping the area using the spoil from the river works;
- planting riverside and marginal trees, shrubs and wild flowers with the help of local residents; and
- creating a surfaced riverside footpath and installing benches and litter bins.

FIGURE 4-1

River Tame at Perry Hall, Birmingham<sup>7</sup>

Figure 4-1 shows the river before (left) and after (right) a new meander was created. This involved widening a section of river channel within which the river could find its own course, so reducing the velocity of the flow and the likelihood of flooding. Steep riverbanks were reshaped to create new beaches that allow easier public access to the water's edge.

**River Quaggy** At a site in Greenwich, the River Quaggy, which had been in a concrete culvert since 1967, was opened up as part of a flood alleviation scheme. The Environment Agency created a series of meanders similar to the river's original configuration, and the surface of the surrounding park was lowered to provide a floodplain to store water during storms. The £250,000 project created new reed

beds for treating pollutants and additional river and wetland habitats, resulting in higher biodiversity and better flood storage capacity. The scheme's social benefits included creation of an attractive, diverse and accessible public open space close to urban centres, which proved to be of value to local schools and a wide spectrum of the local community.

**River De Grift, the Netherlands** The local authority and the water company in the town of Apeldoorn worked together on a comprehensive Water Plan for the river and 14 of its tributaries. The 25-year plan aims to bring the streams to the surface once again, a technique known as 'daylighting', so that the rivers, groundwater and floods can be managed more naturally. It has meant tackling entrenched views within professional bodies attuned to the traditional approach of containing rivers, and revising regulations designed with the same purpose in mind.<sup>8</sup>

- 4.14 We are concerned that despite impressive individual projects in some of our cities the full potential of urban river restoration is a long way from being realised.
- 4.15 **We recommend that the Environment Agency, the Scottish Environment Protection Agency and the relevant body in Northern Ireland, in partnership with other bodies, each produce a strategy on urban river restoration and publish guidance on its costs, environmental, social and economic benefits, potential funding sources, opportunities for community engagement and examples of good practice.**
- 4.16 This information should inform the strengthened planning guidance on the natural environment that we recommend later in this chapter (4.97), which should also cover other water bodies in urban areas, including waterfront developments, groundwater, aquifers, canals, lakes and ponds.

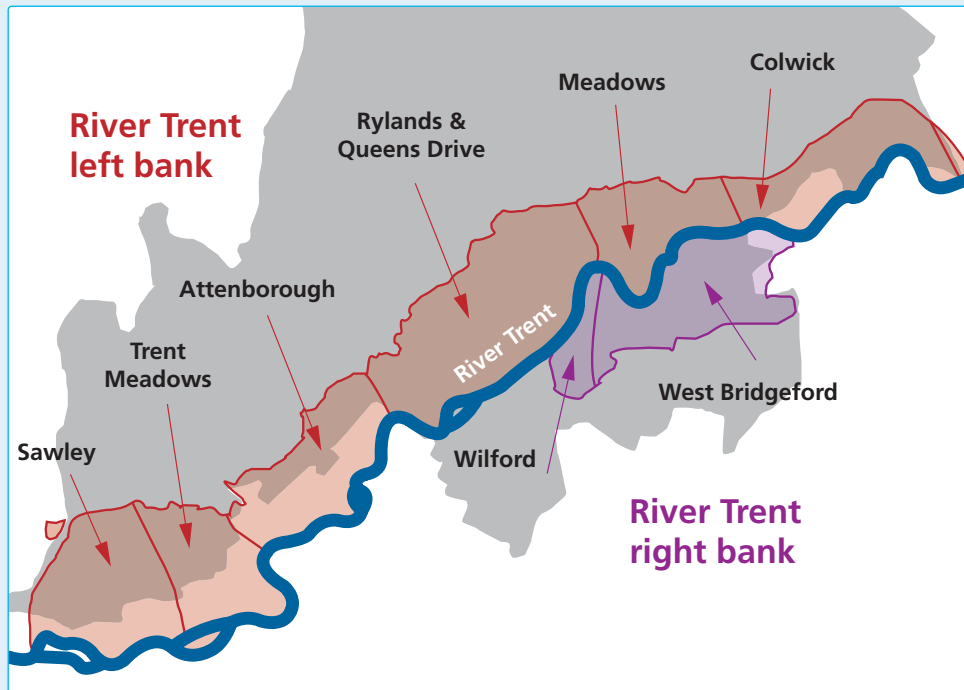
## **FLOODING**

- 4.17 Many UK towns and cities are exposed to some degree of flood risk from rivers or the sea (box 4B). On top of this, more than 80,000 urban homes are estimated to be at risk from flooding caused by heavy downpours that overwhelm urban drains.<sup>9</sup> Urban areas face distinctive risks compared with the wider rural river catchment. For example, surface drainage systems that have been modified through urbanisation cannot respond to excessive rainwater in the same way as natural channels. In extreme events, urban surface pathways – not least roads – become important relief systems, but with significant potential for damage to property.

## BOX 4B

MULTIPLE BENEFITS FROM FLOOD ALLEVIATION<sup>10</sup>

FIGURE 4-II

River Trent flood alleviation scheme<sup>11</sup>

*The grey area shows part of the city of Nottingham. The proposed flood alleviation schemes for the left and right banks of the river are represented by the red and purple areas.*

The River Trent runs through Nottingham. The city's flood defences are nearing the end of their design life, and some are in poor condition. In some places, the current defences are sufficient to protect against a flood that has a chance of occurring once every 50 years. To improve this situation, the Environment Agency and local authorities are developing a new flood alleviation scheme, which will raise the protection to a 1 in 100 year standard. The scheme will use a mix of traditional engineering and green infrastructure techniques, while taking account of the physical constraints imposed by existing urban infrastructure. Measures are expected to include:

- putting aside land for flood storage;
- realigning defences to improve river flow during extreme floods;
- increasing the height of existing earth embankments; and
- building new or raised flood walls.

As well as improving flood protection for 15,000 properties, the scheme aims to increase people's enjoyment of the river and improving the environment by:



- creating wetland areas;
- enhancing river and fisheries habitat;
- providing new footpaths, improving access to the river and a better quality environment; and
- enhancing lakes in a local nature reserve and other wildlife sites.

The scheme for the river's left bank includes public consultation and negotiation with landowners and local authorities, and will eventually require planning permission. It is important to discuss expectations about what areas will be protected and to what standard, because, although the scheme aims to raise overall levels of protection, there will be less protection in some areas where, for example, farmland may in future be used for flood storage.

- 4.18 The likelihood of different kinds of flooding is set to increase as climate change leads to rising sea levels, changes in precipitation patterns and more intense rainfall. The UK's annual flood losses "could increase from 0.1% of GDP today to 0.2-0.4% of GDP once the increase in global average temperatures reaches 3 or 4°C".<sup>12</sup> Furthermore, more intense rainfall could have a disproportionate impact on urban flooding, since it has been estimated that a 40% increase in rainfall could lead to a 100% increase in flood volumes and a 200% increase in flood damage.<sup>13</sup> The Environment Agency already spends over £500 million (over half its budget) on combating flooding and this figure looks set to increase in the future due to these climatic effects.
- 4.19 The planning system already discourages new building in places that are most at risk from flooding, but will sometimes permit it where, for example, an area is at lower risk, there are existing defences, or the development incorporates extra flood protection or resilience. The principles underlying planning policies on flooding are broadly similar across the UK, although the categorisation of flood risk and the approach to precaution varies.<sup>14</sup>
- 4.20 Allowing development in flood-prone areas may create a public expectation that these places will continue to be protected in future, even if doing so becomes more difficult and expensive. At that point, the original developers may not be liable, and insurers may reconsider whether they will provide further cover. HM Treasury has told us that it does not intend to cover uninsured losses in such circumstances; but there is a possibility that it will be called on to provide extra money for flood protection. HM Treasury has already acknowledged that "there is a potential cost to the Exchequer over the longer term from the management of flood risk to protect assets created by new development, particularly given climate change".<sup>15</sup>
- 4.21 To reduce such problems, new development now requires a flood risk assessment to identify the source and pathways of potential flooding. However, the flood risk maps used in the planning

system take account of fluvial and coastal flooding only, not the risks posed by sewers and surface flow which are responsible for a large number of insurance claims. The current planning system also fails to consider how highway design, building layout and other aspects of urban development may affect surface flood pathways and storage.<sup>16</sup>

- 4.22 Fortunately, it is possible to reduce flood risk to some extent by improving the design of the built environment and using green infrastructure to manage surface water.<sup>17</sup> Parts of New Zealand, Australia and the US have developed the concept of overland flood-flow pathways by identifying surface routes for water to follow and linking them together like a conventional drainage system.<sup>18</sup> Surface routes, such as roads, convey water to sacrificial areas within the urban zone, such as parks, car parks and brownfield sites, which act as temporary flood storage areas.
- 4.23 This approach is already being used in Glasgow, where the City Structure Plan identifies new and existing parks that can be used to absorb flood water. The proposed green grid in the Thames Gateway would allow green spaces to accommodate overflow when there is flash flooding in the tributaries to the Thames, and provide environmental and social benefits for the local community the rest of the time. A third example is a development at Tilbury, which is being planned as an exemplar of a long-term initiative for flood risk environments. It will be designed to function in conditions of repeated flooding and to have a flexible infrastructure for transport, power, waste and food provision that can adapt to these conditions. The plan makes extensive use of grazing marshes for flood retention and green corridors to direct discharge away from built-up areas, with more flood-resilient construction in the risk zone.
- 4.24 Although design and technical measures can improve the management of surface water and urban flooding, one of the most challenging aspects of the problem revolves around the way the system is governed, because responsibility for urban drainage is spread across many organisations such as local authorities, sewerage undertakers, internal drainage boards, the environment agencies, the Highways Agency, the devolved administrations and private landowners. One way of bringing these partners together to address the urban water system and flooding in a more strategic way is through integrated urban drainage management (IUDM). However, this approach is still relatively rare in the UK. Where IUDM has been set up, it has sometimes been due to a sudden crisis (as with the Glasgow floods of 2000), or where one stakeholder has been prepared to play a champion's role to bring other stakeholders on board.<sup>19</sup> We make recommendations on this point later in this chapter (4.86).
- 4.25 We are concerned that urban development should not exacerbate flood risk or create a legacy of difficult to defend areas for the future. In the face of the long-term risks from climate change, our view is that the planning system should change its stance from a presumption in favour of development in flood risk areas to one that is more precautionary. We are aware of planning permission being granted in flood risk areas where the Environment Agency has advised against

it or was not consulted.<sup>20</sup> The UK government and devolved administrations should ensure that action taken through the planning system, the EC Water Framework Directive and the proposed EC Floods Directive is co-ordinated to reduce the risk of flooding as far as possible.

- 4.26 **We recommend that the UK government and devolved administrations strengthen their planning policies to direct development away from high flood risk areas, and ensure that planning authorities follow this principle in practice.**

### SOILS

- 4.27 Soils provide a range of functions that sustain natural systems and help meet human needs in urban areas. Among these are the provision of a platform for the built environment, the management of waste, the maintenance of above and below ground habitats and the regulation of natural cycles for water, carbon dioxide and nutrients.<sup>21</sup> These cycles depend in part on the transfer of water, air and materials to and from soils, which in turn depends on the permeability of the soil surface and the extent of surface sealing by construction, paving and compaction.<sup>22</sup> Increased sealing is therefore an important factor in the hydrology of urban areas because it can cut the capacity for storm water management and aquifer recharge, and reduce the availability of water for surface vegetation. The issue of soil protection is covered in more detail in our Nineteenth Report on the Sustainable Use of Soil.

### BROWNFIELD LAND

- 4.28 Although brownfield land (appendix H) is usually seen solely as a development opportunity, it actually provides a range of environmental services for urban areas. For example, it plays a role in urban hydrology because it often represents an area of greater permeability and higher evapotranspiration within a built-up region. It can also buffer changes in the local climate. Furthermore, it can boost biodiversity by adding to the mix of land uses present in towns and cities. As a result, some brownfield sites have surprisingly high levels of biodiversity and are home to nationally rare and endangered species,<sup>23</sup> particularly invertebrates. The most significant factor for biodiversity is habitat quality, but the amount of physical disturbance is also important, since disturbance creates habitats containing vegetation at different successional stages.<sup>24</sup> As such, the overall stock of brownfield sites represents a resilient pool of biodiversity in urban areas. They may also have the potential to act as migration corridors, although the extent to which they do so in practice is unclear.<sup>25</sup> Dispersal may be unlikely for many species whose habitat requirements mean they are more or less confined to certain sites.<sup>26</sup>
- 4.29 The planning system provides some protection for brownfield land, acknowledging that where such sites have “significant biodiversity or geological interest of recognised local importance, local planning authorities, together with developers, should aim to retain this interest or incorporate it into any development of the site”.<sup>27</sup> Planning policy also exempts ‘natural’ brownfield sites from development pressure although this is not clearly defined in the Planning Policy Guidance

on Housing (PPG3). It is unclear how planners can assess the quality of such sites when the presence of important species may not be obvious. The guidance also takes little account of the wider ecosystem value of such areas and the relationship of individual sites to the surrounding urban landscape.

- 4.30 The pressure to redevelop brownfield sites is high, partly as a result of government policy which favours its use (2.55). While strongly supporting the recycling of brownfield land to regenerate urban areas and to conserve valuable parts of the countryside, we are concerned about the environmental impact of brownfield policies.
- 4.31 **We recommend that the UK government and devolved administrations review the environmental impact of brownfield policies across the UK, and consider whether the 60% target will remain appropriate across England after 2008.**
- 4.32 This is especially important given that current policy is affecting the ability to meet some of the UK Biodiversity Action Plan targets. The review should examine the effect of brownfield policies on the pressure to develop different types of land (for example, the extent to which developers are choosing to build on gardens and green spaces compared with derelict or contaminated land) and the consequences for the environment, including ecosystem function and biodiversity.
- 4.33 Where the loss of brownfield land with significant ecosystem functions is unavoidable, planning authorities should require developers to replace the functions that are lost through redevelopment of such sites, by creating new habitats elsewhere and employing techniques like sustainable drainage and green roofs. However, any agreement made as part of the planning process needs to do more than replace valuable wildlife sites with sterile and uninteresting open space,<sup>28</sup> and to recognise that not all the original functions can be fully replaced.

### URBAN GREEN SPACES

- 4.34 There are many different kinds of urban green space, often with multiple uses, and this section sets out some of their characteristics and functions. Green space includes: parks, gardens and farmland on the outskirts of cities; open spaces (such as town squares, cemeteries and tree-lined streets); land along river and transport corridors; areas that have developed fortuitously (such as brownfield land, derelict industrial sites and secondary woodlands); and the vestiges of long-established habitats that have been encapsulated within urban areas (such as woodlands, heaths and marshes). These types of urban green space constitute a relatively high proportion of many urban areas (for example, around two-thirds of Greater London is green space or water, although the amount declines to 19% in the urban core).
- 4.35 The advisory body Commission for Architecture and the Built Environment (CABE) Space has been created as a champion of public space in England and Greenspace Scotland promotes green space issues in Scotland. Although there is no similar voice for green space in Wales

or Northern Ireland, green space projects are being promoted by their administrations and non-governmental organisations. These activities, along with specific initiatives, such as Scotland's Strategic Greenspace Partnerships and the Department for Communities and Local Government's (DCLG's) 'Cleaner, safer, greener' campaign, have helped reverse some of the decline in the quality of urban green space, and raised awareness of its importance to local communities.<sup>29</sup>

- 4.36 However, there is evidence that not all local authorities have a strategic approach to green space or are pursuing the plans with vigour. Those areas that are worst off and worst managed are most likely to lack a good green space strategy.<sup>30</sup> Ideally, all local authorities should have a strategy for managing the natural environment and green space, which takes account of all the green space in an area, not just that in local authority or other kinds of public ownership. These strategies could be part of a wider environmental contract between central and local government which we discuss in Chapter 6.
- 4.37 There is concern that spaces in and around social housing are in danger of being left behind in the focus on parks and the public realm; with a few exceptions they are by and large the worst of our urban green spaces, and yet are on the doorsteps of two million households.<sup>31</sup> Although Greenspace Scotland works on some of these issues, they receive less attention in England and Wales, with the exception of the Neighbourhoods Green Project. This addresses green spaces owned and managed by social landlords, and is preparing guidance funded by DCLG, but much work remains to be done. Given that more green space is passing from local authorities to registered social landlords, there is a lack of support, incentives and resources to maximise the potential benefits of these spaces. We would hope that government recognises this issue more fully and provides the Housing Corporation and other agencies with support in assisting social landlords.

### *Green belt*

- 4.38 The green belt has a specific role that provides distinctive benefits compared with other kinds of green space found in urban areas. The Town and Country Planning Act (1947) allows local authorities in England to designate countryside next to urban areas as green belt. The policy aims to:
- check the unrestricted sprawl of large built-up areas;
  - prevent neighbouring towns from merging into one another;
  - assist in safeguarding the countryside from encroachment;
  - preserve the setting and special character of historic towns; and
  - assist in urban regeneration, by encouraging the recycling of derelict and other urban land.<sup>32</sup>

- 4.39 In 2004, there were 14 separate green belts covering 13% of England, equal to 1.68 million hectares.<sup>33</sup> In contrast, Wales has only more recently begun to have a green belt policy of its own, while the Scottish concept is somewhat broader. The amount of green belt in England has increased by 25,900 hectares between 1997 and 2004, but this masks the fact that some land has been traded, so that new areas, created mainly in North-East England, have offset losses elsewhere. Currently, an average of about 800 hectares of green belt are lost each year to new development, housing, airport expansion and other uses,<sup>34</sup> and green belt boundaries are under review in a number of places, including the four English growth areas (2.15).
- 4.40 Some argue that it is better to allow existing urban centres to expand, even if this means losing some green belt, than to constrain housing in a way that forces people to travel long distances to work.<sup>35</sup> We recognise the benefits of keeping commuting to a minimum, and that only a small percentage of green belt has been lost so far (an average of 0.06% a year). However, because not all green areas are equally valuable – and there is significant variation in their quality – trading them undermines the concept of the green belt as a local policy to curb urban sprawl. Our view is that the government should retain a strong green belt policy to preserve the benefits built up over the last 50 years and maintain distinctive boundaries between town and country into the future.
- 4.41 **We recommend that the Department for Communities and Local Government and its devolved equivalents strengthen the presumption in planning guidance in favour of green belt protection and make it clear that it should be set aside only in truly exceptional circumstances of development need.**

#### *Private gardens*

- 4.42 Private gardens are an important and attractive part of the UK urban environment. They account for a significant proportion of green space, comprising around 19-27% of the urban area in the UK cities for which there are data.<sup>36</sup> Besides creating character in a neighbourhood, gardens provide opportunities for social interaction, recreation and exercise, and have important benefits for urban biodiversity, especially when they contain shrubs and trees that give a garden greater structure and volume.<sup>37</sup>
- 4.43 Unfortunately, gardens are being increasingly paved over to provide car parking and to reduce the need for maintenance. Such small-scale changes have an important cumulative effect; for example, an area 22 times the size of London's Hyde Park has been lost as a result of converting many of London's front gardens to hard-standing.<sup>38</sup> Even greater proportions have been lost elsewhere in the country, with estimates suggesting that 47% of front gardens in North-East England are more than three-quarters paved.<sup>39</sup>
- 4.44 As well as changing the garden's value to wildlife,<sup>40</sup> paving can cause problems with local drainage and increase the risk of flooding and water pollution. As a result, some countries

increase sewerage charges according to the amount of hard-standing around a house. This is not the case in the UK where there are no restrictions on the area that can be covered by hard surfaces at or near ground level.<sup>41</sup> However, local authorities can apply to the relevant Secretary of State to remove permitted development rights that allow paving and other minor changes. Furthermore, better supplementary planning guidance coupled with raising awareness could be used to encourage people to reduce paved areas or to use a range of more permeable materials like gravel, brick or matrix pavers, that provide good quality hard-standing and allow water to drain away. Such simple changes could improve the situation.

- 4.45 **We recommend that local planning authorities use supplementary planning guidance to minimise the use of hard-standing, and require the use of permeable surfaces for paving and car parking.**
- 4.46 The government does not collect figures on how the area of gardens is changing, but many are being lost to new development. Figures for England show that most house building takes place on agricultural, vacant or derelict land, although in 2003, 20% of the land used for housing was previously in residential use.<sup>42</sup> The trend has been encouraged by the fact that planning guidance defines gardens as previously developed land, so building on them is in line with planning policy across the UK and contributes to England's 60% brownfield reuse target (2.55). Furthermore, the government's commitment to increase the average density of new housing is likely to reduce the size of new gardens. Smaller plots may be unsuitable for planting large trees or shrubs of a scale that can deliver the environmental benefits described earlier. Therefore if the high density policy continues, then it is essential to plan strategically to provide communal green space on a scale capable of accommodating larger blocks of vegetation.
- 4.47 Development of gardens takes two forms; where an old house is demolished, new housing may extend over the whole property including its former gardens. Elsewhere, 'backland' or 'infill' development may convert sections of back gardens into new homes. Only a small amount of garden is likely to be lost if the footprint of the new house is similar to the old one, but this varies depending on the site and the density of the new development. Older gardens may also contain more mature trees that have a significant environmental role, and their gradual loss has a disproportionately detrimental effect on the urban environment. Although careful design can help to mitigate these trends, the overall effect is to reduce the amount of green space in urban areas and the ecosystem services they once provided.
- 4.48 While removing gardens from the definition of previously developed land might be desirable, we recognise that this could raise practical difficulties, as a single plot might have to be divided into 'brown' and 'green' land. However, the Natural Environment and Rural Communities Act 2006 allows local authorities to take action to protect gardens from development should they so wish.

- 4.49 **We recommend that the Department for Communities and Local Government and its devolved equivalents ensure that planning policy and guidance recognise that not all brownfield land is equally suitable for development, because gardens and other areas may provide ecosystem and amenity services if left undeveloped.**
- 4.50 This is consistent with our support for higher housing densities in urban areas, although we recognise that there is potential tension between high density housing and sufficient green infrastructure (2.60).

### *Allotments*

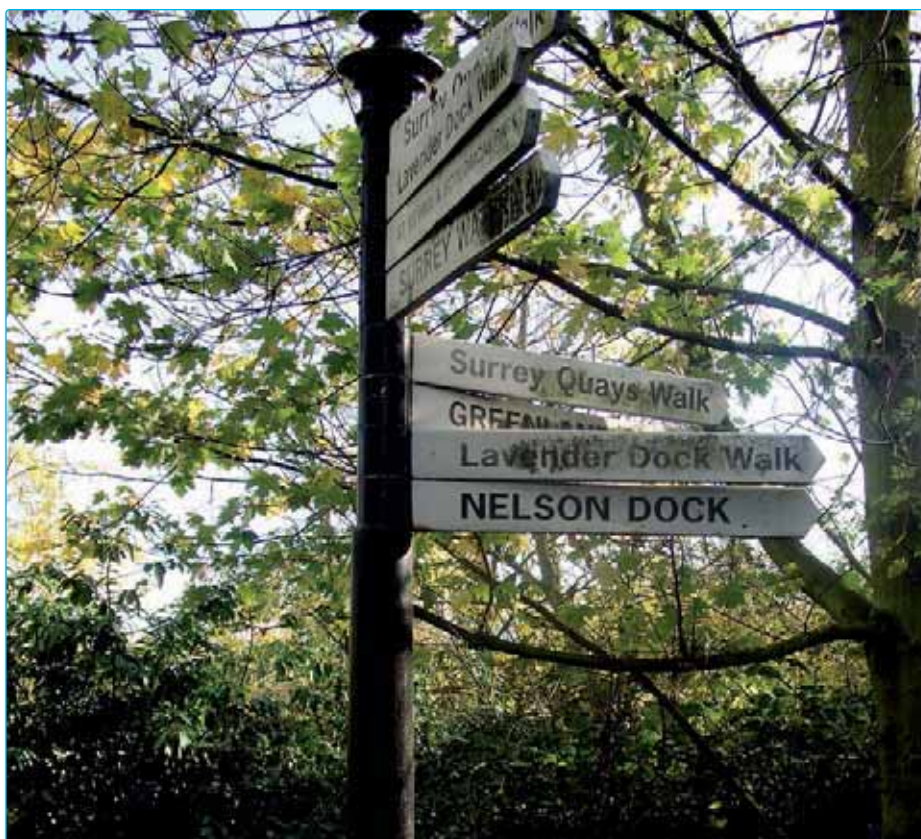
- 4.51 Allotments are a source of fresh, local food which benefits not only the individual, but potentially reduces the demand for transporting food. The concept of ‘urban farming’ capitalises on this and is part of planned urban growth in some countries. Allotments also provide leisure and exercise and can be good for biodiversity. Interest in them has increased in recent years and many local authorities have produced formal allotment strategies.
- 4.52 Statutory allotment sites receive protection under the Allotments Act (1925), although there are fewer safeguards for private and temporary sites. The last published survey of allotments suggested that there were just under 300,000 plots in England, amounting to over 10,000 hectares.<sup>43</sup> Their distribution varies across the country, and is highest in the north-east and the East Midlands. However, there is a mismatch between the availability of sites and demand. For example, there are vacant plots in some outer London boroughs, but long waiting lists in inner London. Demand among certain communities – not least some ethnic groups – is particularly high. The problem could be reduced if local authorities allowed non-residents to use vacant sites, something that the Greater London Authority is seeking to encourage through a cross-London strategy on allotments. However, if availability and demand are not better aligned, more vacant sites could be lost to development. Future demand for allotments also needs to be formally factored into new developments, including the four planned English growth areas (2.15).

### *Trees and woodland*

- 4.53 Trees are integral to the character of many urban areas, softening the landscape, making it more attractive and boosting property values.<sup>44</sup> People also benefit from the shade and shelter which they provide and their ability to screen out noise and light. In addition, if suitable varieties are appropriately situated, trees can have significant ecological benefits, providing wildlife habitats and corridors, moderating the urban climate, storing carbon dioxide and intercepting rainfall, which reduces erosion and flooding.



**FIGURE 4-III**  
**Urban woodlands<sup>45</sup>**



*Urban woodlands, nature reserve and trails established 20 years ago on a brownfield site in London's Docklands.*

- 4.54 Urban woodlands (figure 4-III) can provide a new use for brownfield or contaminated land, provide biomass for renewable energy programmes and supply forestry products such as wood chip mulches. The multiple benefits of urban trees have already led to urban forestry programmes like Treeregeneration in Wales, and to a number of voluntary initiatives to green the UK's streets. Almost 50 such initiatives were recorded across the UK by 2005.<sup>46</sup> However, the UK's various forestry strategies could give greater encouragement to urban forestry, and it is perhaps indicative of the weak understanding of the contribution that trees can make to the urban landscape that the National Urban Forestry Unit folded in 2005 after government support was discontinued.
- 4.55 Statutory protection is available for some urban trees, for example, those in conservation areas, some Sites of Special Scientific Interest (SSSIs) and where there are individual Tree Preservation Orders. However, many others are unprotected and this is a particular problem for street trees which since the mid-1990s have been at risk of damage from pipe and cable laying, despite the introduction of a voluntary code to moderate the activities of the utility companies.
- 4.56 Local authorities may also be concerned about the need for ongoing management since a significant number of trees will die unless they receive attention immediately after planting. At

the same time, responses to the issues of health and safety and subsidence have seen increasing recourse to felling. Finally, pollution, drought, soil compaction and vandalism make for a relatively harsh environment; species choice needs to reflect these conditions, as well as other concerns such as biodiversity value, impact on air pollution and allergen production.

4.57 Given the multiple benefits of trees for urban areas, **we recommend that the Department for Environment, Food and Rural Affairs, the Department for Communities and Local Government and their devolved equivalents:**

- **publish information on the extent and condition of urban trees;**
- **increase support for urban tree planting and maintenance within national forestry strategies and planning guidance; and**
- **ensure that local authorities use their powers to protect existing urban trees and ensure that adequate provision is made for the protection or planting of trees when planning permission is granted for new developments.**

#### **URBAN CLIMATE AND AIR QUALITY**

4.58 Urban green space helps to cool urban areas and moderate the urban heat island effect. Woodland areas tend to be cooler than grassland, although the effect varies with the season and the type of tree. By lowering temperatures, green spaces may also help to address some aspects of air pollution, since there is a small dependence of photochemical ozone formation on elevated ambient temperatures.

4.59 Trees can also improve air quality directly by absorbing some polluting gases and trapping particulate pollution. Some species, such as pine, larch, and silver birch, have a more positive effect on air quality than others like oak, willow and poplar, since the latter emit higher levels of volatile organic compounds (VOCs) that in turn form other pollutants such as ozone and particulates.<sup>47</sup> However, with a careful species choice to limit VOC emissions, research suggests that large-scale tree planting could be positive for air quality in urban areas, and reduce associated mortality.<sup>48</sup>

4.60 The cooling, shading, humidifying and filtering effects of green space are likely to become more important as climate change leads to summers becoming increasingly warm and dry with more periods of higher temperatures.<sup>49</sup> Climate change may threaten the viability of some tree species while favouring others. Since an urban tree may live for many decades, there is a need to think ahead and plant species that will tolerate a different climate. There is also an opportunity to highlight the role of the natural environment and green infrastructure in proposed new planning policies on climate change, and in existing planning policy on biodiversity.

## **BIODIVERSITY**

- 4.61 Urban areas are an important reservoir of biodiversity, and there are valuable opportunities to create new habitats as part of both new and existing urban developments (more detail is provided in a study commissioned for this report).<sup>50</sup> The habitats may vary from small ecology parks, community gardens and green roofs to major new ecological sites, green networks and community forests on the urban fringe.
- 4.62 However, national conservation policies fail fully to recognise the special nature of urban habitats. Implementation of the UK's Biodiversity Action Plan (BAP) (1994), national BAPs and the designation of SSSIs currently provide less protection to urban sites than rural ones; there are, for example, very few urban SSSIs. This is because urban sites frequently contain habitats and species that are not generally found in rural areas, and some are restricted to specialised conditions resulting from post-industrial landscapes that are poorly described in UK habitat and vegetation classifications. If the government is to achieve its aim of halting biodiversity decline by 2010, there is in our view a need to do more to assess and protect the biodiversity value of urban sites.
- 4.63 To support this, we would welcome further research to:
- provide definitions and classification of habitats of special urban character (particularly those of post-industrial landscapes); and
  - develop criteria for assessing the value of urban biodiversity, including social values and the importance of urban heritage components.
- 4.64 To protect urban biodiversity, cities like Birmingham, Bristol, Manchester, Sheffield and York have adopted Local BAPs or strategies, often linked to Local Development Frameworks and this link to the planning system contributes to the success of local conservation (box 4C). Similarly, London has a statutory requirement for a biodiversity strategy, which helps underpin the London Biodiversity Action Plan and aims to promote action across London boroughs and as a part of the overall London Plan. However, many urban BAPs fail to identify the potential for maximising biodiversity through advocating green infrastructure, ecosystem function, and integrating features onto existing buildings and new development.

**BOX 4C****CITY OF YORK BIODIVERSITY ACTION PLAN**

York's Biodiversity Action Plan demonstrates the variety and quality of some of the wildlife habitats that can be found within urban areas, and which support species of international and national conservation importance. Within the city of York, there is an important set of semi-natural floodplain habitats containing a mix of wet grassland, fens and swamps which the Action Plan identifies as priority habitats. Priority animal species include otter, salmon and river lamprey, while other species of concern include bittern, marsh harrier, water vole and a number of beetles and snails. The Action Plan proposes restoring ten hectares of wet grassland within the city by 2010 and re-establishing breeding populations of snipe, lapwing and redshank.<sup>51</sup>

The York Plan demonstrates many of the attributes that research has shown to be important in developing effective biodiversity strategies, namely:

- a comprehensive inventory of habitats throughout the urban area;
- a system for evaluating sites to determine their nature conservation importance based on criteria relevant to the urban context;
- implementation through strategic planning and development control;
- expert advice to planners on the ecological implications of individual development proposals; and
- provision of expert ecological advice to support the local authority in the event of planning appeals.<sup>52</sup>

4.65 In order to protect urban biodiversity more effectively, **we recommend that:**

- **the UK government and devolved administrations amend UK and national Biodiversity Action Plans to include a priority habitat of special urban character; and**
- **all urban local authorities produce a Local Biodiversity Action Plan linked to their Local Development Framework.**

## **MAXIMISING COMMUNITY BENEFITS OF THE NATURAL ENVIRONMENT**

4.66 One of the strengths of urban nature conservation has been its emphasis on community involvement, with many programmes led by urban wildlife groups with strong community links and an emphasis on improving people's access to nature. Support for nature conservation in urban areas has drawn on a wider social constituency than the science-based approach to site protection that forms the main plank of UK nature conservation policy. The value of community involvement is also readily apparent in the river restoration projects described in box 4A, and we consider other aspects of community engagement in this section.

4.67 The natural environment in our towns and cities can stimulate community activity, training, education and employment, leading to greater self-confidence and pride. The work of the Wildlife

Trusts, the British Trust for Conservation Volunteers and other local groups on engaging people in the enhancement of their local natural spaces has created a large constituency of active citizens. Work has been underway for a number of years to broaden the range of people involved.<sup>53</sup> There are also important benefits for health and wellbeing, which are described in Chapter 3 and in CABI Space's analysis of how high quality parks and public spaces create economic, social and environmental value.<sup>54</sup>

- 4.68 To make the most of these advantages, it is crucial to involve the wide range of organisations that have a stake in the development of the natural environment in towns and cities. There are clear synergies between the interests of different groups. Greenspace Scotland has capitalised on these by helping to create Strategic Greenspace Partnerships to support green space networks. These draw on the expertise of city councils, agencies such as Communities Scotland, Scottish Natural Heritage and National Health Service Scotland, and representatives from the community, voluntary and business sectors. The groups develop a vision for green space in their area underpinned by an audit of the existing green space, which is translated into action on the ground.<sup>55</sup>
- 4.69 The Scottish Executive has provided £4 million to fund over 50 urban green space projects, concentrating on the 15% most deprived areas and other areas that are disadvantaged or lack quality green space. All the projects aim to contribute to environmental justice and biodiversity, along with other priorities including physical and mental health, social justice, stronger and safer communities, community capacity building, active involvement of children and young people, environmental education and lifelong learning, and creating opportunities for play and recreation.
- 4.70 However, the extent to which people are able to enjoy these benefits in practice depends in part on how comfortable they feel in using green spaces. Park wardens and rangers can play a valuable role in promoting security, deterring vandalism, encouraging activities and enhancing environmental understanding amongst park and green space users. However, since the heyday of Victorian parks, and particularly since the local authority reorganisations of the 1970s, there has been a decline in the number of park and community wardens and river rangers,<sup>56</sup> and even where staff are available they may not be present on site all of the time.
- 4.71 One alternative is closed circuit television, but less intrusive forms of security can be provided by people in buildings overlooking the green space or passing through the area. Perhaps the most important form is provided by the users themselves. This kind of self-monitoring needs to be present throughout the day, and is more likely to be the case when the green space can attract different users, like parents and children, dog walkers or office workers at different times of the day.<sup>57</sup>

- 4.72 Access is also important. The closer an area is to home, the more valuable it is likely to be for children. Connectivity between different areas is also a key element in providing many of the health-related benefits of green space, especially through walking and cycling.<sup>58</sup> English Nature developed standards for accessible natural green space in towns and cities that place considerable emphasis on the value to be gained in terms of health and wellbeing.<sup>59</sup> Its successor, Natural England, is proposing that there should be a campaign to achieve an area of natural green space within 300 m of every home. Local authorities have also adopted open space standards (as encouraged by planning policy guidance),<sup>60</sup> but these focus almost exclusively on the provision of sport and recreation facilities to the exclusion of natural green space. However, a different approach has been taken in London where areas of deficiency in access to nature have been mapped and used to inform local authority decision making.<sup>61</sup>
- 4.73 Our Twenty-third Report on Environmental Planning recommended that planning guidance should include targets for the maximum distance between an urban household and a public green space of a specified size. In its response to the Report, the government rejected the idea of national standards for England and Wales, arguing that green space provision is best determined locally so that it can cater to local circumstances. To achieve this, current planning guidance requires local planning authorities to set standards for size and accessibility of all types of open space, and provides advice and good practice examples to guide authorities.<sup>62</sup> The situation is different in Scotland, where the Scottish Executive is consulting on national minimum standards for the size of public open space to be included in new developments.<sup>63</sup>
- 4.74 The appreciation of the role of green space has increased considerably in the four years since our Twenty-third Report, and green spaces have become a key part of government's vision for its growth areas and other developments. However, there is a risk that residents in deprived areas, social housing estates or with less well-performing councils may not share in these benefits.<sup>64</sup>
- 4.75 **We repeat the recommendation from our Twenty-third Report on Environmental Planning that the Department for Communities and Local Government and its devolved equivalents set minimum standards on size and distance to ensure access to good quality green space particularly in urban areas.**

## CREATING GREEN INFRASTRUCTURE

### *SUSTAINABLE DRAINAGE SYSTEMS (SuDS)*

- 4.76 It is possible to supplement the functions of the natural urban environment by creating new elements of green infrastructure to replace losses due to development or as an alternative to conventional engineering solutions. This could mean measures to improve or create natural and semi-natural features (for example, river restoration, habitat creation and tree planting), as well as more engineered solutions such as green roofs and sustainable drainage. The concept of functional green infrastructure is beginning to be adopted, particularly in some Regional

Spatial Strategies and the government's growth strategies, but needs more vigorous promotion in both new and renewed developments.

- 4.77 Sustainable drainage systems (SuDS) are a well-developed element of functional green infrastructure. They involve a set of management practices and structures designed to drain surface water in a more sustainable fashion than conventional techniques such as pipe-based drainage.<sup>65</sup> Generally, SuDS aim to mimic natural drainage as closely as possible and to help prevent flooding and water pollution. They can also provide wetland habitats that are good for biodiversity and are attractive features within the urban environment.
- 4.78 Types of SuDS include green roofs, areas of grass that convey surface water run-off (swales), wooded areas, and treatment basins, including ponds and wetlands, that absorb and moderate run-off. Other additions to the built environment can include infiltration trenches, soakaways, permeable surfaces and rainwater storage reservoirs beneath pavements, car parks and roads.
- 4.79 SuDS-style systems have been widely accepted as part of new urban developments and regeneration for many years in countries such as Sweden, Germany, Switzerland and the Netherlands. Although elements of SuDS have been used for some time in the UK, it is only recently that the concept has gained general acceptance for use in major urban development schemes. Examples include a Dunfermline scheme that could not have been developed without SuDS because of the constraints imposed by local drainage conditions. Sustainable drainage schemes are also integral to the Swindon Southern Development Area, and have been successfully retrofitted to remediate polluted run-off from existing sites such as the Baglan Energy Park near Port Talbot and the Houston Industrial Estate in Livingston.<sup>66</sup>
- 4.80 Scotland has had primary legislation to promote SuDS since 2003, and further secondary legislation is expected in 2007. As a result, Scottish Water is able to adopt SuDS, and we were told by the Scottish Environment Protection Agency (SEPA) that planning authorities generally accept the technique. SEPA believes that the use of SuDS is already routine in Scotland.<sup>67</sup> However, other organisations are concerned that the new management arrangements are not yet working well enough to bring about the widespread use of good quality SuDS.<sup>68</sup>
- 4.81 In our view, major changes in practice, legislation and guidance are needed in the rest of the UK to ensure that SuDS become standard practice and to tackle the constraints that hold back their adoption. Some developers are reluctant to install SuDS unless they have to, because they believe that they would not be able to recover the outlay.<sup>69</sup> However, studies show that SuDS are generally no more expensive than traditional pipe drainage and underground storage, and that land take and compliance with other policies influence drainage design more than cost.<sup>70</sup> The cost to society of flooding also needs to be taken into account in assessing the long-term costs and benefits of implementing SuDS as an integral part of urban development.

- 4.82 A real barrier is presented, however, by the complex legislation and ownership of urban drainage, which leads to a lack of clarity about which organisation should adopt and maintain the various elements of SuDS.<sup>71</sup> Local authorities may resist responsibility for local drainage management, while water companies may be reluctant to deal with the largely social challenge of managing utilities above ground. In cases where developers have been obliged to provide SuDS they have only to maintain them for a maximum of 14 years,<sup>72</sup> and it is not clear who will adopt these systems at the end of this period. Government needs to resolve this issue and give urgent consideration to legislative changes to make one specific body responsible overall or for leading a partnership of different organisations.
- 4.83 Another unhelpful aspect of legislation in England and Wales is that Section 106 of the Water Industries Act 1991 gives property owners a right of connection to a public sewer irrespective of the suitability of alternative drainage systems. This means that water companies often insist on surface water sewers being provided in addition to SuDS. The Planning Policy Statement on Development and Flood Risk (PPS25) goes some way towards strengthening the arguments for the use of SuDS. However, the government could go further by placing a duty on public bodies and developers to implement SuDS in preference to traditional pipe drainage schemes.
- 4.84 SuDS can help deliver the wider concept of integrated urban drainage management (IUDM) which attempts to manage the different components of drainage (from river to sewer) so that flood and pollution risks are reduced.<sup>73</sup> Again, a variety of authorities are responsible for different parts of the drainage system and the lack of overall responsibility creates difficulties in taking a long-term strategic approach. Different management structures have been reviewed as part of a Department for Environment, Food and Rural Affairs-funded scoping study on IUDM, which recommended identifying a lead body to organise the partnerships.<sup>74</sup>
- 4.85 The increasing urgency to improve the management of urban drainage, reduce the risk of flooding and respond to climate change, combined with the evident benefits to the natural urban environment of effective drainage management means that there are powerful arguments for the implementation of IUDM (including SuDS) to be given much higher priority.
- 4.86 **We recommend that the UK government and devolved administrations promote a strategic and integrated approach to the urban drainage system. As part of this, we recommend that the Department for Environment, Food and Rural Affairs, the Department for Communities and Local Government and their devolved equivalents:**
- **clarify ownership and responsibility for the long-term maintenance of every element of surface water drainage systems, including sustainable drainage systems (SuDS);**
  - **bring forward reforms to ensure that SuDS are the preferred option, and are incorporated wherever feasible in all new urban drainage schemes within five years;**



- amend Section 106 of the Water Industries Act 1991 in England and Wales to encourage the use of SuDS; and
- promote the role of SuDS in strengthened planning policy statements and guidance on the natural environment (4.97) and elsewhere (such as planning policy on biodiversity, climate change, flooding, pollution and housing).

### GREEN ROOFS

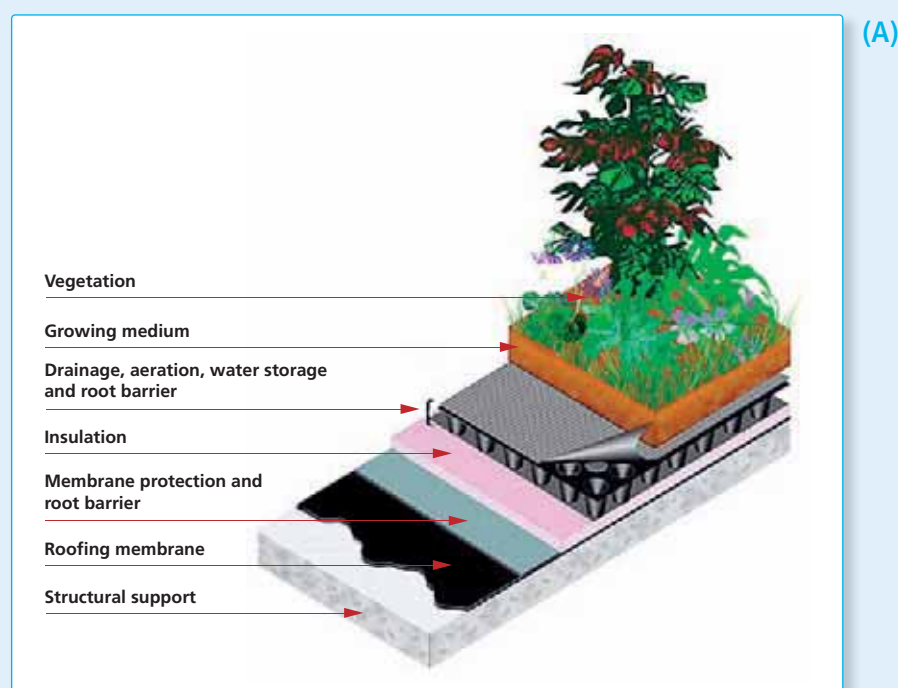
4.87 Although part of the built environment, green roofs can be considered as a type of sustainable drainage system which, if well designed, provide valuable wildlife habitats and have a range of other qualities that make them a useful component of the urban natural environment. Green roofs are the modern day successors to the traditional turf roofs which have been widespread across northern Europe for hundreds of years. Today's green roofs are made up of a natural or semi-natural habitat planted in an artificial membrane (box 4D). The habitats can be formed of low-growing herbs and grasses, specialised plants adapted to drier conditions (for example, succulents like sedums) or open stony or rubble-based habitats with scattered wild flowers. Some habitats require little or no maintenance, although more complicated designs can require irrigation and tending. In all cases, the additional roof layers need to be constructed to ensure they protect the building underneath from moisture and do not overload the structure. Different designs are available for flat, sloping, inaccessible and lightweight roofs.

#### BOX 4D

#### CONSTRUCTION AND BENEFITS OF GREEN ROOFS

FIGURE 4-IV

#### Green roofs





(B)



(C)

(A) Structure of a green roof<sup>75</sup> (B) Green roof at Canary Wharf<sup>76</sup> (C) Green roof in the City of London with intensive planting<sup>77</sup>

The benefits of green roofs can be categorised as:

**Ecological** – slowing and reducing storm water run-off, providing wildlife habitats and green space in densely built-up areas, reducing the urban heat island effect through evaporative cooling and reducing air pollution.

**Amenity** – providing roof-top gardens, improved visual amenity and psychological benefits.

**Technical** – protecting the roof surface (particularly from ultraviolet damage), providing thermal insulation and amelioration of extremes of temperature and humidity, providing acoustic insulation and increasing the efficiency of any photovoltaic cells, since these work more efficiently as a result of the cooling effect of the green roof.

**Financial** – green roofs can reduce longer-term maintenance and running costs. The capital cost depends on the type and size of roof, with some advantages of scale; in the UK, costs are around £20 to £60/m<sup>2</sup>.<sup>78</sup>

4.88 Green roofs are encouraged by planning policies in some US cities such as Seattle and Portland. In Europe, Germany has led the way by encouraging new technologies, imposing legislation that requires green roofs for particular types of development and, in about 30 of the largest cities, providing direct financial aid to cover 25-100% of the installation costs.<sup>79</sup> As a result, the approach is well established and green roofs are now a part of normal practice for industrial and residential developments.

4.89 In the UK, green roofs remain “something of a novelty, and those that have been established are largely for showcase buildings or environmental centres”.<sup>80</sup> However, there has been a growing awareness of the potential benefits of such roofs, partly in response to detailed guidance from

English Nature (now known as Natural England),<sup>81</sup> and we recommend that planning policy is strengthened to promote their uptake (4.97).

## AN INTEGRATED APPROACH TO THE URBAN NATURAL ENVIRONMENT IS NEEDED

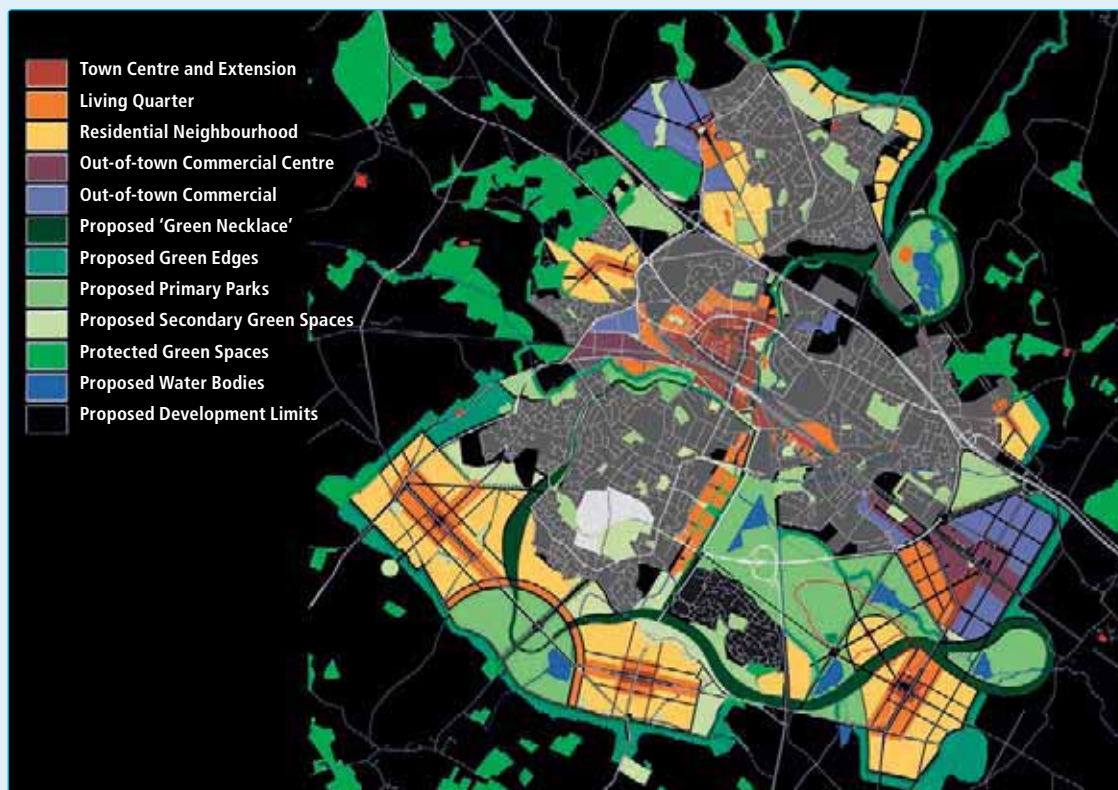
- 4.90 It has been a common practice to compartmentalise urban green space according to its primary function, such as river corridor, brownfield land, park or nature reserve, with little attempt to find a unifying approach that reflects its full environmental and social benefits. While a single site or area is unlikely to deliver the complete range of potential benefits, sites with different primary and secondary uses can be networked together to make a powerful contribution to the way urban ecosystems function. This involves understanding the character of the existing environment and the ways in which new green space can be provided as an integral part of the built environment.<sup>82</sup>
- 4.91 Green networks (including whole river corridors) can help reduce the environmental impact of urban growth areas.<sup>83</sup> The green network planned for the Ashford Growth Area aims to promote integrated water management, biomass energy, biodiversity and conservation of landscape character and local heritage (box 4E).<sup>84</sup> Similar plans have been proposed for the Thames Gateway which emphasise the need to integrate the development of green networks with the statutory planning system (including specific planning policy guidance such as that on housing) at all levels including the Regional Spatial Strategy, the Local Development Frameworks and site development briefs and masterplans.<sup>85</sup>

### BOX 4E

### GREATER ASHFORD DEVELOPMENT AREA

**Greater Ashford Development Area** Up to 31,000 new homes and 28,000 new jobs are planned in Ashford as part of the Sustainable Communities Plan, and the town hopes to use green infrastructure to minimise the environmental impact of the development. There are particular concerns over flood risk as parts of the town and the new development lie within a floodplain. Other considerations include a desire to manage surface water, retain moisture during periods of low rainfall and minimise impacts on greenfield sites. The town's development partners commissioned a study to examine using existing spaces as part of a green network and to create a green girdle around the town. They also examined the possibility of using the town's hinterland to provide biomass for energy and wastewater treatment, and produced a strategy for sustainable drainage to control run-off from new development.<sup>86</sup>

FIGURE 4-V

Ashford's master plan with its green grid<sup>87</sup>

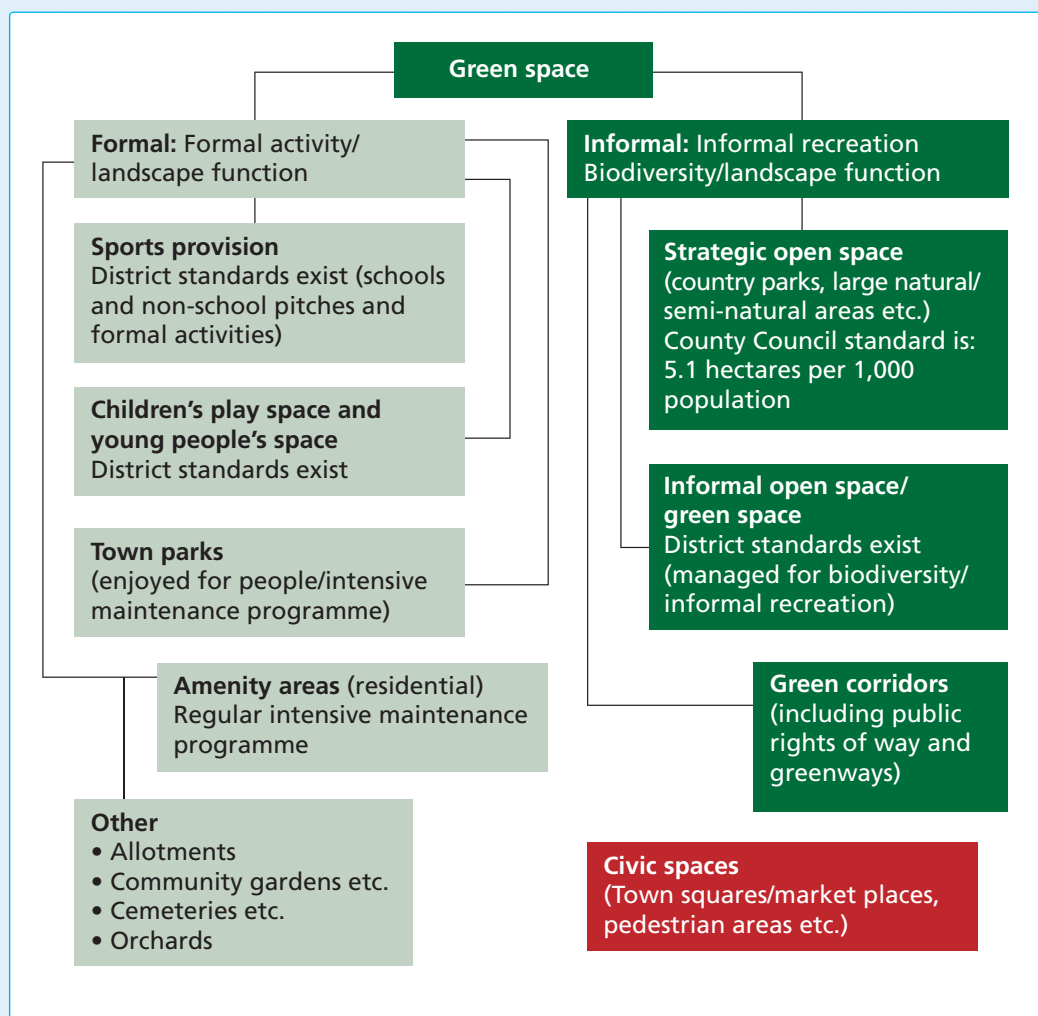
*The proposed parks are shown in light green and yellow. The dark green area threading through the town is the 'green necklace' for water management and recreation, while the thin green line round the edge of the town is the 'girdle' of green space separating the town from its hinterland. Existing built-up areas are shown in grey, with new ones in orange, brown and purple.*

- 4.92 A healthy river corridor can, as in the Ashford example, form a key component of a green network. In the Thames Gateway this has led to an additional subregional planning framework and specific planning guidance for the River Thames itself. In a similar move, Leicester City Council has developed a linear green corridor along the River Soar and the Grand Union Canal, which crosses the entire urban area, connecting the city centre to the rural edge. Other examples include the Stoke-on-Trent River Strategy and the Lower Lea project in London.<sup>88</sup>
- 4.93 Green networks are valuable for existing urban areas as well as new developments, and one of the earliest examples in the UK was created in Telford from the 1970s onwards. It was developed from naturally regenerated and landscaped brownfield sites and now covers some 2,800 hectares, most of which is in public ownership.<sup>89</sup> The network includes all the green spaces in the town, and is accorded formal recognition and protection from development in local planning documents. Other urban areas developing large-scale green networks to bring together multiple environmental, social and economic benefits include Glasgow, London and Cambridge. Approaches used in Cambridge, Europe and the US are outlined in box 4F.

## BOX 4F

## GREEN NETWORKS IN EXISTING URBAN AREAS

FIGURE 4-VI

Hierarchy of green infrastructure in Cambridgeshire<sup>90</sup>

The figure shows a typology of green spaces that Cambridgeshire County Council has suggested could be used to develop green infrastructure. A recent public examination of the East of England Regional Spatial Strategy recommended that the Strategy should identify, protect, create and extend areas and networks of green infrastructure, and that local development documents should define a hierarchy of green infrastructure in terms of location, function, size and use.

**European networks** Green infrastructure plans can be underpinned by more detailed surveys or geographical information system (GIS) based mapping. For example, in Oslo and Stockholm, GIS mapping has been used to identify different habitat types and plan their future use. In Stockholm, core areas are surrounded by zones that act as a buffer between greener areas and urban development, and other zones that provide connectivity between different parts of the network. The plan also identifies areas of high ecological potential that are suitable for restoration. Similarly, Berlin has developed a broad Biotope Strategy for city-wide planning, with the primary objective of using the green infrastructure to deliver ecological services.<sup>91</sup>

**US networks** The US Department of Agriculture and several individual states have promoted the concept of green networks, which now cover a large area. Some encompass mostly natural and semi-natural habitats, but others are of a more mixed or urban character like Florida's Statewide Ecological Network and the Metro Greenways in the Twin Cities, Minnesota.<sup>92</sup> US states employ a variety of measures to assemble land into networks, including the use of bonds, taxes and trusts to buy all or part of a site, legal agreements to restrict the type of land use (known as conservation easements or purchase of development rights), zoning (to limit the density of development or create an urban growth boundary similar to a green belt), conservation banking (where developers can buy credits for habitat protection elsewhere) and designation and notification of sites.<sup>93</sup>

**Green networks design** The ecological principles that should guide the design of green networks are similar to those we described for marine networks in our Twenty-fifth Report. Considerations like habitat size, connectivity, representativeness and rarity are all important.<sup>94</sup> Maturity is also important; the capacity to rebuild biodiversity in an established urban area like the Thames Gateway may be greater than in a completely new urban area or in a relatively impoverished post-agricultural landscape.<sup>95</sup> Making the most of potential benefits for health, communities and local economies will also be crucial, although network design will almost inevitably be constrained to some extent by existing development.

4.94 We are clear, nevertheless, that green networks cannot by themselves change a fundamentally unsuitable development into one that is environmentally sustainable. In this situation, the most they can do is to alleviate the problem before further action needs to be taken. In addition, many of the benefits of green space are local or regional and do not remove the need to find ways to reduce the global (cumulative) impact of urban areas which we consider in the following chapter.

### **IMPROVING THE NATURAL ENVIRONMENT IN URBAN AREAS**

4.95 This chapter has shown that the valuable natural environment in our towns and cities consists of much more than parks and green space. If considered as green infrastructure, it has a host of benefits, particularly for flood and water management, amelioration of climate, biodiversity, health and wellbeing, and these benefits will become ever more important with a move towards high quality, dense urban living which respects environmental limits.

4.96 At present, green infrastructure for the English growth areas is planned according to the rather limited guidance laid out in *Planning Policy Guidance 17: Planning for Open Space, Sport and Recreation*. There is little support for green infrastructure in new developments outside the growth areas or in existing urban centres, despite the encouragement of bodies like CABI Space and Greenspace Scotland.<sup>96</sup> Similarly, while Planning Policy Statement 9 focuses on biodiversity, it does not describe the other benefits of the natural environment in urban areas nor how that environment can be supplemented with green infrastructure. Currently, ecosystem services are not dealt with adequately, or at all, in the planning process. What is needed is integrated guidance, drawing on

the full range of issues covered in this chapter and bringing some, including the health benefits of urban green space, further up the agenda for action.

4.97 **We recommend that the Department for Communities and Local Government and its devolved equivalents amend their planning policy statements and guidance to reflect a broader definition of the natural environment in urban areas and to recognise and protect the role that urban ecosystems can play in improving towns and cities. Planning policy and guidance should describe the range of functions and benefits associated with the natural environment of urban areas, promote the use of green infrastructure and provide a menu of options for planners and developers to use, including:**

- **creation of green networks and green infrastructure;**
- **urban river restoration;**
- **the use of green and built infrastructure for flood storage and redirection;**
- **the use of sustainable drainage systems, including green roofs; and**
- **the promotion of urban trees and woodland.**

4.98 In particular, these documents should cover: ecosystem functions and connectivity; social, economic and health benefits; and the wider value of urban biodiversity. The advice should also be reflected in other relevant planning policy and guidance on topics such as biodiversity, climate change, flooding and housing, and the proposed Code for Sustainable Homes,<sup>97</sup> the interim code of practice on SuDS, and the Sustainability Checklists produced by Regional Development Agencies. These should be underpinned by more detailed guidance along the lines of the Town and Country Planning Association's *Biodiversity by Design*<sup>98</sup> and the London Development Agency's *Design for Biodiversity*<sup>99</sup> to provide information on case studies, costs, benefits and sources of funding.

## CONCLUSIONS

4.99 The natural environment should be at the heart of urban design and management. Green infrastructure (from individual trees to private gardens, parks and healthy river corridors) can reduce the environmental impact of urban areas and help them respond more flexibly to a changing set of environmental challenges, including climate change. At the same time, multi-functional green space and green networks can do much to make towns and cities good places in which to live, helping to respond to the needs of all parts of society, including families with children, the elderly and the less well-off, by providing local amenities and encouraging exercise and recreation with real benefits for health and wellbeing. And yet much of the integrity of the natural environment within towns and cities is being weakened by inappropriate development, poor design and management, and a lack of awareness of its potential.

4.100 It will, however, be challenging to realise the benefits of improving the natural urban environment without changes in institutions, infrastructure and the availability of information and skills, which should be delivered through stronger planning guidance on the natural environment, and other measures including:

- changes in policy and practice to recognise and protect urban ecosystems and the services they provide;
- changes in planning, legal and regulatory frameworks to deliver a more flexible approach to environmental problems, making effective use of green infrastructure (such as SuDS and green roofs) rather than relying heavily on hard engineering;
- a requirement for local authorities to have a plan for managing and improving the natural environment in an integrated way and the capacity and skills to deliver this (for example, through training for planners and land managers on managing the natural environment);
- the establishment of partnerships to create and manage green infrastructure projects as part of a wider network. For example, individual sustainable drainage systems may be simple in themselves, but they need to be integrated in a way which works at the catchment as well as the local level, and complements existing infrastructure; and
- involvement of local communities to ensure that green networks and individual projects are well suited to the area to meet local people's aspirations and needs.



# Chapter 5

## THE BUILT URBAN ENVIRONMENT

*Buildings and urban infrastructure have major impacts on the environment. There is an urgent need to improve their environmental performance and ensure that new urban areas are constructed to increasingly challenging standards.*

### INTRODUCTION

- 5.1 The built environment – buildings, supporting infrastructure and public spaces – is a defining characteristic of towns and cities, and for many people it is fundamental to their experience of urban life. The built environment evolves over time, for the most part slowly and incrementally; according to some estimates, for example, at current rates of turnover an average dwelling in the UK would have a lifetime of around 1,000 years.<sup>1</sup> Change is more rapid in areas of renewal and regeneration, while new settlements and major extensions offer unique opportunities for imaginative and attractive urban planning and design. It is impossible to predict with accuracy the social and technological context in which urban areas will need to operate in the future. This means that plans must be sufficiently flexible to allow adaptation to meet future needs.
- 5.2 Buildings and urban infrastructure have major implications for the environment. The built environment directly affects the quality of urban living and creates a sense of place, though in too many instances this contribution has not been positive. Less directly, the ways in which people interact with the built environment give rise to diverse environmental impacts including, for example, carbon dioxide emissions, floods and over-abstraction of water resources. Unless such factors figure prominently in development and refurbishment – and particularly in planning, design and construction – urban areas are unlikely to be environmentally sustainable or fit for purpose in the longer term.
- 5.3 Many recent reports, including those by the Urban Task Force<sup>2</sup> and CABI Space,<sup>3</sup> have attempted to define the characteristics of a ‘desirable’ urban area. Alongside green space and enhanced biodiversity, aspects of the built environment are prominent among such characteristics. They include, for example:
- diverse, good quality building and housing stock with access to high quality public spaces;
  - good transport links and ease of movement;
  - clean, attractive public spaces and buildings;
  - attention to aesthetics, heritage and sense of place;

- a vibrant and diverse street culture, with participation of people in a wide range of activities;
  - facilities and services for people of all ages (e.g. schools, hospitals, sheltered housing, day-care centres);
  - the provision of jobs; and
  - fitness for surrounding environmental conditions.
- 5.4 In policy statements, the emphasis on each of these characteristics varies. For example, the Department for Communities and Local Government (DCLG) has set out the ‘liveability agenda’ in England to create places “where people choose to live and work”, a key part of which is a liveability fund to manage and maintain public spaces.<sup>4</sup> At a more local level, Glasgow’s City Plan includes key issues and actions concerning people, jobs, infrastructure and the environment.<sup>5</sup> The guiding environmental principle is “... that Glasgow will be a sustainable city that is characterised by a good quality environment that will provide an enhanced quality of life for all of its residents, help attract visitors and investors to the City and enhance biodiversity”.<sup>6</sup>
- 5.5 The Urban Task Force acknowledges that “since the industrial revolution, we have lost ownership of our towns and cities, allowing them to become split by poor design, economic dispersal and social polarisation”.<sup>7</sup> Economic, social and environmental considerations are often in tension. Environmental factors are often either excluded, or added as an after-thought. We see an urgent need for integrated design that builds in the features that encourage better environmental and health-related outcomes.
- 5.6 We begin by examining transport, water and urban energy systems, as well as the design and efficiency of individual buildings, and then discuss the challenges of significantly improving the UK’s domestic and commercial building stock in terms of resource consumption and carbon dioxide emissions. The chapter concludes with a discussion of planning and design principles that should underpin attractive, successful, liveable and healthy urban environments, and we review the tools for achieving these objectives through design.
- 5.7 We have no doubt that there is an urgent need to improve the environmental performance of existing buildings and other infrastructure, and to ensure that new urban areas are constructed to increasingly challenging standards. However, improving the urban fabric is only part of the answer. Buildings and the systems that service them have socio-technical characteristics, so that their use and environmental impacts are affected by social, cultural and behavioural norms, and by economic considerations, as much as by construction methods and technologies; indeed all of these factors interact.<sup>8</sup> Although we focus in this chapter on structures and design, we are convinced of the need for a better understanding of these interactions if we are to progress towards more environmentally sustainable urban areas.

## IMPROVING EXISTING FEATURES OF THE BUILT URBAN ENVIRONMENT

### TRANSPORT

- 5.8 Transport is a crucial factor shaping towns and cities and can be both a driver and a consequence of decisions affecting land use and the built environment. We were struck by how many of those submitting evidence for this study insisted that getting transport right was of fundamental importance for both existing and planned urban areas. The need to reduce road traffic and its serious negative impacts is widely acknowledged, as are the implications that people should travel less, or travel by more environmentally sustainable means. There is a broad consensus that moving in this direction must involve a combination of measures including urban design, efficient public transport, economic instruments, traffic management and behavioural change.
- 5.9 We do not discuss transport issues in great depth in this report, as we have analysed them extensively in previous reports. Our Eighteenth and Twentieth Reports on transport and the environment, published in 1994 and 1997 respectively, set out a number of key objectives, including the integration of transport and land use policies and the reduction of car-dependence. An independent review of progress in 2002 and our own assessment since, found that of the sixteen targets we set to reduce transport impacts, only two were likely to be met in full (table 5.1). The other targets had been missed or only partly achieved; in some cases there were insufficient data to assess progress.<sup>9</sup> These failures, in spite of significant developments in transport policy, have substantial implications for the quality of life within urban areas, and for their impacts on the wider environment.

**TABLE 5.1**

**Summary of progress towards the targets of the Eighteenth Report, Transport and the Environment, reviewed in 2002<sup>10</sup>**

Target	Progress
To achieve full compliance by 2005 with World Health Organization (WHO) health-based air quality guidelines for transport-related pollutants	Mostly met but some exceedences
To establish in appropriate areas by 2005 local air quality standards based on the critical levels required to protect sensitive ecosystems	Not under active consideration
To reduce the proportion of urban journeys undertaken by car from 50% in the London area to 45% by 2000 and 35% by 2020, and from 65% in other urban areas to 60% by 2000 and 50% by 2020	2000 target for London not met; 2000 target for other urban areas nearly met; meeting 2020 targets might prove difficult
To increase cycle use to 10% of all urban journeys by 2005, compared to 2.5% now (1994), and seek further increases thereafter on the basis of targets to be set by the government	Not likely to be met, as cycle use in urban areas is declining; <i>2005 update: cycling is now increasing, albeit from a low base level.<sup>11</sup></i>

To reduce pedestrian deaths from 2.2 per 100,000 population to not more than 1.5 per 100,000 population by 2000, and cyclist deaths from 4.1 per 100 million kilometres cycled to not more than 2 per 100 million kilometres cycled by the same date	Target for reducing pedestrian deaths met; target for reducing cyclist deaths was not
To increase the proportion of passenger-kilometres carried by public transport from 12% in 1993 to 20% by 2005 and 30% by 2020	Increasing, but a faster rate is needed to meet 2005 and 2020 targets; <i>2005 update: no overall data available.</i> <sup>12</sup>
To increase the proportion of tonne-kilometres carried by rail from 6.5% in 1993 to 10% by 2000 and 20% by 2010	2000 target not met; significant improvement needed to meet 2010 target
To increase the proportion of tonne-kilometres carried by water from 25% in 1993 to 30% by 2000, and at least maintain that share thereafter	2000 target not met
To reduce emissions of carbon dioxide from surface transport in 2020 to no more than 80% of the 1990 level	Not likely to be met on current projections
To limit emissions of carbon dioxide from surface transport in 2000 to the 1990 level	2000 target not met
To increase the average fuel efficiency of new cars sold in the UK by 40% between 1990 and 2005, that of new light goods vehicles by 20%, and that of new heavy duty vehicles by 10%	Figure for cars not met; insufficient data to assess progress for other vehicles; <i>2005 update: figure for cars not met. No data for other vehicles.</i> <sup>13</sup>
To increase the proportion by weight of scrapped vehicles which is recycled, or used for energy generation, from 77% at present (1994) to 85% by 2002 and 95% by 2015	Increasing, but technical and incinerator capacity problems might make meeting targets difficult
To increase the proportion of vehicle tyres recycled, or used for energy generation, from less than a third at present (1994) to 90% by 2015	Significant recent improvements and target may well be met before 2015
To double the proportion of recycled material used in road construction and reconstruction by 2005, and double it again by 2015	No information exists to determine whether target might be met
To reduce daytime exposure to road and rail noise to not more than 65 dBLAeq.16h at the external walls of housing	No complete information exists to determine whether target might be met
To reduce night-time exposure to road and rail noise to not more than 59 dBLAeq.8h at the external walls of housing	No complete information exists to determine whether target might be met

*The table shown here is as originally published in 2002, but with some updates to illustrate progress against 2005 targets.*

5.10 A major reason for the failure to meet these targets is growth of road traffic. This is not only a problem in the UK. Private car ownership and use have increased significantly across the European Union in recent years.<sup>14</sup> The length of the average journey by private car in an urban area increased by 20% during the 1990s.<sup>15</sup> The growth in long-distance commuting and non-work related activities are creating the increase in journey length.<sup>16</sup> This trend is set to continue unless action is taken, with the distance travelled in urban areas by road transport in Europe

predicted to rise by 40% by 2030 relative to 1995.<sup>17</sup> Problems are compounded because fear of traffic, along with noise, pollution and a generally hostile road environment, deters people from travelling in less environmentally damaging ways. In a recent survey, 47% of people said they would cycle more and 65% said they would walk more if problems with traffic were addressed (figure 5-I).<sup>18</sup> The fact that, in spite of substantial efforts, transport trends are moving in the opposite direction to that desired is indicative of the complex web of constraints that we outlined in Chapter 1 (figure 1-I).

**FIGURE 5-I**  
**Modes of transport**



- 5.11 Another problem has been the lack of a coherent framework for different elements of transport and land use policies. It is widely accepted, for example, that the physical form of urban areas has significant implications for travel patterns. Relatively compact and mixed use developments have the potential to reduce travel needs, make local facilities more viable and accessible, and encourage the use and provision of public transport, where available. In contrast, when housing, employment and services are widely separated, and facilities can only be accessed by car, lengthy journeys become a necessity rather than a choice, and those without access to a car may suffer a new dimension of deprivation (figure 1-I).
- 5.12 These issues have been taken up in planning policy guidance on transport and in policies on development densities.<sup>19</sup> But the appropriate policies have sometimes been difficult to implement, especially in competitive environments,<sup>20</sup> and good urban design is not the only condition necessary to encourage environmentally sustainable transport. It must be part of a wider package containing disincentives to travel by car. Similarly, a well integrated, efficient, convenient, predictable and reasonably priced public transport system is invariably included among the desirable characteristics of a good urban area, but experience suggests that this too needs to be part of an integrated transport strategy if it is to result in a reduction of car use.

- 5.13 There are some success stories. Experience with London's congestion charge shows that urban traffic can be reduced as a result of active and innovative public policy. In this case, a combination of policies – a congestion charge, substantial investment in public transport (particularly the bus system), the introduction of the Oyster smart card and a reallocation of space and priority to public transport – were implemented together, representing a considerable act of political will. While London is in many respects unusual, not least in terms of its socio-economic and transport infrastructure, there are clearly lessons to be learned.
- 5.14 Although there are exemplary developments in some areas, traffic growth and the related web of constraints make the shift towards environmentally sustainable urban transport systems more difficult than numerous reports and strategies have implied. Progress in many existing urban areas in the UK has been frustratingly slow. We believe that the time has now come to drive further progress through the adoption of demanding traffic reduction targets, through the mechanism of Local Transport Plans.
- 5.15 Great Britain is one of only two areas in the EU that have a legal requirement for local transport management plans (Local Transport Plans).<sup>21</sup> Plans exist in Northern Ireland, but have no formal legal status. Introduced in 1998, these plans require local authorities to develop objectives for the planning and delivery of local transport. A key requirement is for local authorities to address the role and potential of local transport in delivering a “better quality of life”.<sup>22</sup>
- 5.16 **We recommend that the government develops and strengthens requirements for Local Transport Plans, such that by the end of 2008 they can include statutory targets for reduction in urban traffic.**
- 5.17 New development should offer an ideal opportunity for integrated land use and transport policies which reduce both the need to travel and its impacts. Instead, new communities in the UK are expected to contribute substantially to traffic growth. According to one study, development in areas such as the Thames Gateway and satellite communities in Hampshire, Kent and Hertfordshire are likely to create “longer distance commutes, and an additional 38% capacity needed on the transport network to provide for an additional 6 million trips per day”.<sup>23</sup>
- 5.18 A key consideration is whether people have access to public transport when they move in to a newly developed area. If public transport provision is deferred, people will have to acquire and use cars and their established choices will be difficult to change. While a number of developers and development agencies readily accept the principle that public transport should be provided from the outset in a new development, this does not often translate into practice in the UK. When funds are limited, the public transport element may be downgraded or lost altogether from the final scheme, even if the housing or commercial development goes ahead.

- 5.19 We have heard, for example, in Ashford, that the express bus link will be implemented in stages, by bringing together existing park and ride schemes, rather than providing a strategically designed service from the outset.<sup>24</sup> Yet we know of European schemes, for example, in Vienna, where bus and tram routes are running before people move into a new area to ensure that sustainable transport choices are available when they do.
- 5.20 We are concerned that there is so much uncertainty about the provision of environmentally sustainable transport systems in development areas, despite transport being a key component of DCLG's Sustainable Communities Plan.
- 5.21 **We recommend that before development plans are approved, the government publishes a clear assessment of the transport infrastructure needs for all proposed housing growth, how they will be funded and the environmental and health impacts of meeting those needs. This should be accompanied by a clear plan for phasing in the necessary supporting infrastructure, such that new transport provision is environmentally sustainable.**

### **ENERGY SUPPLY**

- 5.22 Given the urgency of delivering a major reduction in carbon dioxide emissions, a strategic approach to planning for energy in new and existing urban areas is essential.<sup>25</sup> On the supply side, a low carbon, urban energy strategy should mandate greater use of renewables and Combined Heat and Power (CHP). On the demand side, reduction of energy use and greater conservation must be encouraged.
- 5.23 CHP requires relatively large, fixed investments, with significant financing implications. Net densities of 100 people per hectare (or about 40-50 dwellings per hectare) are the minimum densities for CHP district heating, making its use more viable in high density urban areas than in low density suburban or rural areas.<sup>26</sup> Another problem is that, in recent decades, major power stations have been located outside urban areas, making it uneconomic to pipe their waste heat into cities. However, the need to replace a substantial quantity of power generation capacity by 2020 and for substantial urban new build and regeneration, provides major opportunities for large-scale gas-burning CHP programmes in urban areas. Although there are potential air quality issues inherent in repatriating power generation to urban areas, there would be off-setting benefits arising as a result of the removal of individual combustion-based heating systems from the areas benefiting from CHP.
- 5.24 CHP systems can also meet a demand for cooling through using waste heat with absorption chillers. This will be particularly important as an alternative to the rising use of electric air conditioning systems. With climate change predicted to increase average temperatures and the heat island effect within cities, it is essential that energy efficiency is considered in terms of both heating and cooling.

- 5.25 In London, the Mayor plans to make CHP district heating a practical reality through decentralising energy generation. Decentralised energy entails local generation of a significant proportion of the energy consumed in homes, offices, shops and public buildings.<sup>27</sup> Currently, it relies largely on the use of existing, technically proven solutions based on conventional energy sources, with some small-scale renewable energy generation. The installation of CHP plants and community heating networks capable of distributing heat from different fuel sources would offer flexibility in meeting heat demand in the coming decades.
- 5.26 In the report informing the Mayor's decision, two scenarios are presented, assuming the growth estimates set out in the London Plan.<sup>28</sup> Both show the clear potential to meet a significant amount of London's heating and electricity needs by 2025 by decentralised means.<sup>29</sup> Scenario one conservatively estimates that adoption of a low level decentralised energy generation strategy can reduce carbon dioxide (CO<sub>2</sub>) emissions in London by 28% by 2025 (from 2005 levels), while providing London with 30% of its heat demand. Scenario two indicates that if a high decentralised energy strategy is adopted, CO<sub>2</sub> emissions would drop by 36% below 2005 levels, providing 50% of heat demand.
- 5.27 Some urban areas already have decentralised energy generation. In the Netherlands 40% of electricity is created using decentralised systems; in Finland 98% of Helsinki is heated by community networks. Some examples of local energy generation are presented in box 5A.

#### BOX 5A

#### EXAMPLES OF LOCAL ENERGY GENERATION

**District heating in Copenhagen** After the 1973 oil crisis the Danish government decided to reduce its energy demand and hence its reliance on imported energy supplies. In 1976, the government drew up a plan to supply energy in the form of district heating and Combined Heat and Power (CHP). As a result of this plan, 98% of properties in Copenhagen are now supplied by district heating produced by CHP plants either burning natural gas or municipal waste. This has increased energy efficiency, and the energy consumption for space heating has fallen by 30% between 1972 and 1995.<sup>30</sup>

**Cutting carbon dioxide emissions in Woking** Woking Borough Council (WBC) is a good example of how environmental entrepreneurs working within a local authority have inspired innovative action on climate change that has gone well beyond central government's minimum requirements. Between 1990/91 and 2004, WBC managed to reduce its energy consumption by 49% and its CO<sub>2</sub> emissions by 77%,<sup>31</sup> while those from the town fell by 17%. The CO<sub>2</sub> savings were achieved in a variety of ways, but the two most innovative aspects were:

- the establishment of a revolving fund to recycle money from energy efficiency savings into a capital fund for projects on renewables, and energy and water efficiency; and
- the creation of the first private wire electricity distribution network in the UK so that WBC can supply council offices and residential properties with power from its own generating sites.



The Council's recent Climate Change Strategy aims to go even further and reduce CO<sub>2</sub> emissions from the Borough as a whole by 60% by 2050 and by 80% by 2100.

**Merton policy on renewable energy** The London Borough of Merton has adopted a planning policy designed to encourage energy efficiency and renewable energy. This states that “the council will encourage the energy efficient design of buildings and their layout and orientation on site. All new non-residential development above a threshold of 1000 sqm will be expected to incorporate renewable energy production equipment to provide at least 10% of predicted energy demand.”<sup>32</sup>

The Merton policy had a difficult birth. It grew out of a personal interest in climate change and the Borough's Local Agenda 21 Environmental Action Plan.<sup>33</sup> It was then included in the draft Unitary Development Plan in 2000, but there were two objections to the policy. The Government Office for London cited Planning Policy Guidance on Renewable Energy (PPG22) and said a policy such as Merton's “should not be included unless it has been demonstrated to be reasonable and feasible”; while the Chartered Institute of Professional Development said parts of the policy made “unacceptable and unjustified requirements” that “could impose significant additional costs on development”.<sup>34</sup> However, the Government Inspector upheld the policy noting that the UK has a target that 10% of electricity should come from renewable energy by 2010, and that Regional Planning Guidance “advises authorities to use their development control and building regulations processes” to incorporate renewable energy in new developments. The amended policy was approved in 2003.

Following this decision, changes were made in the drafting of the new Planning Policy Statement on Renewable Energy (PPS22) issued in 2004. This states “Local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments.” However, the guidance contains two important caveats: that the policy should apply only where it is viable, and it should not place undue burdens on developers.<sup>35</sup> Planning policy was further strengthened by a Ministerial Statement in 2006 (which has the weight of a material consideration in the planning process) to the effect that local authorities are expected to include policies like Merton's in their development plans.<sup>36</sup>

To date, over 120 English local authorities have a draft or fully adopted policy similar to Merton's in their development plan, and around 39 of these are prescriptive and contain targets.

- 5.28 In London, the Mayor has used his planning powers to help decentralise energy generation, and Scotland is taking the same route. It has, however, proved more difficult in other parts of the UK. In England, Planning Policy Statement 22 recognises that “small scale renewable energy schemes can be incorporated into new developments and some existing buildings”, and that “local planning authorities should specifically encourage such schemes through positively expressed policies in local development documents”.<sup>37</sup> It also states that local authorities should consider energy needs and supply over the long term before granting planning permission for all new developments – especially for heating and cooling.

- 5.29 Although central government has started to encourage local authorities to take account of energy issues in planning consents, the London Mayor has already gone further by announcing in September 2006 that local councils will be *required* to insist that 20% of energy in substantial new developments come from renewable sources.<sup>38</sup> The new Planning Policy Statements on Climate Change will provide a landmark opportunity to show how the planning process can be used to deliver renewable and more sustainable forms of energy and to encourage more fuel-efficient technologies.<sup>39</sup>
- 5.30 **We recommend that the new Planning Policy Statements on Climate Change require all new developments beyond a certain size to incorporate a strategic approach to energy planning and provision, that takes all opportunities to optimise the use of low carbon technologies, renewables, microgeneration and Combined Heat and Power, as appropriate, and in sympathy with air quality management objectives.**

## WATER INFRASTRUCTURE

### *Pressures on water supply*

- 5.31 Continued urban growth is putting severe pressure on water supply, to the extent that water resources will become a major problem in some areas of the UK, particularly in South-East England and some urban areas in Scotland such as Dundee and Edinburgh.<sup>40</sup> Recent modelling by the Environment Agency suggests that continued housing growth in the south-east will only be possible if new water resources, such as reservoirs, are created and, at the very least, if an 8% reduction in per capita consumption is achieved in the new homes that are built.<sup>41</sup>
- 5.32 However, the provision of major infrastructure such as reservoirs incurs large financial and environmental costs, may take 15 to 20 years to implement and often meets strong public opposition.<sup>42</sup> DCLG has stated its belief that “effective systems are in place to ensure effective forecasting of water demand, and good management of the demand/supply balance”.<sup>43</sup> However, research suggests that by 2025 without substantial additional provision of water infrastructure, the Ashford Growth Area and parts of Milton Keynes and the South Midlands Growth Area would have a daily deficit of between 5 and 14 megalitres, while parts of the Thames Gateway Growth Area would have a daily water deficit of between 15 and 39 megalitres.<sup>44</sup>
- 5.33 **We repeat the recommendation from our Twenty-third Report on Environmental Planning that development allocations should not be made until it has been established that water supply and management can be provided in an environmentally sustainable manner. We recommend that the environment agencies are made statutory planning consultees with regard to environmental constraints on water for a given catchment area.** We understand that legislation passed by the Scottish Parliament and awaiting Royal Assent (as at November 2006) would provide for the Scottish Environment Protection Agency to take on this role in Scotland.

- 5.34 As well as water infrastructure there is a need to increase the efficiency of water use in buildings, which we explore in 5.78-5.84.

### *Sewerage systems*

- 5.35 Most water supplied in urban areas is removed by the sewerage system, which also collects rainwater draining from roofs, roads and other impermeable surfaces. Increased urban growth will put pressure on the systems, which require investment to make them robust in the current demand context and also to provide the capacity to meet future levels of use. These factors combined with the impact of the more stringent standards imposed under the EC Water Framework Directive, mean that significant investment in infrastructure is required.
- 5.36 Housing developments built before the Second World War, are usually connected to a combined sewer system, where both foul water and storm water are combined. Foul water is transferred directly to the sewage treatment works. However, in times of heavy rainfall, excess foul water can be discharged directly into watercourses.
- 5.37 Most later developments have separate sewer systems: storm water from gutters and roads travels via storm sewers directly to rivers, whereas foul water travels by foul sewer directly to a sewage treatment works or to an existing part of the combined sewer network. However, sometimes cross-connections have been made in domestic properties such that foul water is directed into storm sewers, which discharge directly to rivers. Only 1 in a 100 storm sewers need to have a wrong connection for there to be an adverse impact on watercourses, and we received evidence that the cross-connection rate is higher than this.<sup>45</sup> Wrongly connected sewer systems result in untreated sewage being discharged into urban rivers, damaging freshwater ecosystems and posing risks to human health, including hepatitis A, hepatitis B and *E. coli*. The age of the sewer system is also a problem as leaking sewers result in diffuse urban pollution of groundwater.<sup>46</sup> Improvements to the combined sewer system have begun to be addressed by recent water company investments, so that they will discharge untreated sewage less regularly. However, cross-connections have not yet been tackled.
- 5.38 Treated sewage is normally discharged into rivers, which presents problems during low flows in the summer. Sewage needs to be treated to the appropriate standard if it is not to place additional nutrient and organic load on river systems. It is clear that there has been a failure to consider fully the environmental constraints of wastewater treatment in policy and planning regimes, and development locations in the south-east are already constrained by wastewater disposal problems.<sup>47</sup>
- 5.39 **We recommend that the government and devolved administrations require water companies to produce and implement long-term strategic plans for sewage and wastewater treatment in consultation with the relevant environment agencies, and that these plans are fully taken into account by relevant authorities in development planning.**

These plans should identify the action needed to deliver the necessary investment in sewage and wastewater infrastructure and to deal with the implications of deteriorating assets, the requirements of the EC Water Framework Directive, urban growth and climate change.

### *Long-term planning*

5.40 The House of Lords Science and Technology Committee's report on water management in England and Wales (2006) considered the state of water resources and the respective roles of the water companies, regulators and government. In particular, the Committee looked at the issue of demand management and the impacts of the government's Sustainable Communities Plan. It raised concerns, which we fully share, that housing growth plans have not been factored in to the water companies' long-term plans and recommended that this is rectified as a matter of urgency. We support this recommendation. It is also vital that the environmental impacts of over-abstraction and water pollution on water resources are integrated in long-term plans. We also support the Committee's recommendation that there needs to be a more holistic approach to water management and that there should be a partnership between the different bodies and organisations involved.

### *Water leakage*

5.41 In England and Wales, Ofwat sets an 'economic level of leakage'. This standard only gives minimal consideration to the environmental impact of leakage. This system is now under review and we welcome the focus on the environmental and social costs mentioned by Ofwat in their consultation document.<sup>48</sup> Leakage levels have been reduced by nearly 30% in England and Wales since the 1990s, although Thames Water still has significant problems in London, which has the highest rate of leakage in England and Wales, entailing the loss of 253 litres per property per day in 2005-06.<sup>49</sup> This is due in part to the fact that a third of the mains system is over 150 years old and movement of the London clay in which the pipes are buried causes damage to the pipes. Given the scarcity of water in a number of regions in the UK, it is clearly an environmental imperative to lower leakage rates as soon as possible.

5.42 Leakage rates are even higher in Scotland. As Scottish Water is publicly owned, the responsibility for tackling this issue lies with the Scottish Executive; but there are as yet no regulations to bring down the level of leakage.

5.43 **We recommend that Ofwat (the Water Services Regulation Authority) sets more stringent leakage targets for water companies supplying urban areas in the south and east of England and that these targets reflect the scarcity of water resources and the environmental impacts of the additional compensating water abstraction that is required. We also recommend that the Scottish Executive sets leakage reduction targets for Scottish Water, particularly for areas of water scarcity.**

## ENERGY USE IN BUILDINGS

5.44 Buildings are responsible for more than 45% of total UK carbon dioxide (CO<sub>2</sub>) emissions, with 27% of the total emitted from domestic dwellings.<sup>50</sup> To help reduce CO<sub>2</sub> emissions from housing and contribute to the UK goal of a 60% reduction in CO<sub>2</sub> emissions by 2050, both new and existing homes must become much more energy efficient. The current uptake of energy efficiency measures is not sufficient to offset rising demand for energy from households. Research shows that a 60% reduction in CO<sub>2</sub> emissions from housing would be technically possible through a combination of major improvements to the building fabric (for example, cavity wall and roof insulation, draught proofing windows, and insulation of floors and solid walls throughout the housing stock), substantial increases in the energy efficiency of lights and appliances, and the installation of low and zero carbon technologies (LZCs)<sup>51</sup> to provide renewable energy to buildings (figure 5-II). The combination of measures will be important – any one of these interventions on its own will not be sufficient.

**FIGURE 5-II**  
Example of a zero-carbon dwelling, East London<sup>52</sup>



5.45 Non-residential buildings account for approximately 20% of CO<sub>2</sub> emissions in the UK. Energy efficiency measures are therefore vital for non-residential as well as residential buildings. These can be achieved through physical and practical design changes that improve the way people work as well as producing environmental and cost savings, for example, by:

- maximising the use and quality of daylight to enhance the working environment and thus reduce the use of artificial light;

- minimising the need for air conditioning;
- optimising passive aspects of the construction materials commonly used in buildings. ‘Heat’ or ‘cool’ can be stored in the structure, moderating temperature swings during the day and reducing the heating or cooling loads on boilers or air conditioning; and
- adopting designs for easy reconfiguration during medium-term occupancy and for future occupants.<sup>53</sup>

5.46 Given its prevalence, the environmental impact of air conditioning in commercial premises is an important issue. Air conditioning provision is rising and, if current trends continue, it is estimated that 40% of commercial floorspace will be air conditioned by 2020, compared with 10% in 1994.<sup>54</sup> This could be tackled through good building design, which can help to keep indoor temperatures more comfortable through a variety of techniques, including passive cooling and the provision of good ventilation and appropriate use of solar shading and active facades. Recent surveys suggest that occupants prefer naturally ventilated buildings. For example, US research has shown that occupants of naturally ventilated buildings are comfortable over a much wider range of temperatures compared to occupants of air-conditioned buildings, primarily because the higher degree of personal control shifts expectations and preferences.<sup>55</sup>

5.47 The introduction of the wide range of technologies available to deliver more environmentally sustainable buildings needs to be accelerated through a package of policy measures. These would include comprehensive and freely-available information about building energy performance; increasingly stringent standards for commercial, industrial and domestic buildings (new and refurbished), as well as effective enforcement to ensure implementation; and financial incentives to make energy saving more financially attractive. In our view, lower energy use in buildings is much more likely to be achieved and maintained when technological improvements are complemented and reinforced by greater awareness of energy use and behavioural change.

### *Information provision*

5.48 The EU Energy Performance of Buildings Directive (EPBD) is an important driver to improve the environmental performance of buildings. It requires new and existing homes, public sector buildings and commercial properties to display an energy rating when the building changes hands. Partly in response to this Directive, the government has introduced a range of initiatives to increase greatly the information available to householders about the energy use of buildings (box 5B). The EPBD requires Member States to review their Building Regulations every five years, although we consider that this may be too long a period to give the required impetus to improvements. The construction industry is still awaiting the government’s plan for implementing the EPBD’s requirements in respect of Building Regulations for non-domestic buildings.

**BOX 5B****MAKING HOUSEHOLDS AWARE OF ENERGY COST AND PERFORMANCE**

**Energy Performance Certificates** will provide buyers and sellers with A-G ratings reflecting the energy efficiency of their homes. They will be similar to labels on appliances and it will be mandatory to include them in Home Information Packs which, from June 2007, all sellers of property must provide to potential buyers. The existence of the certificates will for the first time provide a universal objective basis for possible fiscal or other financial incentives (such as 'green mortgages') to improve homes.

**Home Condition Reports** will provide more detailed information about the physical condition of the property and, therefore, what measures may be available to make it more energy efficient. At present it is intended that these reports may be included in the Home Information Packs on a voluntary basis.

**More informative billing** From 2007 electricity suppliers will have to provide bills to householders which give more detail in an easily comprehensible form of the quantity and sources of their electricity and its associated carbon emissions.

**'Smart' metering** Trials are being carried out for gas and electricity meters which give real-time information about consumption, allowing differential charging according to the time of use. There are also electricity meters with an 'import-export' capability, allowing households which generate some of their own electricity to export surplus to the grid and be paid for it. Also under development are interactive meters, which would be able to turn equipment like freezers off and on according to whether electricity is more or less expensive.

*Building Standards*

- 5.49 A combination of mandatory standards and voluntary codes exist to reduce the environmental impact of new residential and non-residential buildings, with the Building Regulations providing the main regulatory standards. In England, Part L of the Regulations sets minimum building and construction standards with respect to energy efficiency. This was revised in April 2006, and the government claims it will improve the energy standards of new homes by 40% compared with pre-2002 levels.<sup>56</sup> However, other aspects of the Building Regulations across the UK remain less stringent than those in a number of other European countries, and a DCLG Minister has recently called for UK buildings to be built to higher Scandinavian standards.<sup>57</sup> There are also major concerns regarding compliance with and enforcement of Part L requirements of the Building Regulations,<sup>58</sup> and these are discussed further in 6.75-6.77.
- 5.50 The Building Regulations also fall short of best available practice.<sup>59</sup> Other standards include the Ecohomes ratings developed by the Building Research Establishment (BRE) and those standards set by Passive House, the Beddington Zero-Energy Development project (BedZED), the Energy Efficiency Partnership for Homes, and the Association for Environment Conscious Building (AECB). These require, among other things, a thick layer of insulation in the building fabric (including high-performance windows and doors), as well as attention to airtightness.<sup>60</sup>

- 5.51 As a result, the BedZED and Hockerton Housing Project housing schemes achieve zero net space heating demand with current technology.<sup>61</sup> Energy consumption is very low by conventional standards due to careful design to maximise useful solar gain, combined with an envelope of insulation about 300 mm thick in the walls, roofs and floors.
- 5.52 However, at present there is little incentive for housing developers to go beyond the Building Regulations, and some developers, with a tried, tested and profitable product, resist proposals for the tightening of standards. To improve construction, the Sustainable Buildings Task Group was set up in 2003. It recommended the creation of a Code for Sustainable Buildings, to which the government responded by developing a Code for Sustainable Homes.<sup>62</sup> This focuses on raising standards of design and construction in new housing. It sets out different levels of ambition, including on energy efficiency, carbon dioxide emissions, water consumption and waste.
- 5.53 While the Code for Sustainable Homes is voluntary, it is envisaged that over time the Building Regulations will be tightened to reflect it. In turn the Code's standards will become increasingly stringent, progressively ratcheting up the mandatory standards. While this is an improvement, we are disappointed that the opportunity was not taken to extend this Code to all buildings (i.e. not just new homes), although we note that the government is currently reviewing the sustainability of existing buildings.<sup>63</sup>
- 5.54 **We recommend as a matter of urgency that the Department for Communities and Local Government extends the Code for Sustainable Homes to cover all buildings. We further recommend that the Department for Communities and Local Government progressively tightens the Building Regulations and the standards in the Code, in respect of both energy and water efficiency, over a pre-announced three-yearly cycle.** We welcome the indication in the Chancellor's Pre-Budget Report 2006<sup>64</sup> that the government is minded to consult on a timetable for progressively strengthening the Building Regulations in England and Wales towards the energy efficiency levels set out in the Code for Sustainable Homes.
- 5.55 Since April 2006, all new publicly-funded residential developments have been required to meet the level in the Code for Sustainable Homes that corresponds to EcoHomes<sup>65</sup> 'very good' or above.<sup>66</sup> It will be important to put in place mechanisms to ensure that performance does not fall short of aspiration. For non-residential developments, it would seem that very considerable improvements are required. For example, in 2003/04 only 3 out of 137 new public sector non-residential buildings were delivered to a BREEAM 'excellent' standard compared with the target level of 100%.<sup>67</sup>
- 5.56 **We recommend that high standards of environmental performance be included in private finance initiative and public private partnership contracts for non-residential buildings and that government puts in place management processes to ensure that 100% of public sector non-residential buildings meet the BREEAM 'excellent' standard.**



## REFURBISHMENT AND IMPROVEMENT

5.57 Existing buildings can be refurbished and/or improved to meet higher energy efficiency standards, in many cases up to the standard of average new build. There have been some impressive refurbishments of even the least promising housing, for example the Urban Splash projects in Manchester and Birmingham.<sup>68</sup> Resource efficiency and social renewal can occur at a lower financial and environmental cost when buildings are refurbished (figure 5-III).

**FIGURE 5-III**  
Urban refurbishment in Manchester



5.58 We commissioned a study from the Environmental Change Institute on reducing the environmental impact of housing.<sup>69</sup> It reviewed several recent studies in this area and concluded that although details differed, the technological potential for environmental savings in the housing stock was significant. However, the report also recognised that technological potential is not the only important aspect in reducing, for example, CO<sub>2</sub> emissions. People's behaviour in buildings will also have a significant impact, in some cases potentially undermining technological savings, in others enhancing it.

5.59 As part of this study, the Environmental Change Institute developed three scenarios to assess aspects of the environmental impact of housing stock up to 2050, including CO<sub>2</sub> emissions. Scenario A reflected the continuation of current and near-term trends, technology, policies and practice with changes occurring slowly into the future. Society is assumed to continue along current trends with no restriction on consumption and with any uptake of new energy efficiency technology being slow. Scenario B looked at how the residential sector could achieve the UK's goal of a 60% reduction in CO<sub>2</sub> emissions by 2050. As well as technical measures, it was assumed in this scenario that society becomes more carbon and energy aware and makes changes in its behaviour accordingly. Scenario C looked at the options for CO<sub>2</sub> reductions greater than 60%, through increased new build, more energy from renewables, greater uptake of energy efficiency measures and higher rates of demolition of existing housing than in scenarios A and B. However, demolition is controversial for a number of reasons, including its social and

heritage impact, and because it produces construction waste.<sup>70</sup> It is possible that by changing the assumptions in the scenarios, a similar level of CO<sub>2</sub> savings might be technically achievable with less demolition. In addition, the scenarios used in this study considered only effects on CO<sub>2</sub> emissions in the housing stock and did not include any broader impacts on society such as the cost of infrastructure associated with new build.

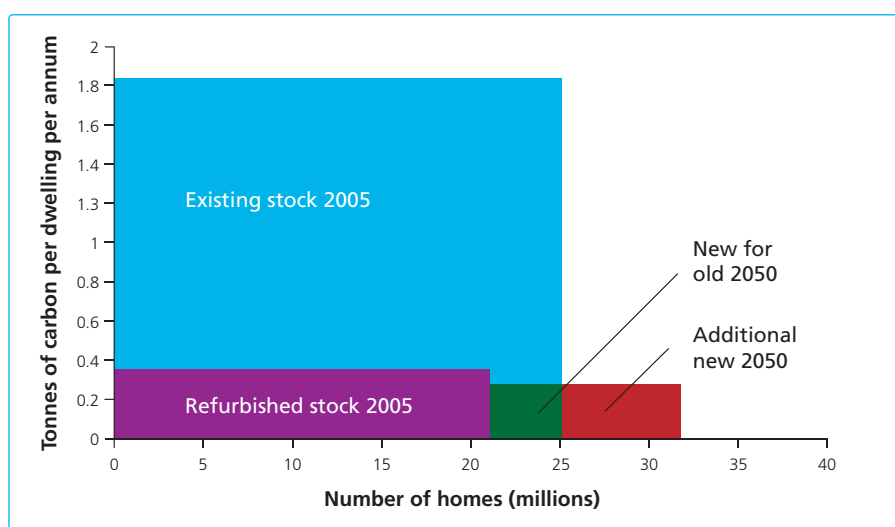
5.60 The outcome of the three scenarios in terms of CO<sub>2</sub> emissions is as follows:

- Scenario A achieved an 8% cut in CO<sub>2</sub> emissions by 2050 compared with 1996;
- Scenario B achieved a 56% cut in CO<sub>2</sub> emissions by 2050 compared with 1996;
- Scenario C achieved a 75% cut in CO<sub>2</sub> emissions by 2050 compared with 1996.

5.61 Figure 5-IV compares CO<sub>2</sub> emissions from refurbished and new-build homes under Scenario C. The shaded rectangles in the graph represent the total CO<sub>2</sub> emissions from different parts of the housing stock, which is a product of the number of homes (on the x-axis) and the average annual CO<sub>2</sub> emissions per home (y-axis). The total for 2005 is shown in the largest rectangle and the total for 2050 is the sum of the three remaining rectangles – refurbished stock in 2050, new dwellings which have replaced demolished ones by 2050 and additional new houses in 2050. The term ‘refurbished’ here covers much more than just the building fabric and represents a ‘whole systems’ approach – it encompasses both energy demand reduction and the installation of low and zero carbon technologies. The total reduction in CO<sub>2</sub> emissions in 2050 is a combination of:

- refurbishment of existing stock;
- demand reduction for lights and appliances in all homes;
- replacement of some old housing with new housing (i.e. demolition and new build);
- a change in householder attitude to energy saving;
- new homes to meet projected demand; and
- the installation and use of low and zero carbon technologies (for example, photovoltaics, CHP).

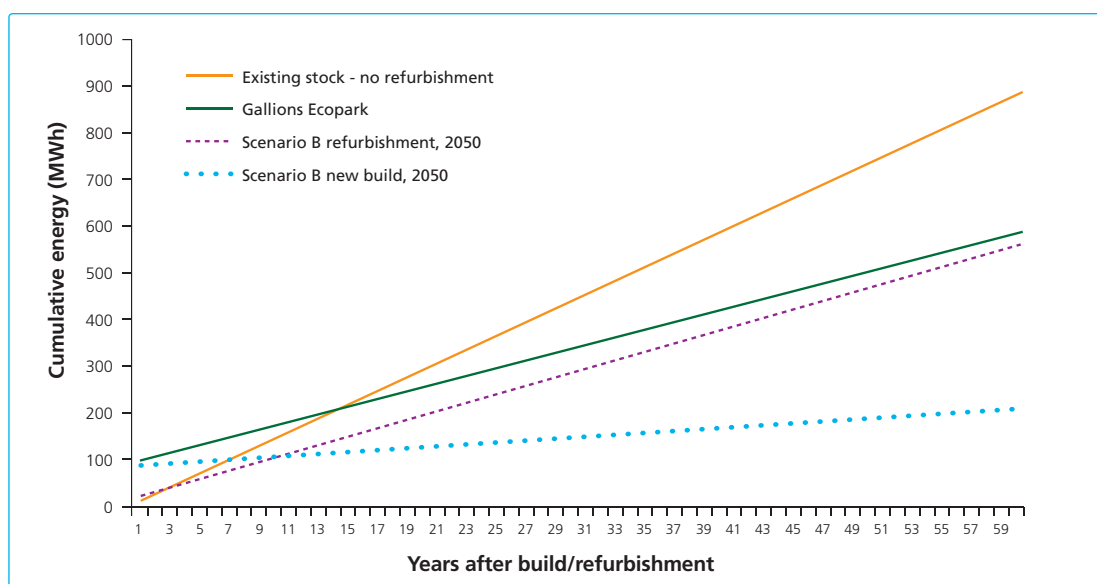
**FIGURE 5-IV**  
Carbon emissions from refurbished and new-build homes, Scenario C<sup>71</sup>



5.62 This analysis illustrates the importance of refurbishment of existing stock compared with new build in terms of carbon reductions, highlighting the fact that the major challenge lies in dealing with the existing stock.

5.63 The process of building new homes or carrying out refurbishment requires energy, for example, to extract raw materials, to process them and to assemble the building. This is known as embodied energy and, for new buildings, accounts for about 10% of a building's lifetime carbon emissions. However, as the efficiency of buildings increases, the embodied energy will represent a higher proportion of total energy use.<sup>72</sup> Embodied energy in refurbishment works can be one sixth that of new-build works.<sup>73</sup> Figure 5-V illustrates a comparison of embodied and operational energy for refurbishment and new build.

**FIGURE 5-V**  
Comparison of embodied and operational energy for refurbishment and new build, Scenario B<sup>74</sup>



- 5.64 Figure 5-V can be read as two pairs of lines: the top two (on the right-hand side) represent the 1996 stock average of 15 MegaWatt-hours (MWh) delivered energy per year for space heating (with zero embodied energy), and an example of a recent development, Gallions Ecopark in Greenwich, with an average of 8 MWh delivered energy per year for space heating and 90 MWh embodied energy.<sup>75</sup> The Gallions Ecopark development was built to the EcoHomes ‘excellent’ standard – one of the most stringent standards used by the mainstream construction industry – and is used here as an example of current good practice. The lower pair of lines on the graph represent Scenario B levels of refurbishment (15 MWh embodied energy) and Scenario B new-build standard (90 MWh embodied energy).
- 5.65 There are several key messages from figure 5-V. If embodied and operational energy are both taken into account, then the impact of the Gallions Ecopark new-build home is lower than the existing, unrefurbished house after 13 years. After 60 years, the total cumulative energy of the new-build home is significantly less than the total energy consumed in running the existing home. Therefore, the embodied energy in dwellings is no reason not to demolish, but there may be other reasons why demolition is not appropriate, including social, community or heritage reasons. Moreover, demolition and rebuild is only beneficial over refurbishment in energy terms provided that the new homes are built to a high enough standard.
- 5.66 The Environmental Change Institute also found that it would be technically possible to reduce CO<sub>2</sub> emissions from housing by 60%, in line with the UK’s goal, if the existing stock was refurbished to roughly the same level as the ‘excellent’ standard achieved by the Gallions Ecopark development, but that significantly higher standards would have to be met by new buildings. Standards for new build therefore have to be made much more ambitious than at present, and existing housing must be refurbished to at least a maximum average space heating demand of 9 MWh in order to reach the 60% goal. To achieve the CO<sub>2</sub> reductions beyond 60%, as set out in Scenario C, the standard of refurbishment would need to be to 6 MWh. Aiming for Scenario C may be necessary to ensure that a 60% reduction in carbon emissions is achieved in practice, because some investments may not deliver the expected savings, or because of unexpected social trends.
- 5.67 While our focus up to this point has been energy, it is important to understand the impact of refurbishment and new build in terms of waste generation. Construction waste is a significant component of the waste stream in urban areas. Increasing the rate of housing renewal can lead to increased levels of construction and demolition waste. The Environmental Change Institute study suggests that the total amount of waste generated would increase significantly with an accelerated programme of demolition and rebuild and to a lesser extent refurbishment.<sup>76</sup>
- 5.68 In order to minimise the environmental impacts of redevelopment, the reuse of materials needs to be prioritised over recycling materials and using new materials with recycled content. However, much of this waste is hard to reuse and recycle, although there is scope to recycle bricks, wood

and piping. The environmental consequences of material use in construction and refurbishment include depletion of natural resources, local and global impacts of extraction and processing activities, and transport effects. Additional factors to consider include the embodied energy of construction, use of material resources, disruption to communities and heritage value.

- 5.69 Since the vast majority of current housing in the UK will be in use for at least the next 50 years,<sup>77</sup> improvements made within the existing stock could yield major environmental savings immediately and in the future. Significant efforts to improve the efficiency with which energy, water and natural resources are used in buildings have a key role to play in meeting the UK's CO<sub>2</sub> reduction targets for 2010 and 2050.
- 5.70 Refurbishment of existing dwellings to a standard significantly beyond current Building Regulations is crucial if CO<sub>2</sub> targets are to be achieved. However, the actors involved in refurbishment are many and varied. Homeowners are key in bringing about change. The rented housing sector, where the landlord receives no direct benefit from any alterations, is a further challenge. There are tax incentives to encourage this and proposals in the Chancellor's 2006 Pre-Budget Report to extend them.<sup>78</sup> An alternative approach has been suggested recently to require landlords to ensure their properties meet a minimum environmental standard before they can be rented out.<sup>79</sup>
- 5.71 Other important actors are the builders who carry out refurbishment work, which are often different from the large companies that typify the mainstream construction industry. Their small scale of operation presents a particular challenge when attempting to bring about change in which each tradesman has a significant role to play in informing and influencing house builders and owners about the various technologies available.
- 5.72 The refurbishment and improvement of existing dwellings, including retrofitting of energy efficiency measures, is hugely challenging. Homeowners are not always aware of the available opportunities to reduce running costs, or how to deliver them, nor do they perceive use of capital for this purpose as a priority over other expenditure. Therefore, the point at which a property is purchased or rented is a key opportunity to demonstrate what needs doing, and we believe that the government should be more ambitious in exploiting the potential for energy saving via the forthcoming provision of easily accessible information for homeowners. The Home Information Pack has the potential to be a useful tool.
- 5.73 Despite there being a strong economic, social and environmental case for refurbishment, there are still challenges to be overcome; for example VAT is currently charged at the full rate on refurbishment, while new buildings are zero rated. Various organisations, including the Sustainable Development Commission, have urged a change of VAT rules in order to not disadvantage refurbishment and we recommend changes in 5.76.

*Building on recent achievements*

5.74 The Warm Front, Decent Homes and Energy Efficiency Commitment policies, and similar policies in Scotland and Wales, have begun a systematic improvement of the existing housing stock. The Code for Sustainable Homes (which needs to be expanded) provides a mechanism for progressively tightening provisions for energy (and water) efficiency in building regulations. The Department of Trade and Industry's microgeneration strategy<sup>80</sup> provides the basis for the large-scale installation of low and zero carbon technologies. Energy labelling of appliances has proved the power of certain kinds of information to transform markets, and, as seen in box 5B, a whole raft of new information measures, from the Home Condition Report to more informative utility bills, is in the pipeline. The Mayor of London has recently announced plans for the first major zero carbon new community to be built in the city, the bidding for which excited considerable corporate interest.<sup>81</sup>

5.75 However, much more needs to be done. For example, we note from the House of Commons Environmental Audit Committee's report that Germany has a plan to increase the energy efficiency of its existing housing to the standards of its current building regulations, which are already more stringent than those in the UK.<sup>82</sup> We can begin to see the policy architecture required to deliver the kinds of reductions in CO<sub>2</sub> emissions that are necessary for the housing stock to make its necessary contribution to the government's 60% CO<sub>2</sub> emissions reduction goal. The following recommendations are designed to build on and strengthen the current framework.

5.76 **We recommend that:**

- **VAT rates be equalised between refurbishment and new build at a level which is fiscally neutral. This means raising the VAT on new build above the minimum level of 5%, and reducing the VAT on refurbishment to match it, such that the revenue gained is equal to the revenue lost;**
- **the government draws up realistic but demanding timetables to improve the energy efficiency of the building stock and the uptake of low and zero carbon technologies, taking account of the drivers for change and the policy levers appropriate for the various sectors. For example, fiscal incentives, such as rebates on stamp duty land tax or council tax for energy saving measures, should be introduced to provide real encouragement to developers and householders to deliver new building and refurbishment to a high environmental standard; and**
- **existing homes should be improved to the EcoHomes 'excellent' standard by 2030, with equivalent standards applied in other sectors, wherever the technologies are available to achieve this consistent with social, cultural, heritage, urban landscape and aesthetic considerations.**

5.77 We welcome the principle of moving to zero carbon for new build and the indication of fiscal measures to incentivise this in the Chancellor's Pre-Budget Report.<sup>83</sup> We are fully persuaded of the urgent need to improve the energy efficiency of the existing building stock, the vast proportion of which is in urban areas. However, improving the fabric of the building is only part of the answer. We continue to need a better understanding of ways in which people actually behave if we are to make progress in terms of energy use.

### **WATER AND WASTE IN BUILDINGS**

5.78 The environmentally sensitive supply and use of water, and environmentally appropriate waste management, are not solely urban issues, but the cumulative impact of urban areas on water demand and waste generation make their achievement there particularly important. We have addressed both issues in previous reports<sup>84</sup> and only briefly revisit them here. The main message is that much of the policy architecture developed for improving energy efficiency also needs to be applied to water and waste.

5.79 Greater water efficiency should be a crucial consideration in new developments and there should be a focus on demand reduction, rather than on increasing supply. Failure to address improved water conservation and efficiency will have complex and far-reaching effects on water flow in rivers, pollution levels and ecology, as well as energy use in water treatment and pumping. The technology already exists to make homes more water efficient. Savings are possible and reasonably affordable through water-efficient appliances and grey water and rainwater systems, particularly in new build, although retrofit costs for existing buildings may be expensive.<sup>85</sup> Technological improvements will also need to be backed up by changes in behaviour. We support many of the recommendations of the report of the House of Lords Science and Technology Committee on water management.<sup>86</sup> However, we single out three issues for specific attention.

5.80 Firstly, government water policy sets out a series of actions to address water demand and supply within households,<sup>87</sup> but there are no targets for reducing water consumption in the existing stock. In addition, the Water Act 2003 aims to promote the sustainable use of water resources and the promotion of water conservation, but, again, contains no specific provisions relating to household consumption. At present, households have the option of installing a water meter, as laid out in the Water Industry Regulations 1999. In 2002, only 21% of properties in the UK had water meters but this figure is forecast to rise to 36% by 2010.<sup>88</sup> The average effect of metering on consumption is estimated to be a 10% reduction.<sup>89</sup> The government is consulting on increasing water metering in water-scarce areas of England.<sup>90</sup> This needs to go further. Metering is key to water management, since it provides information about usage.

5.81 **We recommend that all domestic buildings are metered for water, beginning in the areas shown in assessments of the environment agencies to be in water-scarce zones.**

5.82 Secondly, we agree with the House of Lords Science and Technology Committee's conclusion that the government should further educate the public about water efficiency. But we are concerned that the Committee's recommendation to give additional responsibilities for water efficiency to the Carbon Trust and Energy Saving Trust could blur these organisations' objectives.

5.83 **We recommend that the UK government and devolved administrations:**

- **introduce a Water Efficiency Commitment on water suppliers, along the same lines as the Energy Efficiency Commitment;**
- **strengthen the Business Resource Efficiency and Waste (BREW) programme; and**
- **establish a Water Saving Trust to provide advice on water efficiency to households.**

5.84 Thirdly, table 5.2 shows the policy packages that have been, or might be, introduced for energy, water and waste in both the business and household sectors. The range of policies includes economic instruments (taxes, charges and emissions trading schemes), voluntary schemes or agreements, supplier obligations, regulations, measures to reduce distributional impacts, and the provision of information and advice.

**TABLE 5.2**  
**Emerging policy architecture for energy, water and waste**

*Entries in italics are policies that have been proposed by government, but not yet introduced.*

<b>POLICY PACKAGES</b>	<b>ENERGY</b>	<b>WATER</b>	<b>WASTE</b>
<b>Business sector</b>			
Metered/measured	Yes	Yes	Yes
Economic instruments: Tax/charge Emissions trading	Climate change levy EU Emissions trading scheme <i>Energy (Performance) Commitment</i>		Landfill tax Aggregates levy
Government subsidies	Capital grants Enhanced capital allowances		
Voluntary agreements	Climate Change Agreements		<i>Producer responsibility agreements, e.g. newsprint industry use of recovered fibre</i>
Supplier obligation	Renewables Obligation		<i>Renewables Obligation for some types of thermal recovery</i>
Regulation	Industrial Pollution Prevention and Control  Building Regulations	Regulations on discharge water quality  Building Regulations	Multiple regulations



<b>POLICY PACKAGES</b>	<b>ENERGY</b>	<b>WATER</b>	<b>WASTE</b>
Measures to reduce distributional impacts	Climate Change Agreements		<i>Transfrontier shipment of waste regulations</i>
Information/advice	Carbon Trust Metering/billing information	Business Resource Efficiency and Waste (BREW) Metering/billing information	BREW Metering/billing information Waste awareness campaigns, e.g. Envirowise
<b>Household sector</b>			
Metered/measured	Yes	Part	No <i>Variable charging may be introduced</i>
Economic instruments: Tax/charge	VAT at minimum level of 5%	No	Landfill tax (local authorities)
Emissions trading	None		Landfill Allowance Trading Scheme (local authorities)
Government subsidies	Warm Front, Decent Homes		
Voluntary schemes or agreements	Code for Sustainable Homes	Code for Sustainable Homes	<i>Waste prevention plans</i>
Supplier obligation	Energy Efficiency Commitment		Waste Electrical and Electronic Equipment Directive
Regulation	Building Regulations	Building Regulations	Recycling targets (local authorities)
Measures to reduce distributional impacts	Benefits system (e.g. Winter Fuel Allowance)		
Information/advice	Energy Efficiency Advice Centres <i>Energy Performance Certificates</i> <i>Home Information Packs/ Reports</i> Metering/billing information	Metering/billing information	Variable from local authorities <i>National Scottish Waste Awareness Campaign</i>

5.85 Table 5.2 demonstrates that the policy framework is more developed for energy than water and waste, and is more advanced for businesses than households. If all sectors of society really are to play their part in reducing environmental impacts, as the government has frequently argued, then the water and waste components need to be substantially developed. Further, if the environmental impacts from buildings are to be considerably reduced, then policy measures within the packages will need to be significantly strengthened.

## IMPROVING THE BUILT ENVIRONMENT THROUGH URBAN DESIGN POLICY

- 5.86 Government policy for housing provision is set out in Regional Spatial Strategies, the Structure Plans for Scotland, Wales and Northern Ireland, and most recently for England in the Sustainable Communities Plan, which was launched in February 2003.<sup>91</sup> The plan sets out a long-term programme to deliver ‘sustainable communities’ in both urban and rural areas in England over the next 15-20 years. It focuses primarily on housing and aims to tackle housing supply in the south-east as well as low demand in other parts of England. The plan identifies four key areas of major new development, Ashford (Kent), Milton Keynes–South Midlands, London–Stansted–Cambridge and the Thames Gateway.
- 5.87 A programme of refurbishment and demolition is also underway. In 2002, the government introduced the Housing Market Renewal scheme, in which nine pathfinder areas were set up to regenerate the most deprived and low demand areas in the north of England and the Midlands. The government has said that the focus of this scheme is on refurbishment and adjustment of homes rather than demolition, although it maintains that some homes will have to be replaced to meet modern demands.
- 5.88 There is no shortage of initiatives, policies and plans for development and redevelopment, many of which acknowledge the need for the reduction of environmental impacts under the umbrella of sustainable development. However, we have many concerns over the government’s plans for new development, including the Sustainable Communities Plan. Many commentators have noted that, as originally proposed, the Sustainable Communities Plan failed to take the environmental impacts of new developments adequately into account. For example, the House of Commons Environmental Audit Committee robustly criticised the Sustainable Communities Plan for not addressing environmental sustainability adequately and called for a thorough environmental appraisal of the Plan.<sup>92</sup> Changes have been made subsequently, but the failure to include environmental concerns from the outset underlines an important gap; though there are currently many government policies that affect urban areas, there is no clear policy for the urban environment, and environmental issues are too often seen as peripheral to the real policy imperatives focused on economic drivers.

## PLANNING

- 5.89 The planning system controls land use and development and is one of the main levers to reduce the environmental impacts of urban areas. Planning is a devolved responsibility and in recent years, the systems in England, Wales and Scotland have all undergone reform. The structure of the planning system is set out in appendix I.
- 5.90 In England, national planning policy is explained in Planning Policy Guidance notes (PPGs) and more recently, Planning Policy Statements (PPSs). In Wales, planning guidance is set out in Technical Advice Notes (TANs) and in Scotland as National Planning Policy Guidelines (NPPGs)

(currently being replaced by Scottish Planning Policies (SPPs)), supported by Planning Advice Notes (PANs). Most PPGs and PPSs provide some guidance on design and environmental issues. Planning Policy Statement 1 (PPS1)<sup>93</sup> addresses the delivery of sustainable development through the planning system, and sets out what the government considers to be good urban design. It recommends that the direct and indirect impacts on the natural environment should be considered during development and that designs that do not improve the “character and quality of an area” should be rejected.

- 5.91 PPS1 includes principles aimed at protection and enhancement of the environment through good design, but this is not firmly backed up by its supporting documents, including *By Design*<sup>94</sup> and the *Urban Design Compendium*.<sup>95</sup> These lack scope and vision on even basic environmental design principles and their integration within the built environment. *By Design*<sup>96</sup> contains no environmental measures, and the *Urban Design Compendium*<sup>97</sup> briefly mentions aspects of environmental design in developments, including solar design, collection, storage and recycling of rainwater, and minimisation of waste, but provides no guidance on implementation.
- 5.92 PPGs and PPSs are being used in an attempt to incorporate good quality design in areas of housing growth and housing market renewal.<sup>98</sup> However, a report by CABI Space<sup>99</sup> found that although housebuilders and developers have demonstrated they are able to deliver urban developments of quality design, actual achievement of this is rare.
- 5.93 We acknowledge that the Department for Communities and Local Government has responded to recent pressure and is now placing greater policy emphasis on environmental protection, but in our view this still does not go far enough in ensuring that new communities respect environmental constraints in terms of both their local and global environmental impacts. It is not sufficient simply to provide environmental ‘signposts’ in the planning guidance.

### DESIGN TOOLS

- 5.94 Masterplanning and design codes are being used in new developments and refurbishment projects. Masterplans set out proposals for buildings, spaces, movement within the development and land use in three dimensions and match these aspirations with an implementation strategy.<sup>100</sup> A design code is a document that sets specific design instructions for a new development and is often used in conjunction with a masterplan.<sup>101</sup> The government sees masterplans and design codes as a key tool to help deliver its Sustainable Communities Plan and both can feed into the planning system at various levels. A design code currently has the strength of a ‘material consideration’ in planning decisions, and weight will only be afforded to the code if it has been prepared in consultation with the general public, businesses and other interested parties.
- 5.95 Masterplans and design codes are useful tools with potential to tackle some of the issues that have significant environmental impacts, such as the provision of transport links. It is our view that while they complement the planning system, they are not always used to their full potential

in terms of environmental measures. They could, for instance, factor in long-term aspects like flexibility of use and preparedness for climate change, as well as issues like aesthetics. Although clearly a difficult area, we see aesthetic issues as central to developing urban areas with a sense of place and appropriate to their context. This is not to deride modern architecture and call for a return to vernacular styles, which can all too easily degenerate into pastiche, but it does mean more effort to improve design quality to create pride in communities and unique identity in our towns and cities. From this perspective we are broadly in favour of masterplans and design codes, but they need to link more directly into the regional and local planning framework and include environmental considerations as standard.

**5.96 We recommend that masterplanning and design codes incorporate environmental design principles in all new developments and redevelopments.**

## CONCLUSIONS

5.97 The planning system deals with land use and development and mainly affects new development. Some environmental principles have been embedded in the planning system, but there are other areas, including urban infrastructure and buildings, where action, including behavioural change, is needed to reduce and manage environmental impacts. Policies and strategies, such as air quality management plans, do exist to deal with some of these environmental impacts, but there is little integration between them. These issues are discussed in Chapter 6.

5.98 It has become increasingly clear to us during the course of this study that much of the necessary technology to improve the environmental impact of urban areas already exists. The challenge for policy is to increase greatly its rate of installation and to encourage the essential changes in behaviour that will ensure that such technologies will deliver on their environmental potential. Achieving such change is far from straightforward and requires above all an appropriate and well articulated structure of governance which promotes policy coherence and integration through the urban system as a whole. Developing recommendations for such a structure is the subject of the next chapter.

# Chapter 6

## GETTING THE FRAMEWORK RIGHT

*This chapter discusses the forces that drive or constrain progress towards environmentally sustainable urban areas. In addressing these, we recommend a portfolio of measures, including an explicit policy for the urban environment and an environmental contract between central and local government.*

### INTRODUCTION

- 6.1 Previous chapters have shown that it is possible to create high quality urban areas with much less impact on the environment, but making this standard practice remains a major challenge. We have repeatedly revisited the idea that much of what is conventional wisdom in sustainable urban development has not been implemented effectively. In part this is because urban areas are complex systems, giving rise to ‘wicked’ problems that are not susceptible to simple policy interventions (Chapter 1).
- 6.2 In this chapter, we evaluate the extent to which mainstream policy has begun to incorporate environmental issues (including their impact on health and wellbeing). We note that existing policy places little emphasis on the importance of understanding and responding to the characteristics and needs of urban areas. We also conclude that while it is not appropriate to create detailed prescriptions for the long term, there must be a concerted effort to develop a clear vision for improving the environment of the UK’s towns and cities. This leads us to call for an explicit government policy for the urban environment that would also improve health and wellbeing.
- 6.3 In our view a major opportunity exists to support local action on the environment, particularly in the larger urban areas and city regions. We therefore recommend developing an environmental contract between central and local government to stimulate environmentally sustainable development. The contract should also involve the private and voluntary sectors to encourage innovation. We also recommend a package of environmentally demanding regulations and incentives to send a clear signal to businesses and to citizens.
- 6.4 We recognise the challenge represented by our recommendations, particularly as effective policy making for the urban environment needs to reflect the wide range of perceptions, interests and behaviours, and the myriad of dispersed decisions that shape outcomes. While these factors provide many opportunities for nudging behaviour towards desirable outcomes, it is not easy to predict the precise nature of such outcomes in advance. However, we can define the direction of travel required to make urban areas much more environmentally sustainable.

## A WEB OF CONSTRAINTS

- 6.5 Some of the forces holding back environmental progress derive from the most fundamentally unsustainable aspects of modern existence: an addiction to cheap fossil fuels; wasteful use of natural resources; and the lack of price mechanisms to reflect the environmental impacts of human activity over time. These can effectively lock society into one particular approach, whilst locking out a potentially better one. An important example of this is the extent to which urban industrialised societies appear to be locked into a high carbon economy.<sup>1</sup> Our study has identified a ‘web of constraints’ that make it difficult to shift society from one regime to another. This means that while better technologies are helpful, they will not be enough on their own to bring about a transition to an environmentally sustainable future.
- 6.6 Identifying this more subtle set of constraints has helped us to understand why many seemingly common-sense policy ideas and readily available technical solutions, advocated for so long, have proved so difficult to implement. From the evidence presented to us, there are at least five such generic concerns, namely: institutions; infrastructure; instruments; inclinations; and information.
- **Institutions** are the structures that govern the behaviour of organisations and individuals. They may be political, legal, financial or managerial. They embody rules that are often finely balanced compromises between different interests. The rules may have been designed for different circumstances, so changing them requires negotiation of new settlements, which will often be contested.
  - **Infrastructure** consists of the fundamental structures that provide society with energy, water, transport, buildings, green space and other services. Infrastructure is often long-lived and will have been designed for the needs of the time when it was built, but it may not be appropriate for the low carbon, low environmental impact lifestyle we now require. Changing infrastructure may be contested, expensive, disruptive and frustratingly slow.
  - **Instruments and incentives** include policies, regulations, prices, risks and rewards that shape current activities. Altering the structure of instruments and incentives can lead to more environmentally desirable patterns of activity. However, this may threaten some interests, cause inconvenience and alter costs, so some will resist it.
  - **Inclinations** refer to the preferences, desires and aspirations that influence people’s behaviour. Many people derive advantage and pleasure from activities that incidentally damage the environment, such as driving cars in urban areas. Some inclinations may have become the norm before the damage they cause was realised, and may be difficult to change. Inclinations often evolve to take advantage of available infrastructures, and may be promoted by current institutions and incentives, and so may be very difficult to change unless these also change. Trying to bring about preference change in an environmentally beneficial direction is thus often politically difficult.

- **Information, capacities and skills** Constructing and managing new kinds of infrastructure may require different skills and capabilities from the old kind, and the same is true if institutions are to work effectively with different rules. For example, if transport departments are staffed mainly with highway engineers, then transport solutions may be perceived in terms of reducing congestion by increasing road capacity, rather than decreasing the need to travel. In this way, skill shortages or misalignments may reinforce other constraints. People also need to understand why they are being asked to change their behaviour or pay more for activities they value, otherwise they may resent and resist such requests. However, it is not easy to convey environmental information to people in such a way that they pay attention to, understand, trust and are persuaded by it, and information by itself is often not enough to change behaviour. Other forces such as incentives and societal norms need to be pulling in the same direction.

6.7 Box 6A gathers together information on some of the constraints on environmental sustainability in urban areas that were presented to us in evidence. New technology is not at the heart of these concerns. Instead, the people we spoke to repeatedly emphasised the need to implement existing measures and address institutional, regulatory and economic factors. They also underlined the importance of leadership, both institutional and individual, and the need to take account of synergies and conflicts between different issues. However, the arguments put to us also suggest that deep societal norms, including beliefs, values and behaviours, are challenged by the need for a better urban environment. In other words, there are reasons for the failure to implement what might seem to be fairly obvious solutions.

#### BOX 6A WEB OF CONSTRAINTS ON ENVIRONMENTAL PROGRESS IN URBAN AREAS<sup>2</sup>

This box describes the complex web of constraints that holds back environmental progress in urban areas. Each heading gathers together views submitted to us in evidence showing how these constraints play out in practice.

**Institutions** Factors include:

- A lack of political will that may be related to vested interests, inertia and short-termism.
- Insufficient policy emphasis on the environment generally and on integrating the environment with other policies.
- An undervaluing of the urban environment and urban green space by public policy and by environmental organisations.
- The division of responsibility for the urban environment between many organisations, which needs better co-ordination at national level and more effective implementation at local level.
- Insufficient attention to sustainable development in utility regulation.
- Insufficient engagement with local communities.

**Infrastructure** Factors include:

- Lack of investment and insufficient support for long-term management of assets.
- An emphasis on minimising capital costs of infrastructure rather than lifetime costs, where environmental savings are likely to become apparent.
- The need to co-ordinate infrastructure at national level and deliver it effectively at local level.
- The need to phase provision of infrastructure so that, for example, public transport is provided ahead of new housing to minimise car dependence.
- Some existing infrastructure (e.g. in the water sector) may no longer be fit for purpose.
- Because the replacement rate of infrastructure is slow, it takes a long time to raise standards (e.g. in housing).
- A lack of clarity over who is responsible for some types of infrastructure (e.g. sustainable drainage systems).
- Legacies of bad management or land contamination that hold back regeneration.
- A need for new or better technologies.
- New technologies may not be fully tested, and there may be a risk of perverse outcomes when introducing them.

**Instruments and incentives** Factors include:

- A lack of the right mix of fiscal instruments, and voluntary and mandatory measures.
- Incorrect price structures for natural resources because, for example, externalities are not fully factored into their cost.
- The potential for regressive effects or perverse outcomes from environmental taxes and measures.
- Cost-benefit analyses do not always reflect the full range of environmental and other issues.
- Split incentives such as landlords' unwillingness to invest in measures for the benefits of tenants.
- Regulation is missing in some areas. Other regulations are complicated, underused, unco-ordinated or lack a strategic view that helps deliver sustainable development and encourage innovation.
- Insufficient enforcement of standards and limited prosecution of environmental offences.

**Inclinations** Factors include:

- Insufficient policy emphasis on demand management and behavioural changes.
- Behaviour and socio-economic trends can offset other improvements (e.g. greater use of appliances in the home has offset savings from energy efficiency measures).
- Investors, housing developers and consumers may not consider sustainable development important, and may be concerned that measures to promote it will increase costs.
- Risk aversion may reduce the uptake of new methods.



- New policies and methods can raise concerns over unintended outcomes. For example, managers may have concerns over health and safety and legal implications of changes to current practice.
- Past failures may lead to negative perceptions (e.g. of high density housing).
- Some people exposed to environmental hazards may not feel they are in a position to complain.

**Information, capacities and skills** Factors include:

- Low awareness of environmental issues among some consumers.
- The need to present information in a way that connects with people's behaviour and values.
- An inadequate skills base, especially for new practices or disciplines. This reduces uptake of research findings and new methods by policy-makers, professional bodies and practitioners, and leads to poor installation of new technologies.
- Limits on expertise and poor supply chains can hinder growth in demand for environmental products.
- Lack of underpinning research and good practice information.

6.8 Decision-makers need to understand how the constraints in box 6A can block or release progress, but there is no silver bullet. Instead, a portfolio of measures will be needed, involving different actors and approaches, with the aim of getting the starting conditions right and setting the direction of travel. In this chapter, we suggest how constraints in each of the five areas could be tackled by: reorientating the institutional framework to put more emphasis on the urban environment; investing in infrastructure that promotes environmentally sustainable development; creating a package of incentives and other measures that reinforces inclinations towards environmentally friendly behaviour; and providing people with the information and skills to take action.

## INSTITUTIONS

6.9 We begin with the role of government which is clearly important, although government's ability to bring about change can be overestimated in comparison with the powerful mixture of market forces and societal preferences that influence daily life.<sup>3</sup> Nevertheless, government at all levels has the ability and the responsibility to promote beneficial change through processes such as legislation, oversight, creating competition and encouraging reinforcing behaviours, such as partnerships. The broader concept of governance is also important. This term applies as much to the private and voluntary sectors as to government, and includes political and legal structures (formal and informal) that define authority and relationships, as well as behaviours that generate effective collaboration by developing mutuality, reciprocity and trust.

### AN URGENT NEED FOR A POLICY ON THE URBAN ENVIRONMENT

- 6.10 Key policies, both urban and environmental, affecting urban areas are summarised in Chapter 2 and appendix E. In the course of our study, however, it has become clear that government does not have an explicit policy for the urban environment *per se*, nor a coherent policy framework to deal with the many issues involved. We consider this a major problem for a number of reasons.
- 6.11 First, the vast majority of us live in towns and cities, and these areas are responsible for a substantial proportion of the UK's total environmental footprint, as well as important impacts on human health and wellbeing. Action to tackle these impacts would be helped by a better understanding of the distinctive characteristics of urban areas and a recognition that they are complex systems with great potential for unintended consequences and missed opportunities. Second, without this wider perspective, traditional environmental policies may be ill-equipped to deal with the difficulties and opportunities of urban areas, since the most powerful solutions may not be entirely technical, and may involve understanding and encouraging behavioural change.
- 6.12 Third, many different arms of government, including the departments responsible for environment, planning, health, education and transport, influence the development of towns and cities. There is no easily identifiable mechanism to bring these different interests together, making it much less likely that key elements of urban policy will be integrated in a way that delivers positive outcomes for the environment and for people.
- 6.13 As an example of this, we are very concerned that much proposed urban development is unlikely to be environmentally sustainable unless environmental goals are embedded in new proposals from the outset and given greater status. We are profoundly troubled that high profile policies such as the Sustainable Communities Plan were initiated with little consideration of their environmental implications, and we agree with criticism made by others in this respect.<sup>4</sup> While efforts have been made since to tackle the environmental impacts of new communities, we are not convinced that they yet amount to the major transformation that will be needed to deliver environmentally sustainable urban living. Furthermore, newer urban policies, such as those on city regions, are still being instigated without reference to environmental concerns.<sup>5</sup>
- 6.14 Opportunities are also being missed with regard to health and wellbeing; although a number of White Papers recognise the public health benefits of better homes, sustainable transport and access to green space, health issues are not fully reflected within broader policy making (Chapter 3). To conclude, responsibility for the environment, health and wellbeing cannot be assumed to rest solely with their parent departments, but needs to be reflected in government thinking generally.

- 6.15 **We therefore recommend that the UK government and devolved administrations develop a coherent policy framework containing explicit policies for the urban environment. The framework should recognise the complexity of urban areas and their contribution to meeting environmental targets and improving the health and wellbeing of their citizens. It should also:**
- **include a vision for the degree of change that needs to be achieved, the measures to deliver it and the necessary reprioritisation of resources;**
  - **ensure environmental objectives and their potential impact on health are introduced into mainstream policies from the earliest stage of development, and tackle the synergies and conflicts between different policy areas by creating policy mechanisms to bring different interest groups together.** The Sustainable Energy Policy Network may provide a possible model of high level engagement across government;
  - **ensure that environmental objectives are central to the work of regional and local government, and are a core part of all major initiatives, such as Local Strategic Partnerships and Regional Spatial Strategies, and the equivalent policies in the devolved administrations; and**
  - **embrace all urban areas, and not be limited to new developments or certain types of urban area.** The policy framework should also take account of those living and working outside the urban environment, but affected by the activities going on within it.
- 6.16 Some parts of the existing policy landscape also need to change. In particular, urban development, regeneration, planning and local government have an important but under acknowledged role in combating climate change. This link to climate change needs to be reflected in the objectives of the relevant government departments. One way of addressing this would be to update the targets known as Public Service Agreements. These apply only in England, where departments agree a limited number of top level priorities with HM Treasury. They are, however, a powerful way of directing the policies and resources of central and local government towards specific outcomes.
- 6.17 **We therefore recommend that the Department for Communities and Local Government takes a share in the Public Service Agreement on climate change and that its devolved equivalents take on similar climate change objectives.**

### ***A STRONGER ROLE FOR REGIONAL AND LOCAL GOVERNMENT***

- 6.18 National level policies can do much to improve the urban environment. However, our examination of the spatial distribution of environmental issues shows that many are clustered in towns, cities and city regions (Chapters 1 and 2). This suggests that another important route to tackling these problems lies at the regional and local level.

- 6.19 Responsibility for regional policies lies mainly with the devolved administrations in Scotland and Wales, and with the Department for Regional Development in Northern Ireland. However, in England there are a number of separate bodies such as the Regional Development Agencies, Regional Assemblies and Government Offices that wield considerable funding and influence. Their resources need to be mobilised to support sustainable development, yet the Sustainable Development Commission has found that regional policies often demonstrate low awareness of sustainable development and a greater concern with economic priorities than environmental and social ones.<sup>6</sup>
- 6.20 On the other hand, local government is already a key delivery body for some environmental issues (appendix E). It has the potential, however, to become a much more forceful agent for change in urban areas, as it is responsible for many aspects of the day-to-day management of urban areas. Unfortunately, central government and the devolved administrations have not done enough so far to require local government to take action on headline environmental issues, nor to reward it for doing so.
- 6.21 An example of this is that central measures of council performance bear little relation to the level of environmental action, except in the case of a few service-orientated activities like waste management.<sup>7</sup> It has also been argued that such measures are more attuned to meeting specific targets (for example, on waste recycling) than tackling the underlying principles at stake (i.e. sustainable waste management).<sup>8</sup> The Local Government White Paper (2006) makes proposals for reforming the system in England, known as the Comprehensive Performance Assessment, and the Lyons Review of Local Government Finance (2006) covers similar ground.<sup>9</sup> These reforms may result in revised performance measures and, in our view, it is critical that these include key environmental concerns such as climate change. However, the number of performance measures relating to the environment may continue to be quite limited, and changes in other policies will be needed to tackle the broader range of issues.
- 6.22 Central government has also provided too little in the way of leadership, since it has often failed to support voluntary moves by local government to improve environmental performance. Indeed, central government has sometimes opposed or offered little encouragement to such activities in their initial stages. Examples include some of the most innovative local government initiatives, such as the renewables project in Merton, local energy generation in Woking and the London congestion charge (Chapter 5).
- 6.23 Given the vital role local government can play in managing many aspects of the environment, and the shortcomings described above, our view is that local government needs the freedom and resources to take more action. A step in the right direction was taken by the Local Government Act (2000), which gave local authorities in England and Wales the power to promote economic, social and environmental wellbeing. In Scotland, local authorities have the power to promote

the wellbeing of their area and its people, and similar arrangements are proposed for Northern Ireland.<sup>10</sup>

6.24 Local authorities can translate these enabling powers into action by producing Sustainable Community Strategies to promote wellbeing. However, these powers have not been used extensively for environmental projects and the Local Government Association believes they should be upgraded to a duty to act.<sup>11</sup> We agree that this would be an important part of bolstering the environmental role of local government, and would bring environmental issues from the margins to the mainstream of local government concerns, among councillors and officials alike. It may also require a reallocation of resources.

6.25 **We recommend that the UK government upgrades local authorities' current discretionary powers on wellbeing to a statutory duty to protect and enhance the environment.**

#### *AN ENVIRONMENTAL CONTRACT BETWEEN CENTRAL AND LOCAL GOVERNMENT*

6.26 There needs to be a stronger strategic relationship between central and local government on environmental issues. Some government departments are already developing their thinking on 'environmental contracts' between various parts of society,<sup>12</sup> and we believe this could be an important way of increasing local action on the environment.

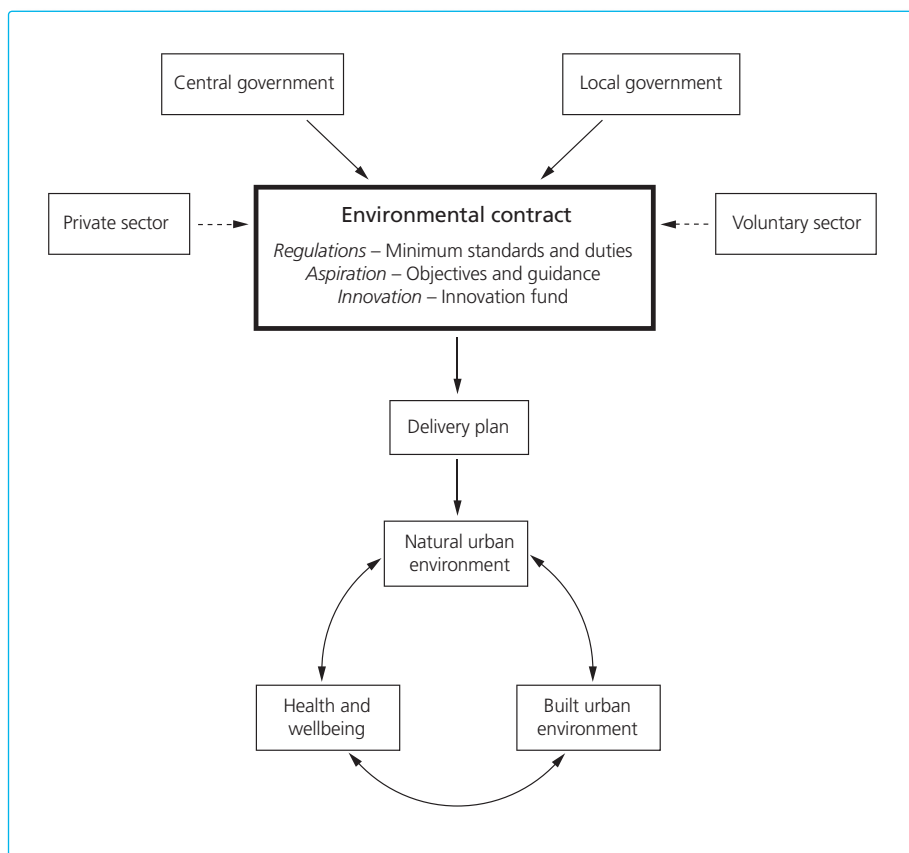
6.27 We propose developing an environmental contract between central and local government, which would be a high level agreement to promote environmental action at the local level. On the ground, this would mean a local authority developing a strategy containing a small number of mandatory elements, but would also encourage the authority to design a programme to tackle a variety of environmental activities across sectors with the aim of stimulating improvement and innovation.

6.28 An environmental contract between central and local government (figure 6-I) would:

- give local authorities a clear remit to take environmental action in their area;
- clarify the respective roles of central and local government on the environment;
- provide an opportunity for the private and voluntary sectors and citizens to contribute to the design and implementation of the contract (6.41 onwards);
- cover all parts of the urban environment (natural and built), not just new developments or areas targeted by specific policies such as regeneration;
- include a range of activities, such as the impact of council operations and the environmental impact of neighbourhoods and businesses, and would not be restricted to decisions influenced by the planning system;

- promote integration across environmental concerns, especially where there are synergies (for example, green space and flood management) or conflicts (for example, air quality and traffic management);
- provide a mechanism for integrating measures across existing plans and strategies (for example, on air quality and traffic management) and for carrying out sustainability assessments at a higher level across such plans; and
- promote integration across local authority boundaries.

**FIGURE 6-1**  
**Environmental contract between central and local government**



6.29 Such a contract would raise the profile of environmental issues within local authorities, especially if it involved decision-makers at the highest level. At the moment, local leadership is usually strongly focused on improving economic and social conditions, while the environment often takes a back seat.<sup>13</sup> The contract would provide decision-makers with information to help them understand the environmental problems within a town or city and their impacts on the hinterland and beyond.<sup>14</sup>

6.30 In our view, the first priority is to introduce environmental contracts in larger urban areas and city regions, since these have a major environmental footprint and much to gain from an

approach that brings together strategies for different parts of the conurbation. However, in principle the contract could apply to all local authorities, large and small, urban and rural. There may also be an opportunity to involve regional bodies in their development.

- 6.31 We conclude that a large urban area with a substantial environmental footprint needs to have an environmental strategy to help it manage its assets and plan for the future. Such a strategy should prioritise a small number of the most important environmental concerns, such as climate change, that must be tackled by all local authorities, while other issues can be given different priorities in different areas.
- 6.32 **We recommend that the UK government and devolved administrations establish an environmental contract between central and local government, beginning with larger urban areas.**
- 6.33 **We recommend that the environmental contract identifies three generic kinds of environmental performance to be achieved by local government:**
- **minimum standards to be achieved by all local authorities in different policy areas;**
  - **aspirational objectives based on the experience of the best performing local authorities, with guidance on how they might be achieved with appropriate resourcing, perhaps on a competitive basis; and**
  - **innovative action to find new ways of improving environmental performance, incentivised through a Local Government Environmental Innovation Fund.**
- 6.34 **We further recommend that the UK government and devolved administrations require local authorities to develop a delivery plan for the environmental contract, beginning with larger urban areas.**

#### *Delivering the environmental contract*

- 6.35 A strong institutional relationship exists between central and local government upon which an environmental contract could be built, but the term ‘contract’ is not used here in a strictly legal sense. It could be interpreted more as a compact, perhaps set out in statutory guidance, that implies inclusion and reciprocity, with central government allowing local authorities more freedom to experiment and to reallocate resources to the environment.
- 6.36 In practice, the contract should state that central government expects standards to be dynamic, in that innovative actions will lead to higher aspirational objectives, and the widespread achievement of these will result in them eventually becoming minimum standards (6.33). In this way, the contract would set out what needs to be delivered when, and how it would be

measured, and would provide for continuous improvement in environmental performance over time. This would be similar to the government's approach to the Code for Sustainable Homes and to Building Regulations, which aims to ratchet up both voluntary and regulatory standards (5.53).

- 6.37 The environmental contract would also help to cascade innovations through local authorities more quickly. This might include policies along the lines of the projects in Merton and Woking (box 5A), an effective framework for sustainable drainage systems (4.86), better strategic protection and management of different types of green spaces (Chapter 4), and initiatives in other areas such as experiments with variable charging schemes for household waste. We are aware that experience shows that best practice can be difficult to transfer,<sup>15</sup> but we anticipate that the dialogue generated in designing the environmental contract and in setting the aspirational objectives within it, along with funds to support innovation, will stimulate the implementation of new knowledge.
- 6.38 Rather than duplicating existing documents, the contract would be a way of integrating and reinforcing the environmental component of strategies on planning and sustainable development. For example, the contract could be used to strengthen the environmental element of existing policies such as Community Strategies and Local Area Agreements. It could also be tailored to help deliver the objectives of other plans such as those for local transport, local air quality management, waste management, flood management, river basin management and local biodiversity action. However, its main aim would be to stimulate much greater ambition in local government action on the environment.
- 6.39 The contract would also require a local delivery plan setting out how the key issues would be addressed, but providing flexibility over the detailed order of priorities, actions and resources, which would be determined locally. Many strategies and plans already exist to influence the environmental performance of urban areas, including environmental regulation, the land use planning system and local plans (including those in 6.38). These can be powerful levers and we would not want to see them replicated or weakened; indeed our recommendations are aimed at boosting their positive environmental effects. However, the delivery plan would help tackle the problems that arise when plans created by different regimes are not integrated, are the responsibility of different agencies and departments of local government and are reactive rather than proactive.<sup>16</sup>
- 6.40 The delivery plan could take various forms. The arrangements could, for example, be set out in an Environmental Management Plan (box 6B). Another approach would be to adopt integrated spatial strategies that bring together environmental and planning concerns from the outset, which we recommended in our Twenty-third Report. Appendix I describes how this framework compares with the existing planning system and Environmental Management Plans.



**BOX 6B****ENVIRONMENTAL MANAGEMENT PLANS**

**Environmental Management Plans (EMPs)** are a way of dealing with environmental issues in urban areas in an integrated way. They also represent a way of deciding, delivering and monitoring environmental priorities locally. An Environmental Management Plan:

- covers the whole town or city;
- links different environmental issues (such as energy consumption, greenhouse gas emissions, water use and treatment, waste, noise, air quality, nature and biodiversity, transport and mobility, design, natural and man-made risks, sustainable construction, related health issues, and quality of life as a whole) in an integrated and co-ordinated way; and
- provides information on the current environmental situation, and sets targets for improvement and actions to meet those targets.<sup>17</sup>

One way of implementing an Environmental Management Plan is through an **Environmental Management System (EMS)** (such as EMAS or ISO 14001). This:

- is a clear procedure to manage environmental goals and targets;
- is a system that includes target setting, consultation, review, auditing and reporting;
- defines the organisational structure and responsibilities, procedures, processes and practices needed to achieve environmental goals and targets;
- provides regular reports to the public; and
- can be used to improve a town or city authority's own internal performance as well as implementing an EMP.<sup>18</sup>

The European Urban Thematic Strategy has proposed that voluntary Environmental Management Plans should be developed for urban areas with a population over 100,000. A number of European States have legal obligations to produce Environmental Management Plans, while several have voluntary measures. However, there are no such requirements in the UK and, in a survey of the UK's larger towns and cities, only 20% of those that replied had an Environmental Management Plan, and about 35% used an Environmental Management System.<sup>19</sup> This means it is likely that many local authorities are neither measuring nor managing the environmental impacts of their day-to-day activities.<sup>20</sup>

Some cities, including Birmingham, Bristol, Glasgow and Sheffield, have some form of plan,<sup>21</sup> but the term EMP is a generic one and such plans may not always be separate instruments. Instead they can be part of documents such as city structure plans or Local Sustainable Development Strategies. Research for the European Commission found that where Environmental Management Plans are in use, 95% of city authorities surveyed believed they had improved the quality and efficiency of environmental planning, with 57% saying the improvements were large. The cost of preparing plans was also modest (about £200,000) compared with the potential cost of environmental impacts,<sup>22</sup> and the significant savings that can be made in reduced energy bills and travel costs.<sup>23</sup>

### **PUBLIC PARTNERSHIPS WITH OTHER SECTORS**

- 6.41 We have examined the direct role of government in improving the environment of urban areas, but this is just part of a much larger picture, since the development of urban areas is strongly influenced by the action of the private sector, voluntary and community groups and private individuals. These organisations have different values and ways of operating, and can come together to respond to the environmental issues associated with urban areas in ways that would not be possible if only one kind of institution was involved.<sup>24</sup>
- 6.42 The environmental contract described in 6.32-6.34 could involve the public, private and voluntary sectors, as well as citizens, in its design and implementation. One way of drawing in these organisations could be through the involvement of Local Strategic Partnerships (LSPs), known as Community Strategy Partnerships in Wales and Community Planning Partnerships in Scotland.
- 6.43 These partnerships cover a broad range of activities, and studies suggest some need improvement as they are rather weak and unfocused.<sup>25</sup> When LSPs were first set up, they did not have an explicit responsibility for the environment, with the result that their Local Area Agreements did not contain much environmental activity.<sup>26</sup> However, the Local Government White Paper (2006) now proposes that, in England, the environment should be an explicit theme, opening the way for LSPs, Local Area Agreements (and the Department for Communities and Local Government's proposed Multi Area Agreements) to include more environmental responsibilities, including those outlined in our proposed environmental contract.
- 6.44 Partnership working has also arisen to deal with specific environmental issues. We have seen examples of good practice (for example, the Strategic Greenspace Partnerships, 4.68). But, elsewhere, the difficulty of establishing partnerships, except in response to a crisis, helps explain why environmental measures such as integrated urban drainage management have so far failed to become widespread (4.24). Such arrangements need support and funding to encourage them to develop as a matter of course and to sustain them in the long term. This experience suggests that the environment needs to be much more strongly embedded as a core part of public private partnerships, especially at the local level – something which we have already recommended (6.15) and which could also be part of the environmental contract.
- 6.45 Another example of public private partnerships are the Business Improvement Districts (BIDs), funded through business rates, which aim to improve the quality of town and city centres and stimulate the local economy. BIDs are a well known concept in the US, but they are in their infancy in the UK, with the majority tackling basic issues to make shopping areas clean, safe and friendly,<sup>27</sup> although some look at waste collection and travel plans. We were told that “The key purpose of BIDs is to improve businesses’ profitability by investing in the trading environment/public realm. If this is achieved by addressing wider environmental issues then

businesses may support proposals which include such projects.”<sup>28</sup> We see no reason why energy efficiency and other aspects of the environment should not be part of their approach. Similarly, environmental action could be included in the remit of the Department for Communities and Local Government’s proposed City Development companies that will operate at the level of the functional economic area or city region.<sup>29</sup>

### **PRIVATE SECTOR INVOLVEMENT**

- 6.46 During our study, we have seen examples of private sector leadership, often driven by highly motivated individuals, who are, for example, determined that their construction company should build homes that are long lasting, flexible and built to high environmental standards.<sup>30</sup> Competition can also act as a driver for change, as in the case of the Department for Communities and Local Government’s £60,000 house, where the winning proposals combined higher environmental standards with modest cost.<sup>31</sup> We have also seen specific developments, such as Brindleyplace in Birmingham, where the developer and the managing agent worked closely with the city council to create a pedestrian-friendly, mixed use development. Another example is Sheffield Council’s work with a private company to extend a Combined Heat and Power scheme from an upgraded energy-from-waste plant, where there was a strong partnership from planning through to delivery and operation. Over 1,000 homes and the whole of the central commercial area are now supplied by district heating with new energy coming from the waste plant.
- 6.47 While it is possible to point to examples of good practice all over the UK, it is equally easy to point to missed opportunities where large-scale developments were built without environmental technologies because developers were unwilling to bear extra upfront costs, were risk averse, could not provide the necessary skills or were simply unaware of the environmental options.<sup>32</sup> In these circumstances, some local authorities and development agencies have found it difficult to negotiate with developers to improve environmental standards, except where there was an obligation to do so (for example, when building on government-owned land). This is despite the fact that the public sector may appear to be in a strong position either as landowner or in terms of its ability to grant planning permission.<sup>33</sup> In our view, the public sector should be pushing forward environmental sustainability where it is involved in a project as a funder, partner or deliverer.
- 6.48 Although some local authorities have faced difficulties in introducing higher environmental standards, their experience contrasts strongly with that of the more than 120 local authorities, which have felt confident enough to insist on higher standards by adopting planning conditions along the lines of the Merton Rule on renewable energy (box 5A). An environmental contract would help ensure that there are fewer missed opportunities, and that good ideas spread faster and more widely, generating more innovation through creative partnerships between local authorities, businesses and communities and citizens.

### **VOLUNTARY AND COMMUNITY GROUPS**

- 6.49 The voluntary sector covers a diverse range of organisations from national and regional bodies with significant assets, through to local bodies (formal and informal), many of which are important in driving real change on the ground. The latter are loosely co-ordinated through local councils of voluntary service, and organisations such as the National Association for Voluntary and Community Action. Some are also represented in Local Strategic Partnerships and similar working arrangements. In our study, we were particularly struck by the efforts of housing associations which have built houses to higher environmental standards than some in the mainstream commercial sector; we were impressed by the dedication that lies behind this achievement.
- 6.50 During visits to Glasgow, Manchester and Southwark, we also saw the valuable role local residents are playing in urban renewal projects and how their views have influenced development at the planning and delivery stages. Such engagement can go beyond physical renewal of the area and play an important part in empowering local communities to take back control, re-establish a sense of place and contribute to the long-term management of an area. We therefore see the voluntary and community sectors as important partners for local authorities in successful development and delivery of the environmental contract.

### **INFRASTRUCTURE**

- 6.51 Infrastructure for new and renewed communities can be expensive in terms of capital costs and long-term maintenance. It also helps determine future environmental impacts, so it is important that it contributes to long-term sustainability. We agree with recent criticism that not enough effort has gone into planning for urban infrastructure. For example, infrastructure funding can be piecemeal and create year-to-year uncertainty; delivery mechanisms can cause problems with timing, so that, for example, public transport may not be in place in time for new residents to use it; and there are gaps in the provision of environmental infrastructure to deliver a sustainable water supply, sustainable drainage systems and renewable energy.<sup>34</sup> We welcome the fact that HM Treasury is carrying out a review of infrastructure needs.
- 6.52 During our visit to Ashford, we heard how important it is that local authorities are able to negotiate with developers to finance infrastructure for new developments. There has been some concern that this arrangement could be damaged if the current system, known as S106 agreements, are replaced by the proposed Planning Gain Supplement, not least because it could reduce the ability to retain revenues for local use. We were reassured by the Chancellor's undertaking in the Pre-Budget Report (2006)<sup>35</sup> that at least 70% of the revenues from the Planning Gain Supplement would be hypothecated to finance infrastructure in the local authority area where the revenue was generated, while the rest would go towards national funding for infrastructure. Nevertheless, we are aware that financing major new developments is difficult, not least in ensuring that money is available at the time when infrastructure is required. We urge caution in

introducing the new system to avoid unintended consequences which could exacerbate what is already a difficult process.

- 6.53 The Local Government Act (2000) has also extended local authorities' ability to borrow for capital investment in England and Wales, and we have seen an example of an innovative funding plan that delivers investment from the outset (box 6C). However, the UK does not take advantage of some of the funding mechanisms used abroad. For example, the success of Business Improvement Districts (BIDs) in the US is largely due to their ability to raise finance through bonds, something that UK-style BIDs cannot do. Another approach is being used in Copenhagen, where part of the funding to extend the metro system will come from using a proportion of the increase in local tax receipts that will result from new development alongside the metro line. A similar idea was suggested by the Urban Task Force (1999), which recommended allowing local authorities to retain a proportion of the increased income from council tax and business rates as a result of regeneration, and recycle it into the management and maintenance of an area.<sup>36</sup>

#### BOX 6C

#### MILTON KEYNES DEVELOPMENT TARIFF<sup>37</sup>

The Milton Keynes Partnership has created a development tariff to help fund new infrastructure for its Urban Development Area. The tariff is a form of S106 planning agreement, but one which requires an extra degree of funding from developers. As a result, the system goes some way to ensuring schools and transport systems will be in place early in the life of the development, rather than being delivered in a piecemeal fashion. Crucially, the tariff is part of a wider framework agreed between the Partnership and the developers, which sets out the likely scale of future development, new infrastructure needs and the quality standards that developers must meet.

Developers contribute £18,500 per residential unit and about £66 per m<sup>2</sup> of commercial floorspace. This will provide some £310 million of funding over the life of the development. As well as the financial component, developers have to meet various stipulations, for example, that 10% of homes will meet the BREEAM 'excellent' standard, while the remaining 90% will be 'very good'. For employment space, the target is 100% 'very good', with a rebate for 'excellent'. The Partnership told us that developers like the scheme because it provides certainty and speeds up planning decisions. Developers also know it will be easier to sell their houses if there are services to support them.

The Milton Keynes Partnership did not need extra powers to bring forward the tariff system. However, it has benefited from English Partnerships' role in underwriting the tariff system, and this arrangement may not be possible everywhere in the UK. While tariff systems go some way to funding infrastructure needs, delivery partnerships still have to put together complicated packages of funding from many uncertain funding streams to complete the task. In addition, the Partnership told us that "preparation for large scale growth has not, to date, been a priority for investment by environmental infrastructure providers. For example, following privatisation, the utilities have tended to centralise their strategic planning resources. Taking into account the five-year regulatory framework, it has been difficult to ensure that all the environmental infrastructure required to meet current and future need will be ready on time."<sup>38</sup>

- 6.54 Another approach is the so-called revolving funds operated by local authorities, such as Bristol and Woking, which pay for energy efficiency improvements and infrastructure and recoup the costs out of future savings. However, local authorities often find it difficult to set aside the money to get them started. Revolving funds are in use in Scotland, and the UK government recently created a £20 million revolving loan fund for local government and other public sector organisations for energy efficiency projects.<sup>39</sup> While this is welcome, it is striking that both this programme and public spending on the measures in the UK's climate change programme is modest, totalling £120 million per year.<sup>40</sup>
- 6.55 As a result, every effort must be made to ensure that other forms of government spending, such as the multibillion pound programmes of house, school and hospital building, contribute as fully as possible to the climate change agenda and to environmentally sustainable development. It is already possible to include environmental criteria into capital projects and public private partnerships. However, bids that have lower initial costs can take precedence over more environmentally-friendly ones that offer longer-term savings; so procedures need to be in place to ensure that environmental considerations are included in the commissioning, delivery and management stages of a contract.<sup>41</sup>
- 6.56 A recent review of central government procurement has shown that the 'whole life costs' approach is not being used in practice despite the fact that it is government policy.<sup>42</sup> Central and local government therefore need to do more to embed investment appraisal methods that give due weight to environmental impacts, including non-monetary aspects, and provide the ability to raise finance for environmental 'spend to save' measures. A criterion for all new infrastructure should be that it contributes to the environmental dimension of sustainable development, and that appropriate long-term financial mechanisms are put in place. This should be reflected in national guidance on infrastructure funding, and it could also be part of the environmental contract described earlier (6.32-6.34).

## INSTRUMENTS AND INCENTIVES

### INCENTIVES

- 6.57 Creating an environmentally sustainable future for our towns and cities will also depend on encouraging more environmentally benign behaviour by business and consumers through a package of measures that includes incentives, legislation and compliance with regulation.
- 6.58 Government needs to send a clear signal that environmental standards will be systematically raised over time across a range of sectors (including energy and water use, transport and waste management), and that charges for the use of scarce environmental resources or the creation of pollution will be increased. Technologies that reduce environmental impacts will then become increasingly economically viable, especially where they are backed up by public purchasing.

As part of this, the reduction of environmental impacts should be systematically incentivised through appropriate environmental taxes, charges or subsidies.

- 6.59 In Chapter 5, we recommended changes to VAT so that it no longer sends a perverse signal that favours new build over the refurbishment of existing properties or provides an incentive for allowing buildings to deteriorate.
- 6.60 The price of natural resources should also be restructured to encourage conservation, while protecting vulnerable consumers. At the moment, the price of regulated utilities such as water, gas and electricity is relatively low for many consumers, even taking account of recent rises. As a result, the unit price is too cheap to significantly penalise overconsumption or reward consumers who take conservation measures. Customers also lack billing information that explains the environmental impact of their consumption and helps them monitor and cut down their use (box 5B). In our view this should be tackled through smart metering and billing methods similar to those used in countries like the US and Australia; we agree with a recent report from the House of Lords that such an approach should become standard in the UK.<sup>43</sup>
- 6.61 As part of a package of measures to substantially reduce the cumulative environmental impact of the UK's urban areas, we consider that a blend of measures to alter utility pricing structures, to improve metering and billing, and to provide information on efficiency measures would give companies and consumers greater ability to manage consumption, and would have a larger combined effect than introducing measures individually.
- 6.62 **We recommend that the UK government and utility regulators create packages of measures for water and energy that:**
- **provide customers with frequent billing information showing how much they are using in comparison with past use and average consumption levels. Bills should also provide information on the environmental impact of consumption and ways of reducing use;**
  - **include appropriate smart metering; and**
  - **encourage utility companies to set tariffs that reward conservation, do not provide discounts for high use and are structured to protect vulnerable groups.**
- 6.63 **We recommend introducing a similar incentives-based package for waste, including equitable charging related to waste generation.**
- 6.64 The regulators for water, Ofwat (in England and Wales),<sup>44</sup> and energy, Ofgem (in Great Britain) and Ofgem (in Northern Ireland), have environmental duties and some are charged with promoting sustainable development. However, it is not clear what this duty should entail

and how far it is being put into practice. For example, we agree with recent reports from the House of Lords and others that suggest Ofwat has done too little to make water companies take action on water efficiency.<sup>45</sup> On the other hand, we welcome the fact that Ofgem has produced a sustainable development report and that the Sustainable Development Commission is preparing an evaluation of Ofgem's contribution to sustainable development.

- 6.65 **We recommend that the UK government clarifies what it expects from utility regulators in respect of sustainable development, and how their performance in this area will be assessed.**

## PLANNING AND ENVIRONMENTAL CONTROLS

### *The planning system*

- 6.66 The planning system has been a major force in shaping land use for over 50 years, and although much of its protection for the environment has been implicit and subservient to economic and social objectives, it has achieved a great deal to resist urban sprawl, prevent destructive development, protect the green belt and enhance the quality of life. There has also been welcome progress in making sustainable development the core principle underpinning planning, as embodied in key documents such as *Planning Policy Statement 1 (PPS1): Delivering Sustainable Development* (2005) and similar policies in the devolved administrations.<sup>46</sup>
- 6.67 Across the UK, the planning system is undergoing a round of review and reform, with an emphasis on reducing the length and complexity of the system. For example, the Energy Review (2006) makes proposals for changing the planning process for major energy infrastructure projects, and initiatives such as the Barker Review of Land Use Planning (2006) are looking at ways of speeding up planning.<sup>47</sup> We are concerned, however, that many of the proposals in the Barker Review could have far-reaching environmental effects that have not been fully assessed, and that environmental topics have been dealt with in a narrow way that focuses on only a few high profile issues.
- 6.68 We are also dismayed by the Barker Review's suggestion that there should be a stronger presumption in favour of development, reflected in its recommendation that "applications should be approved unless there is a good reason to believe that the environmental, social and economic costs will exceed the respective benefits".<sup>48</sup> This appears to contradict existing policy (as expressed in PPS1 and the UK's various sustainable development strategies) that environmental, social and economic goals should be pursued in an integrated way that contributes to sustainable development. Given that government itself has put sustainable development at the heart of the planning system, it needs to ensure this principle is preserved and strengthened by any reform process. By calling for environmental limits to be respected,<sup>49</sup> government has also acknowledged that the different objectives of sustainable development are not infinitely tradeable.



- 6.69 Any review of the planning system and other policies should also recognise that environmental constraints exist in the areas of water quality, water resources and flooding (2.42-2.51) as well as air pollution, climate change.<sup>50</sup> Putting the idea of environmental constraints into practice will require a concerted attempt to understand the capacity of the environment to support urban development and to recognise the environmental constraints on social and economic aspirations in areas like planning, house building and regional development. The necessary work to make this a reality should be undertaken without delay.
- 6.70 **We recommend that central and local government ensure that environmental constraints are recognised and respected by the planning system and by policies for urban areas.**

### *Environmental assessment*

- 6.71 The planning process is also supported by a system of environmental assessment. This aims to provide decision-makers with environmental information on the consequences of major new projects and plans, to examine different options and to suggest how adverse effects can be minimised. The three main planks are Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Sustainability Appraisal (SA). The first two derive from EC Directives and aim to assess environmental effects, with EIA applying to projects and SEA applying to programmes and plans. By contrast, SA is a UK initiative that seeks to take account of economic and social impacts, as well as environmental ones.
- 6.72 In most of the UK, the government has decided that the SEA Directive should apply only to statutory plans and programmes generated by the planning system, and that SEA and SA should be run in tandem. These processes are beginning to be applied at the regional and local level, but an important gap has opened up because the same procedures are not routinely applied to the national policies that drive these lower-level plans. The exception is Scotland, which has decided in principle to apply SEA to strategic plans including its National Planning Framework, and has established a Consultation Authority to ensure that environmental considerations are built into such plans.<sup>51</sup>
- 6.73 While environmental assessment procedures are potentially useful, the quality of the output depends on how well the study is done.<sup>52</sup> If the assessment process is to help decision-makers avoid unsustainable development, it needs to consider different options fully and at an early stage, have access to quantitative information on environmental impacts, and be applied to those policies and plans that really determine environmental outcomes. It will be very difficult to design a regional or local policy that is environmentally sustainable if it is driven by a national policy whose environmental impacts are unknown or unsustainable.

6.74 **We recommend that the UK government and devolved administrations:**

- **apply Strategic Environmental Assessment (SEA) to all major public sector policies, plans and programmes including those at the national level;**
- **provide a mechanism for exchanging experience and developing best practice guidance on SEAs; and**
- **ensure that SEAs are subject to independent review.**

We have already recommended that Health Impact Assessments are factored into environmental assessment (3.72).

### **COMPLIANCE AND ENFORCEMENT OF REGULATIONS**

6.75 Chapters 4 and 5 highlighted areas where environmental improvements are possible but have not materialised, partly because regulations are missing, weak or badly designed (for example, sustainable drainage systems, integrated urban drainage management and water leakage) or because compliance and enforcement are poor (for example, aspects of planning law and Building Regulations).<sup>53</sup>

6.76 Although the penalties handed out by courts for environmental offences are often seen as an inadequate deterrent, regulators have to rely on criminal proceedings in the absence of other options.<sup>54</sup> A recent review suggested that UK regulators should have access to a wider toolkit of sanctions. These might include administrative penalties, enforcement notices, enforceable undertakings, forms of restorative justice (for example, a company might be made to make good the consequences of non-compliance), corporate rehabilitation orders (to undertake activities such as staff training) and publicity for good and bad performers.<sup>55</sup> An important feature of these kinds of penalties is that they could well be more effective than punitive sanctions in encouraging a culture of compliance.

6.77 There is a particularly powerful case for improving compliance with Building Regulations and codes (Chapter 5). A US study suggests that it is more effective to help building firms take voluntary action to improve, rather than concentrating on punishment.<sup>56</sup> However, this approach relies on there being enough trained staff to help raise standards, backed up by an enforcement regime that encourages improvement. The research also found that it was easier to increase compliance when businesses are thriving, suggesting that there is a current window of opportunity as a result of the UK government's house building plans. Nevertheless, there are major concerns over the compliance with and enforcement of the Building Regulations, especially for Part L, which deals with energy efficiency (Chapter 5).

- 6.78 **We recommend that the Department for Communities and Local Government and the devolved administrations periodically review the level of compliance with Building Regulations. We also recommend that local authorities provide adequate resources for the inspection and enforcement of Building Regulations.**
- 6.79 Turning to planning law, it is not in itself an offence to breach this; the offence consists of failing to comply with a notice served by the planning authority about unauthorised development or breach of a condition. Planning authorities have an extended array of enforcement tools at their disposal, but they also have very wide discretion as to whether to enforce.
- 6.80 There is long-standing concern about underenforcement of planning law, which is seen as the weakest link in the planning chain. There has been a significant decrease in the number of enforcement notices issued in recent years. Economic considerations appear to influence enforcement, as it is more common in South-East England than in economically depressed urban areas. Enforcement may also be compromised by the fact that modern planning, especially for larger developments, is a collaborative process between private developers and planning authorities. As part of its recent planning reforms, the government mooted the possibility of removing local planning authorities' enforcement discretion (at least for major breaches), and making breaches of development control law a criminal offence.<sup>57</sup> A recent Department for Communities and Local Government review, however, rejected both these suggestions, but made numerous recommendations for enhancing the wider culture of planning enforcement.<sup>58</sup>

## INCLINATIONS AND INFORMATION

- 6.81 Timely and meaningful information can help influence people's behaviour, but it has long been understood that information is generally not enough to bring about change on its own, especially if other incentives are pulling in the opposite direction. That is why we suggested earlier (6.62) that better information on water and energy use is coupled with other measures, such as a better pricing structure and help with conservation. Taken together, such a package can give people the knowledge, the incentive and the power to act.
- 6.82 Many of the examples of good environmental practice which we saw during our study were championed by skilled and enthusiastic individuals or small teams, who led pioneering initiatives like the Woking renewable energy project or the Nottingham Declaration on Climate Change.<sup>59</sup> To support such people, organisations need to be able to nurture and incentivise leadership and demonstrate sufficient flexibility so that staff can work on innovative environmental policies. In the local authority sector this is most common where authorities have strong strategic goals and the maturity to allow environmental entrepreneurs to survive.

- 6.83 However, it can be difficult to sustain momentum when key individuals leave, and this can be a particular problem if environmental experts are isolated within large organisations. For example, local government expertise is often dispersed across the environment and planning departments, and to a lesser extent in the estate management and corporate branches.<sup>60</sup> The Local Government Association has tried to address this by encouraging virtual networks between environmental professionals. There are also international organisations such as the International Council for Local Environmental Initiatives (ICLEI), which brings together 475 local governments that have made a commitment to sustainability, and the C20 Summit in 2005 involving over 20 major cities from across the world in a bid to tackle climate change.<sup>61</sup> In other cases, organisations have chosen to concentrate their resources in a single team, as has happened with the Office of Sustainable Development in Portland, US, and in Leipzig, Germany.<sup>62</sup> However, more support is undoubtedly needed to encourage environmental entrepreneurs and to build networks of expertise. This is an area where the Local Government Environmental Innovation Fund (6.33) could provide resources to employ environmental managers or create opportunities for training, secondments and awards.
- 6.84 There is also a shortage of people and skills in the built environment sector, and here our findings echo those of the Egan Review of Skills and the first Barker Report.<sup>63</sup> Problems run all the way from the planning process through design to construction and installation. Transport skills emerge as an area of particular concern, with a “skills time bomb” emerging as experienced transport planning professionals retire without being replaced by new entrants,<sup>64</sup> a trend also seen across planning and engineering. The number of public sector architects has also decreased markedly.<sup>65</sup> A Department for Communities and Local Government consultation has also found widespread support for training elected members of local authorities to help them cope with the range of important decisions that they need to make as part of the development process.<sup>66</sup> There are also skill shortages in parts of the construction sector.<sup>67</sup>
- 6.85 However, the biggest problem lies in the planning system. We were told by local authorities and developers alike that there is a widespread shortage of planning officers.<sup>68</sup> This is confirmed by the figures for staff recruitment and retention, where nearly half of all local authorities surveyed in 2003 had problems in finding planners. The problem is most severe in South, East and South-West England, with shortages in London “particularly acute”,<sup>69</sup> and some local authorities heavily reliant on overseas workers whose average stay may be as little as nine months.<sup>70</sup>
- 6.86 Some boroughs are tackling this by retraining graduates from other fields to deal with planning policy and routine matters, and there are bursaries for training junior planners. In addition, the Department for Communities and Local Government has given local authorities substantial sums to reduce the number of weeks taken to give planning approval, and has supported the development of an electronic system for submitting applications. These efforts are welcome, but we continue to be concerned about the pressures on local authority planning departments. As we highlighted in our Twenty-third Report on Environmental Planning, local authorities

must have the resources to employ the range of skills required for sustainable development, and to ensure compliance with regulations and planning conditions. Without tackling this long running problem, it will not be possible to meet the aspiration of the Barker Review of Land Use Planning to speed up the process while maintaining quality.

- 6.87 It is against this background of skills shortages that urgent environmental improvements need to be made. Planners and built environment professionals of all kinds need to have an understanding of environmental issues and a working knowledge of environmental technologies and approaches.
- 6.88 **We recommend that the Department for Communities and Local Government and the devolved administrations ensure that local authority planning departments are adequately resourced and organised to maximise environmental and associated health benefits from developments.**
- 6.89 **We recommend that the higher and further education sectors and professional bodies develop training and continuing professional development for the built environment sector that includes environmental sustainability as a core part of the curriculum, and ensures that the workforce has the skills to identify, install and maintain environmental technologies and green infrastructure in order to promote environmental sustainability in urban areas.**

## CONCLUSIONS

- 6.90 We have identified many areas where change needs to occur. We know that change is possible, but it is complex and difficult to channel. Governments and their agencies can easily overestimate their powers to bring it about. Change also relies on paradoxes: working with the private sector while regulating it to ensure compliance with basic standards; respecting individual freedoms while encouraging individuals to modify behaviour; and working with simplifications when the real situation is complicated.<sup>71</sup>
- 6.91 The challenge is to produce a huge step change in the environmental impact and conditions of UK towns and cities. New technologies will be required and improvements to existing technologies will always be helpful. However, a huge range of technical measures already exist and have been demonstrated to work, although time and again they have failed to become mainstream. The complex problem of the urban environment cannot be solved by simple technical fixes or by exhortations for behavioural change alone. Rather, creating environmentally sustainable cities will depend on different modes of living, encouraged by a whole range of incentives, regulation, changes in governance, better information and unambiguous leadership from government at all levels.

6.92 To tackle the five generic constraints that are particularly important in holding back environmental progress in urban areas we recommend a set of actions addressing: institutions; infrastructure; instruments and incentives; inclinations; and information. As a starting point, we urge government to focus on the problems and opportunities of towns and cities by developing an explicit policy for the urban environment and its impact on health and wellbeing as part of a coherent policy framework. A key element of putting this into action should be the creation of an environmental contract between central and local government, backed up by a legal duty on local authorities to protect the environment.

# Chapter 7

## CONCLUSIONS AND RECOMMENDATIONS

- 7.1 Throughout our study we have been struck by the complexity of the urban environment, which is a classic example of what has been characterised as a ‘wicked problem’, a problem often symptomatic of deeply rooted lifestyles and behaviours. We conclude that it is essential that towns and cities are understood and managed as complex systems, in which apparently plausible but simplistic solutions may not work and may result in a myriad of unintended consequences. However, clarity of vision as to what needs to be achieved in terms of progress on the environment is essential, as is integration of policy and action across different sectors and agencies.
- 7.2 We note that urban issues are not usually identified and addressed explicitly in environmental policies, and that a concern for the environment is often missing from urban policies. We are disturbed that the government has no urban environmental policy, which recognises and responds to the complexity and importance of towns and cities. This means there is no systematic mechanism for understanding how the panoply of environmental policies interacts with the wider social, economic, governance and regulatory framework. Nor is there a vision of how urban areas can contribute to meeting climate change targets, how urban growth and renewal can be accommodated within environmental constraints, or how the environment can affect the health and wellbeing of urban populations and the economic vitality of towns and cities.
- 7.3 More than 80% of the UK’s population lives in towns and cities, and a wide range of interacting factors associated with the urban environment adversely influence their health and wellbeing, whatever their age. We are convinced that if urgent attention is given to these issues, then substantial health gains will be realised.
- 7.4 Developing policy in complex situations is challenging. A policy for the urban environment must reflect the diverse nature of urban areas and the multiplicity of actors, including central and local government, business, the voluntary sector and citizens. It must also respond to the dynamic and diverse nature of towns and cities. Just as the planners of the 1950s could not fully imagine how the cities of today would function, so planning now for all the needs of 2050 is impossible. Therefore, we believe that flexibility must be built into the planning, design and development of urban areas, to allow for the unknown, not least the impact of climate change.
- 7.5 It is clear to us that it is not a lack of technical solutions that is preventing significant environmental improvement right now. Technologies and methods are to hand and have been used and shown

to work in a number of pioneering areas. We have identified what we call the ‘web of constraints’ (6.5) holding back progress towards environmental sustainability. Our report has set out to develop a framework that recognises the complex nature of the problem and identifies the changes needed to cut through the web of constraints to allow the development of successful urban areas which meet the needs of society both in terms of respect for environmental constraints and health and wellbeing. This leads us to our primary recommendation below.

**7.6 We recommend that the UK government and devolved administrations develop a coherent policy framework containing explicit policies for the urban environment. The framework should recognise the complexity of urban areas and their contribution to meeting environmental targets and improving the health and wellbeing of their citizens. It should also:**

- **include a vision for the degree of change that needs to be achieved, the measures to deliver it and the necessary reprioritisation of resources;**
- **ensure environmental objectives and their potential impact on health are introduced into mainstream policies from the earliest stage of development, and tackle the synergies and conflicts between different policy areas by creating policy mechanisms to bring different interest groups together;**
- **ensure that environmental objectives are central to the work of regional and local government, and are a core part of all major initiatives, such as Local Strategic Partnerships and Regional Spatial Strategies, and the equivalent policies in the devolved administrations; and**
- **embrace all urban areas, and not be limited to new developments or certain types of urban area (6.15).**

7.7 One way of implementing this new policy on the urban environment would be the development of an environmental contract between central and local government, drawing on the engagement of other players, for example, within the private and voluntary sectors. The majority of our recommendations flow from this idea of a contract and are intended to provide examples of measures which would help to achieve environmental and health outcomes. We do not suggest, however, that our recommendations are exhaustive: the complex nature of the problem makes this an unrealistic aspiration. But we do believe that they are a helpful package which should be seen as a whole.

7.8 Before listing our more detailed recommendations there is one more point we wish to make. The evidence we received convinces us that the aspirations for environmentally sustainable urban areas will not be met unless the following set of principles is adopted:



- urban management is guided by an explicit urban environmental policy;
- an integrated approach to the natural and built urban environment is adopted, understanding it as an interconnected socio-physical system;
- health and wellbeing are recognised as inextricably linked with the urban environment;
- urban growth and renewal are planned within environmental limits;
- the environment is placed at the heart of urban design, regeneration and management;
- the reduction of negative environmental impacts is incentivised; and
- knowledge, capacity and skills to reduce environmental impacts and promote health and wellbeing are increased and maintained.

7.9 We seek government's response to the set of principles outlined in 7.8, which we see as crucially underpinning our approach. The detailed recommendations which now follow are substantive and, as explained, are intended to be part of a holistic package and illustrative of the type of changes that are needed. They derive from our focus on the urban environment, but have the potential to benefit the wider environment. A cross-reference is given to the chapter where the detail behind each recommendation is given.

## **PUBLIC POLICY TO PROMOTE THE ENVIRONMENTAL COMPONENT OF SUSTAINABLE DEVELOPMENT**

- 7.10 The public policy framework needs to put more emphasis on the environmental component of sustainable development. This message appears embedded in the various sustainable development strategies that apply within the UK, but the political will to transmit this principle throughout government, including across departments, their agencies, regional and local government, is less evident. We intend that this should be addressed by our recommendation for an explicit policy on the urban environment (7.6), and in the following package of measures to build up a coherent policy framework for the urban environment and its impact on health and wellbeing.
- 7.11 **We recommend that the UK government upgrades local authorities' current discretionary powers on wellbeing to a statutory duty to protect and enhance the environment (6.25).**
- 7.12 **We recommend that the Department for Communities and Local Government takes a share in the Public Service Agreement on climate change and that its devolved equivalents take on similar climate change objectives (6.17).**
- 7.13 **We recommend that the UK government and devolved administrations establish an environmental contract between central and local government, beginning with larger urban areas (6.32).**

- 7.14 We recommend that the environmental contract identifies three generic kinds of environmental performance to be achieved by local government:
- minimum standards to be achieved by all local authorities in different policy areas;
  - aspirational objectives based on the experience of the best performing local authorities, with guidance on how they might be achieved with appropriate resourcing, perhaps on a competitive basis; and
  - innovative action to find new ways of improving environmental performance, incentivised through a Local Government Environmental Innovation Fund (6.33).
- 7.15 We recommend that the UK government and devolved administrations require local authorities to develop a delivery plan for the environmental contract, beginning with larger urban areas (6.34).
- 7.16 We recommend that central and local government ensure that environmental constraints are recognised and respected by the planning system and by policies for urban areas (6.70).
- 7.17 We recommend that the UK government and devolved administrations:
- apply Strategic Environmental Assessment (SEA) to all major public sector policies, plans and programmes including those at the national level;
  - provide a mechanism for exchanging experience and developing best practice guidance on SEAs; and
  - ensure that SEAs are subject to independent review (6.74).

## **INCENTIVES AND INFORMATION TO RAISE ENVIRONMENTAL STANDARDS OVER TIME**

- 7.18 Government needs to deliver clear and consistent messages to promote environmental improvement across all departments and in all areas. This must be backed up by well-reported public purchasing policies to make clear that government is behaving in the same way that it is advising citizens to act. Environmental standards across a range of issues (such as energy and water use, transport and waste generation) need to be ratcheted up over time, and the reduction of environmental impacts should be systematically incentivised through appropriate environmental taxes, subsidies or charges. Technologies that reduce environmental impacts will then become increasingly economically viable and supported through public purchasing.

- 7.19 We recommend as a matter of urgency that the Department for Communities and Local Government extends the Code for Sustainable Homes to cover all buildings. We further recommend that the Department for Communities and Local Government progressively tightens the Building Regulations and the standards in the Code, in respect of both energy and water efficiency, over a pre-announced three-yearly cycle (5.54).
- 7.20 We recommend that the Department for Communities and Local Government and the devolved administrations periodically review the level of compliance with Building Regulations. We also recommend that local authorities provide adequate resources for the inspection and enforcement of Building Regulations (6.78).
- 7.21 We recommend that VAT rates be equalised between refurbishment and new build at a level which is fiscally neutral. This means raising the VAT on new build above the minimum level of 5%, and reducing the VAT on refurbishment to match it, such that the revenue gained is equal to the revenue lost (5.76).
- 7.22 We recommend that the UK government and devolved administrations:
- introduce a Water Efficiency Commitment on water suppliers, along the same lines as the Energy Efficiency Commitment;
  - strengthen the Business Resource Efficiency and Waste (BREW) programme; and
  - establish a Water Saving Trust to provide advice on water efficiency to households (5.83).
- 7.23 We recommend that all domestic buildings are metered for water, beginning in the areas shown in assessments of the environment agencies to be in water-scarce zones (5.81).
- 7.24 We recommend that the UK government and utility regulators create packages of measures for water and energy that:
- provide customers with frequent billing information showing how much they are using in comparison with past use and average consumption levels. Bills should also provide information on the environmental impact of consumption and ways of reducing use;
  - include appropriate smart metering; and
  - encourage utility companies to set tariffs that reward conservation, do not provide discounts for high use and are structured to protect vulnerable groups (6.62).
- 7.25 We recommend introducing a similar incentives-based package for waste, including equitable charging related to waste generation (6.63).

## NEW INFRASTRUCTURE SHOULD CONTRIBUTE TO ENVIRONMENTAL SUSTAINABILITY

7.26 A criterion for all new infrastructure should be that it contributes to environmental sustainability. Long-term financial mechanisms need to be put in place to achieve this, and national guidance on planning and infrastructure needs to be clear about the objectives that are to be achieved. Long-term institutional responsibilities for new infrastructure also need to be clarified.

### TRANSPORT

7.27 We have covered transport issues extensively in previous reports, and many of our recommendations remain valid, but not yet fully implemented. In this report, we have focused more narrowly on transport issues related to the urban environment.

7.28 **We recommend that the government develops and strengthens requirements for Local Transport Plans, such that by the end of 2008 they can include statutory targets for reduction in urban traffic (5.16).**

7.29 **We recommend that before development plans are approved, the government publishes a clear assessment of the transport infrastructure needs for all proposed housing growth, how they will be funded and the environmental and health impacts of meeting those needs. This should be accompanied by a clear plan for phasing in the necessary supporting infrastructure, such that new transport provision is environmentally sustainable (5.21).**

### BUILT ENVIRONMENT

7.30 **We recommend that the new Planning Policy Statements on Climate Change require all new developments beyond a certain size to incorporate a strategic approach to energy planning and provision, that takes all opportunities to optimise the use of low carbon technologies, renewables, microgeneration and Combined Heat and Power, as appropriate, and in sympathy with air quality management objectives (5.30).**

7.31 As part of the plans for meeting the UK's goal of a 60% cut in carbon dioxide emissions by 2050, we recommend that:

- **the government draws up realistic but demanding timetables to improve the energy efficiency of the building stock and the uptake of low and zero carbon technologies, taking account of the drivers for change and the policy levers appropriate for the various sectors. For example, fiscal incentives, such as rebates on stamp duty land tax or council tax for energy saving measures, should be introduced to provide real encouragement to developers and householders to deliver new building and refurbishment to a high environmental standard; and**

- existing homes should be improved to the EcoHomes ‘excellent’ standard by 2030, with equivalent standards applied in other sectors, wherever the technologies are available to achieve this consistent with social, cultural, heritage, urban landscape and aesthetic considerations (5.76).
- 7.32 We recommend that high standards of environmental performance be included in private finance initiative and public private partnership contracts for non-residential buildings and that government puts in place management processes to ensure that 100% of public sector non-residential buildings meet the BREEAM ‘excellent’ standard (5.56).
- 7.33 We recommend that masterplanning and design codes incorporate environmental design principles in all new developments and redevelopments (5.96).

#### **WATER AND SEWERAGE**

- 7.34 We repeat the recommendation from our Twenty-third Report on Environmental Planning that development allocations should not be made until it has been established that water supply and management can be provided in an environmentally sustainable manner. We recommend that the environment agencies are made statutory planning consultees with regard to environmental constraints on water for a given catchment area (5.33).
- 7.35 We recommend that the government and devolved administrations require water companies to produce and implement long-term strategic plans for sewage and wastewater treatment in consultation with the relevant environment agencies, and that these plans are fully taken into account by relevant authorities in development planning (5.39).
- 7.36 We recommend that Ofwat (the Water Services Regulation Authority) sets more stringent leakage targets for water companies supplying urban areas in the south and east of England and that these targets reflect the scarcity of water resources and the environmental impacts of the additional compensating water abstraction that is required. We also recommend that the Scottish Executive sets leakage reduction targets for Scottish Water, particularly for areas of water scarcity (5.43).
- 7.37 We recommend that the UK government clarifies what it expects from utility regulators in respect of sustainable development, and how their performance in this area will be assessed (6.65).
- 7.38 We recommend that the UK government and devolved administrations promote a strategic and integrated approach to the urban drainage system. As part of this, we

recommend that the Department for Environment, Food and Rural Affairs, the Department for Communities and Local Government and their devolved equivalents:

- clarify ownership and responsibility for the long-term maintenance of every element of surface water drainage systems, including sustainable drainage systems (SuDS);
- bring forward reforms to ensure that SuDS are the preferred option, and are incorporated wherever feasible in all new urban drainage schemes within five years;
- amend Section 106 of the Water Industries Act 1991 in England and Wales to encourage the use of SuDS; and
- promote the role of SuDS in strengthened planning policy statements and guidance on the natural environment and elsewhere (such as planning policy on biodiversity, climate change, flooding, pollution and housing) (4.86).

## HEALTH AND WELLBEING

7.39 The urban environment places stresses and strains on human health and wellbeing that contribute to tens of thousands of deaths a year and a considerable burden of ill health. Major issues include air pollution, climate, obesity and mental health.

7.40 We recommend that:

- the UK government, devolved administrations and local government implement further measures to reduce traffic levels in the air pollution hot spots of towns and cities and, in particular, to bear down heavily on the most polluting vehicles. We commend for wider adoption the recent proposal in London for a Low Emission Zone;
- the UK government promotes the concept of exposure reduction for reducing the overall health impacts of outdoor air pollutants and actively pursues such measures in domestic, EU and international policy on air quality; and
- central and local government raise awareness of air pollution levels, including their effects on health, among all those who contribute to them, not just those who are at particular risk from detrimental health effects (3.30).

7.41 We recommend that Health Impact Assessments be incorporated explicitly in Sustainability Appraisals, Strategic Environmental Assessments and Environmental Impact Assessments. In order to implement this, we recommend that the UK government and devolved administrations develop a statutory framework for including Health Impact Assessments in the planning process, accompanied by appropriate guidance (3.72).

## NATURAL URBAN ENVIRONMENT

- 7.42 The natural environment of towns and cities is under-recognised and undervalued. It consists of much more than just parks and gardens. It includes air, soil and water and a diverse range of areas and habitats, including little valued areas like brownfield sites and transport corridors. All these areas can make an important contribution to urban ecosystems and provide important ecological services in terms of biodiversity, climate, water and flood management. We want to see more use of this flexible green infrastructure in preference to an over-reliance on the expensive, hard engineering approaches of the past.
- 7.43 **We recommend that the Department for Communities and Local Government and its devolved equivalents amend their planning policy statements and guidance to reflect a broader definition of the natural environment in urban areas and to recognise and protect the role that urban ecosystems can play in improving towns and cities. Planning policy and guidance should describe the range of functions and benefits associated with the natural environment of urban areas, promote the use of green infrastructure and provide a menu of options for planners and developers to use, including:**
- creation of green networks and green infrastructure;
  - urban river restoration;
  - the use of green and built infrastructure for flood storage and redirection;
  - the use of sustainable drainage systems, including green roofs; and
  - the promotion of urban trees and woodland (4.97).
- 7.44 **We recommend that the Environment Agency, the Scottish Environment Protection Agency and the relevant body in Northern Ireland, in partnership with other bodies, each produce a strategy on urban river restoration and publish guidance on its costs, environmental, social and economic benefits, potential funding sources, opportunities for community engagement and examples of good practice (4.15).**
- 7.45 **We recommend that the UK government and devolved administrations strengthen their planning policies to direct development away from high flood risk areas, and ensure that planning authorities follow this principle in practice (4.26).**
- 7.46 **We recommend that local planning authorities use supplementary planning guidance to minimise the use of hard-standing, and require the use of permeable surfaces for paving and car parking (4.45).**

- 7.47 We recommend that the Department for Communities and Local Government and its devolved equivalents strengthen the presumption in planning guidance in favour of green belt protection and make it clear that it should be set aside only in truly exceptional circumstances of development need (4.41).
- 7.48 We recommend that the UK government and devolved administrations review the environmental impact of brownfield policies across the UK, and consider whether the 60% target will remain appropriate across England after 2008 (4.31).
- 7.49 We recommend that the Department for Communities and Local Government and its devolved equivalents ensure that planning policy and guidance recognise that not all brownfield land is equally suitable for development, because gardens and other areas may provide ecosystem and amenity services if left undeveloped (4.49).
- 7.50 We repeat the recommendation from our Twenty-third Report on Environmental Planning that the Department for Communities and Local Government and its devolved equivalents set minimum standards on size and distance to ensure access to good quality green space particularly in urban areas (4.75).
- 7.51 We recommend that the Department for Environment, Food and Rural Affairs, the Department for Communities and Local Government and their devolved equivalents:
- publish information on the extent and condition of urban trees;
  - increase support for urban tree planting and maintenance within national forestry strategies and planning guidance; and
  - ensure that local authorities use their powers to protect existing urban trees and ensure that adequate provision is made for the protection or planting of trees when planning permission is granted for new developments (4.57).
- 7.52 We recommend that:
- the UK government and devolved administrations amend UK and national Biodiversity Action Plans to include a priority habitat of special urban character; and
  - all urban local authorities produce a Local Biodiversity Action Plan linked to their Local Development Framework (4.65).



## RESOURCES AND SKILLS FOR SUSTAINABLE DEVELOPMENT

- 7.53 Local authorities and others need to have the resources to employ the range of skills required for sustainable development planning, and to deliver compliance with regulations and planning conditions. Training programmes for the built environment sector provide the skills to identify, install and maintain technologies and approaches that promote environmental sustainability.
- 7.54 **We recommend that the Department for Communities and Local Government and the devolved administrations ensure that local authority planning departments are adequately resourced and organised to maximise environmental and associated health benefits from developments (6.88).**
- 7.55 **We recommend that the higher and further education sectors and professional bodies develop training and continuing professional development for the built environment sector that includes environmental sustainability as a core part of the curriculum, and ensures that the workforce has the skills to identify, install and maintain environmental technologies and green infrastructure in order to promote environmental sustainability in urban areas (6.89).**

## CONCLUSION

- 7.56 Urban areas present daunting challenges but also immense opportunities. Our focus has been on the imperative to substantially reduce human impacts upon the local, regional and global environment, and to improve human health and wellbeing. These changes will not come about by piecemeal tinkering with existing infrastructures and institutions, nor by pursuing simplistic technological solutions. Appealing to people to change their behaviour or merely providing information in the absence of policy interventions that change incentives and infrastructures, and provide convenient alternatives to current practices, is often futile.
- 7.57 Urban environments are highly complex, interdependent social, ecological, economic and technical systems. We have learnt that changing them for the better on a sufficient scale, and with sufficient speed, to make a major difference to the environment and human health and wellbeing requires a fundamental reshaping of the ways in which they are governed. This means there is a need for a coherent set of policies, laws and regulations at local, regional and national levels, public engagement and education, the involvement of business and the voluntary sector and the careful targeting of enabling technologies. We do not underestimate the web of constraints that impedes progress. But we believe that our recommendations, and the principles that underlie them, if embraced and acted upon as a whole, can achieve the change in direction and pace of travel that is so urgently needed.

**ALL OF WHICH WE HUMBL Y SUBMIT FOR  
YOUR MAJESTY'S GRACIOUS CONSIDERATION**

John Lawton *Chairman*  
Nicholas Cumpsty  
Michael Depledge  
Paul Ekins  
Ian Graham-Bryce  
Stephen Holgate  
Jeffrey Jowell  
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Susan Owens  
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## Chapter 1

- <sup>1</sup> Influential writings on the topic cover a wide range. They include the vivid picture of working class districts of industrial Manchester painted by Frederick Engels in 1844; Ebenezer Howard's (1898) garden city proposals advanced as a solution to the filth and squalor of late nineteenth century London; Lewis Mumford's observations of urban life; and the modernist fantasies of Le Corbusier in the 1920s that culminated in the high-rise developments of the 1960s. Classic critiques of the Utopian tradition in city planning include that of Jane Jacobs (1961).
- <sup>2</sup> Even a cursory search of the worldwide web reveals countless reports from national and international development and environmental agencies, non-governmental organisations and academic researchers on the broad topic of sustainable cities and urban environments, while reports on the environmental state and impact of individual towns and cities around the world abound.
- <sup>3</sup> Information from Professor Jesse Ausubel, Director for the Human Environment, The Rockefeller University, New York, November 2004.
- <sup>4</sup> Department of the Environment, Transport and the Regions (DETR) (2000). *Our Towns and Cities: The Future – Delivering an Urban Renaissance (The Urban White Paper)*. DETR, HMSO, London;
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- <sup>7</sup> Quote from Herbert Giradet in Ecopolis Now, *New Scientist*, 17 June 2006, 41.
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- <sup>9</sup> Rittel, H. and Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, **4**, 155-169.
- <sup>10</sup> See for example, van Vliet, B., Chappells, H. and Shove E. (2005). *Infrastructures of Consumption*. Earthscan, London.
- <sup>11</sup> There are parallels here with the theory of path dependency or technological lock-in described in Arthur, B. (1989). Competing technologies, increasing returns, and lock-in by historical events. *Economic Journal*, **99**, 116-131; and David, P. (1985). Clio and the Economics of QWERTY. *American Economic Review*, **75**, 332-337. The theory states that the survival of technological innovations is determined by their compatibility with earlier choices.
- <sup>12</sup> The Rural Economy and Land Use Programme is a major investment of the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council (NERC), while the Sustainable Urban Environments Programme is maintained by NERC and the Engineering and Physical Sciences Research Council.
- <sup>13</sup> Glass, R. (1976). *Urban images*. Cited in Harrison, G.A. and Gibson, J.B. (Eds.) (1977). *Man in Urban Environments*. Oxford University Press, Oxford;
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- <sup>14</sup> Her Majesty's Government (2005). *Securing the Future: Delivering UK Sustainable Development Strategy*. TSO, London.
- <sup>15</sup> Figure courtesy of Professor Judith Petts, University of Birmingham, November 2006.
- <sup>16</sup> Jacobs, J. (1961). *The Death and Life of Great American Cities*. Vintage Books, New York, US.
- <sup>17</sup> Department for Environment, Food and Rural Affairs (Defra) (2005). *Municipal Waste Management Survey*. Defra, London. Available at: <http://www.defra.gov.uk/environment/statistics/wastats/mwb0304/index.htm>; accessed 10 February 2006.
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- <sup>22</sup> Sustainable Development Commission (SDC) (2006). *Stock Take: Delivering improvements in existing housing*. SDC, London.
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SDC (2006).
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## Chapter 6

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# Appendix A

## ANNOUNCEMENT OF THE STUDY AND INVITATION TO SUBMIT EVIDENCE

### A1 ANNOUNCEMENT OF THE STUDY

The Royal Commission study on the urban environment was announced in a news release on the 10th November 2003 in the following terms. Over 100 organisations were invited to respond to the issues described below and around 40 responses were received.

#### ROYAL COMMISSION STUDY ON THE URBAN ENVIRONMENT

The next study by the Royal Commission on Environmental Pollution will be on the urban environment, both in terms of environmental problems that negatively affect health, material and social wellbeing of urban dwellers and reducing the impacts of urban centres on the environment. The preparatory phase of this new study will overlap with completion of the current studies on the environmental effects of fisheries on the marine environment and bystander exposure to pesticides.

#### *BACKGROUND TO THE STUDY*

Urban issues are becoming of critical importance around the world, and urbanisation is expected to continue, with close to half of the world's population already living in urban areas and some cities now reaching unprecedented sizes.

In the UK, a high standard of local urban environmental quality is characterised by clean, safe attractive streets, and parks and open spaces where people feel at ease. Policy for the urban environment is formulated by central and devolved governments but it falls to local authorities to deliver local urban environmental quality to its communities.

The presence of litter, graffiti, fly-tipping, abandoned cars, dog fouling and loss of play areas or footpaths, noise (from transport, industry and nuisance neighbours), and air, water, light and odour pollution, all detract from local urban environmental quality and consequently reduce the quality of life for those who live there. Housing and transport impinge on biodiversity and landscape.

The study will consider UK policies and the situations they address. This work has identified 4 priority themes: sustainable urban transport; sustainable urban management (Local Agenda 21, EMAS, indicators); sustainable urban construction (resource and energy efficiency, demolition waste, design issues); and sustainable urban design (land use-regeneration, brown field sites, urban sprawl, land use

densities). The overall goal of the European Strategy is to improve environmental efficiency of urban areas and the quality of life of urban citizens.

### **BROAD TOPICS TO BE COVERED**

The environment in which we live and work still has significant problems that affect our health and impose high economic costs. A new approach is needed to deal with these problems in an integrated way. We need to tackle the environmental problems that people experience in their everyday life. The scope of a study on the urban environment could therefore potentially cover a very wide range of topics. It will need to be carefully focused in order to be manageable within the resources available to the Royal Commission. A possible overarching theme might be “delivering a quality urban environment”. Views on an overarching theme for the study would be welcomed.

Broad topics that might be covered in a study on the urban environment include:

- Governance and urban planning policy at local, regional and national scales and the role of the European Union
- Defining local urban environmental quality – what is important to people? How are priorities set?
- Delivery of local urban environmental quality – how well is it being delivered in UK communities? How might it be improved?
- Sustainable building and sustainable communities

A number of issues could be relevant to the broad topics proposed, such as:

- Local urban environmental quality and urban exodus
- Interaction with the rural environment
- Urban regeneration
- Soil contamination – the size of the problem; identifying and remediating contaminated land
- Biodiversity and urban environmental quality – biodiversity in urban habitat patches, the effects of vehicle emissions on wildlife, conservation programmes
- Provision and use of public space. Implications for wellbeing and crime reduction
- Adapting to climate change – infrastructure is typically designed to last for 30-100 years
- Urban air quality – impacts of particulates and NO<sub>x</sub>, indoor air pollution and the effectiveness of regulation
- Water pollution – impacts of sewage and industrial waste on the urban environment, rehabilitation of water sources and pollution prevention. Diffused sources of water pollution including water run off. Sustainable urban drainage

- Noise pollution from transport and industry, and nuisance noise from neighbours. City-dwellers are more likely to be exposed to higher levels of noise than the rural population. This is an issue of great concern to the general public with complaints rising steadily
- Light pollution – this causes night-time vision to be impaired, which can be dangerous to motorists and pedestrians and cause damage and confusion to flora and fauna. Light pollution can also remove an individual's privacy, cause sleep disturbance and has been linked with health problems
- Odour pollution and other statutory nuisance – including dust and bonfire nuisance, efficacy of regulation and monitoring
- Urban waste – its generation and disposal

## **A2 INVITATION TO SUBMIT EVIDENCE**

After considering the responses to the original announcement the Royal Commission wrote to over 360 organisations in May 2005 for evidence on the following questions. Around 100 responses were received.

### **ROYAL COMMISSION STUDY ON THE URBAN ENVIRONMENT – INVITATION TO SUBMIT EVIDENCE**

The study is focusing on the urban environment, including the environmental impacts of urban living and the implications for health and wellbeing. It will provide analysis and recommendations designed to reduce the environmental impact of urban areas and at the same time increase their contribution to human health and wellbeing.

The Commission's study will be guided by a number of underpinning assumptions. Respondents are free to provide evidence that challenges these assumptions listed below.

Making urban areas more environmentally sustainable is a key part of tackling many of the most important environmental problems. Nevertheless, an approach that focuses solely on delivering environmental improvements without taking account of the wider social and economic aspects is unlikely to be successful. The Commission wishes to investigate whether there are solutions that would reduce environmental problems and, at the same time, enable people to be healthier and enjoy a better quality of life. A simple example might be a new urban park that boosts urban biodiversity, while providing opportunities for exercise and recreation. Similarly, new developments that are designed to provide higher housing densities can help make public transport and other essential services more viable.

However, the UK is to some extent locked into existing patterns of urban living as a result of past developments. This has provided important assets in the form of parks, amenities and treasured



homes and buildings, but also with liabilities in the form of contaminated land, ageing infrastructure, etc. This legacy is important in the housing sector where today's homes will form the vast majority of the housing stock in 20 years' time and possibly as much as two-thirds of the stock by 2050. Major improvements will require measures that target existing assets as well as new developments.

Over the coming decades, the urban environment will experience major changes as result of government policy and demographic and economic trends. Over the same period, the UK has set challenging environmental targets to cut carbon dioxide emissions by 60% by 2050, to halt the rate of loss of biodiversity by 2010 and to improve air and water quality. All this will have to be achieved against a background of climate change, where water shortages, floods and heat waves are likely to become more frequent. Meeting these major social, economic and environmental challenges could become increasingly difficult unless action is taken now to plan for more environmentally sustainable towns and cities.

### *ISSUES ON WHICH THE COMMISSION WOULD WELCOME EVIDENCE*

The questions below are not intended to limit the Commission's study, but rather to highlight areas where Members believe they are most in need of input at this stage. You do not need to address all the issues listed. Indeed, you may wish to provide evidence on only a few.

#### *A. What is the current state of the urban environment? What are the negative environmental impacts of urban living inside and outside the urban area?*

1. **Geographical scope of the study.** The UK has a good deal of discretion over the management of urban areas. As a result, the Commission intends to focus on the UK, although it will take account of relevant European policies and international examples of urban development.

We will also take account of the fact that the urban-rural divide is not clear-cut, and that it may assume a different character in different parts of the UK. Nevertheless, for simplicity's sake we plan to adopt the Office of the Deputy Prime Minister's definition of urban areas as those with a population over 10,000. The Commission will pay particular attention to towns and cities of over 100,000 people, since these are the focus of the European Thematic Strategy on the Urban Environment.

Comments are welcome on this choice of priorities, as are suggestions of where the Commission should look to find examples of both good and bad practice in urban areas.

2. **Which environmental issues are most pressing in urban areas, and how are they being addressed? What is the overall environmental profile of urban areas? Are new environmental issues emerging that have been neglected or are little understood?**

Environmental improvements have undoubtedly taken place in many urban areas that now have cleaner rivers and generally better air quality than in the past. But is there evidence that the

environmental impact of urban areas has shifted to less visible effects such as greenhouse gases and greater energy use?

Not all environmental trends are improving. For example, transport is the third largest source of carbon dioxide in the UK and the only sector where emissions are expected to be higher in 2020 than in 1990. On top of this it has been estimated that congestion levels could increase by as much as 50%. In the waste sector, levels of waste production have been rising, particularly from construction and demolition. When it comes to water, parts of the country already experience restricted water supplies and/or flooding, yet some of these areas have been selected for further urban development. There is also a risk that around 20% (by length) of the rivers in England & Wales will not meet the objectives set by the Water Framework Directive.

In summary, urban areas are associated with a wide range of environmental issues. What evidence do we have about the current state of the urban environment and how it is changing? Which are the key environmental priorities that deserve most attention? What evidence exists about the relative importance of other issues such as noise, light and local environmental quality in an urban setting?

3. **In a modern industrial society, do urban lifestyles put more or less pressure on the environment than lifestyles of similar affluence and aspiration lived in the countryside?**

#### *Human health and wellbeing*

4. **Which aspects of urban environmental pollution are most important in terms of their negative affect on human health and wellbeing?** The quality of air, water and soil can all have important consequences for human health. For example, poor air quality is acknowledged to bring forward thousands of deaths each year in the UK, yet there is still uncertainty over the mechanisms by which air pollutants cause ill-health, and which types are the most harmful. Do we have sufficient research in place to understand the effects of environmental pollution on health? Is there a need to focus on the effects on vulnerable groups, such as children and the elderly, when considering the impacts of environmental pollution? Are policies and measures proving effective in tackling current problems? How might these issues develop in future?
5. **How could the urban environment be improved to benefit physical and mental health, wellbeing and quality of life?** What examples are there of synergies between measures on the environment and health?
6. **Is there evidence that deprived urban areas are exposed to greater levels of environmental pollution and/or a poorer local environment?** Some have suggested that deprived urban communities are more likely to be close to major roads, waste facilities and flood risk areas. What is the nature of the evidence for or against this in the UK, and what are the implications?

***B. What changes are needed to reduce the negative environmental impacts of urban areas and to increase their positive contribution to the environment, health and wellbeing?***

*Trends*

7. **What major policy developments are on the horizon over the next 5 to 10 years that might affect the urban environment?** The consequences of current urban policies are likely to continue to be important, but looking forward, what other policy developments could be particularly influential?

For example, will the implications of the Water Framework Directive become more challenging as the 2015 deadline for meeting its objectives comes closer? Is there likely to be more pressure to address previously neglected aspects of pollution such as noise, light and local environmental quality? Are the environmental aspects of sustainable development (including its links to health and wellbeing) well integrated across Government policy and the activities of delivery bodies?

8. **What information exists on the other trends that will shape our urban areas over the next 10, 20 and 50 years?** What is their likely environmental impact? Demographic changes such as an ageing population and a trend toward smaller households are already affecting the shape of our cities. How are these factors likely to change in future? Have the UK's urban areas, and particularly the larger cities, reached a peak of urbanisation or will there be pressure for these areas to grow? How will international competition between world cities affect the UK? What will be the effect of new technologies and industries? Do we need new infrastructure to support new ways of living and promote environmentally sustainable lifestyles?

As well as opportunities for change, will urban areas face increasing constraints of various kinds such as limits on space and growth? What will be the knock-on effects for the environment, positive and negative, of these major societal and economic trends? How will local problems be affected by global environmental trends such as climate change and rising background concentrations of air pollutants?

9. **What measures should be taken to make cities more environmentally sustainable 10, 20 or 50 years into the future? What would these urban areas be like and what would be the social and environmental consequences?** It is possible to envisage a wide range of possible futures for our towns and cities in terms of, for example, transport, access to goods and services and patterns of power generation, distribution and use. What changes would be desirable from the point of view of environmental sustainability?
10. **How will urban areas be affected by climate change?** Densely populated urban areas create their own microclimates that experience higher temperatures and different precipitation rates compared with the surrounding countryside. Will they be more at risk from climate change impacts? Is enough known about how cities, towns and urban regions will respond? What

measures would help urban areas, buildings and systems to adapt? What are the possible policy responses?

### *Role of technology*

11. **To what extent will conventional or near-market technologies be sufficient to meet environmental goals and make cities of the future environmentally sustainable?** Will there be a need for more radical or novel technologies or changes in practice in some sectors? Is there a need for new designs and types of infrastructure? What are the opportunities and what would be their costs and benefits?

### *Construction and design*

12. **Can high-density developments offer a more environmentally sustainable future that is also desirable for householders?** It has been suggested that developments should be built at higher densities to support critical community services and minimise environmental impacts. Set against this, some argue that people prefer lower density homes. In addition, there may be wider considerations of privacy, safety, aesthetics, good design, etc. How could new developments strike a better balance between these concerns? What would constitute a desirable housing density?
13. **Can design codes play a significant role in improving the environmental sustainability of urban areas? If so, what should they look like?**
14. **How can construction be made more efficient in terms of natural resource use and waste minimisation?** Which methods and technologies offer opportunities to minimise or recycle a much greater proportion of the waste stream from construction and demolition? What are the circumstances that allow a higher proportion of construction waste to be recycled in other European countries?
15. **How can the environmental impact of buildings in the domestic and commercial sectors be reduced?** Has too much emphasis been placed on measures taken at the household level (such as insulation), compared with design measures that could apply to a whole development, or group of developments? What is the interaction between environmental measures and aspects such as aesthetics, good design and householder satisfaction?

### *Transport*

16. **How can environmentally sustainable transport systems be encouraged?** Greenhouse gas emissions from transport are continuing to rise, with road freight being one of the sectors where emissions are growing fastest, rising 36% between 1990 and 2002. The Commission has produced two previous reports on transport and the environment (the Eighteenth and Twentieth Reports). In this study, we will be particularly concerned with how good urban design and planning

of urban infrastructure can be used to improve transport systems and reduce environmental impacts in urban areas. For example, what potential is there to improve the integration between different transport networks, and between transport and other infrastructure?

### *Natural resources (e.g. water, waste, air quality and nature)*

17. Some water companies are already experiencing significant water deficits compared with their targets for security of supply. It seems likely that demand management will become a more prominent issue as the number of households increases, demand rises and climate change alters rainfall patterns. **What would be the most effective way of managing the growing demand for water? What other measures should be used to reduce demand and encourage efficiency?**
18. **What measures are needed to improve the quality of sustainable urban drainage and sewerage, and address changing flood risk?** Are changes needed in investment, planning or regulation? Is there a case for changing technologies and practices, for example, to encourage the use 'soft engineering' approaches in new developments?
19. **To what extent can new technologies be harnessed to use waste for energy generation, compost, recycling, etc?** The Commission has previously produced reports on waste and incineration of waste (the Eleventh and Seventeenth Reports), but this study will be concerned with environmentally unsustainable trends in waste.
20. **What is the overall contribution of urban nature to biodiversity in the UK and is it sufficiently protected?** A number of initiatives are promoting green space and urban biodiversity. How can links be made between Biodiversity Action Plans and local authority green space strategies? How can biodiverse brownfield areas be protected if these areas are favoured for development? How can the potential of open public spaces be maximised so that they are valued and maintained, and able to perform to the full range of functions of which they are capable, including flood risk reduction and sustainable drainage?

### *Urban planning and management*

21. **Could an ecosystems approach provide practical benefits for urban areas?** It has been suggested that the fragmentary nature of the management of urban areas is a major obstacle to reducing environmental impacts. An alternative is the 'ecosystem approach', which takes account of the interaction between natural and human systems to help develop a more integrated solution to urban management. What do you understand by this term? What are its advantages and disadvantages? Does it offer practical benefits, and if so, what institutional and other changes would be needed to put it into practice?
22. A possible solution to rising levels of consumption is the introduction of closed-loop systems that return every output back into the urban ecosystem, or as an input to another process.

**To what extent do the technologies and systems exist to underpin such an approach?  
Are there examples of closed loop systems already in existence in the UK?**

*C. How can these changes be encouraged and achieved?*

23. **What is the role of the various bodies involved in urban policy?** Has too much emphasis been placed on the role of central government at the expense of regional and local action? How can the business, voluntary and other sectors be encouraged to contribute to the environmental sustainability of the urban areas?
24. **What part could (a) economic instruments and (b) good practice guidance or other improved management approaches play in improving standards?** Various economic instruments (variable VAT rates, road charging, etc) have been suggested to improve aspects of the urban environment. Good practice can also be encouraged through information, guidance, codes, awards, networks, etc. What evidence is there from the UK or elsewhere that such approaches can be effective?
25. **Why have the changes that would be needed to make urban areas more environmentally sustainable not been effectively implemented before now, given that some of the proposed solutions have been around for several decades?**
26. **Is the implementation and enforcement of current legislation and standards effective? To what extent are better regulation and enforcement required to improve the environmental sustainability of urban areas?**
27. **Is the UK's science and knowledge base sufficient to support current urban policies and guide development in a more environmentally sustainable direction? If not, what are the most important gaps?**
28. **Are there any other any major questions associated with the environmental sustainability of urban areas that the Commission should examine?**

# Appendix B

## CONDUCT OF THE STUDY

In order to carry out this study, the Royal Commission sought written and oral evidence, commissioned studies and advice on specific topics and made a number of visits.

### EVIDENCE

In parallel with the news releases inviting evidence, which are reproduced in appendix A, the Secretariat wrote direct to a large number of organisations.

The organisations and individuals listed below either submitted evidence or provided information on request for the purposes of the study or otherwise gave assistance. In some cases, indicated by an asterisk, meetings were held with Commission Members or the Secretariat so that oral evidence could be given or particular issues discussed.

### *GOVERNMENT DEPARTMENTS*

Department for Communities and Local Government\*

Department for Environment, Food and Rural Affairs\*

Department of Health

Department of Trade and Industry

Her Majesty's Revenue and Customs

Her Majesty's Treasury

Northern Ireland Civil Service\*

### *DEVOLVED ADMINISTRATIONS*

National Assembly for Wales\*

Scottish Executive\*

### *EUROPEAN AND INTERNATIONAL BODIES*

European Science Foundation

## OTHER ORGANISATIONS

Academy for Sustainable Communities\*

Advantage West Midlands

Anglian Water Services Ltd

Architecture and Design Scotland

Association of British Insurers

Audit Commission

Barratt Developments Plc\*

Bournemouth and West Hampshire Water Plc

Bristol Water Plc

British Academy

British Ecological Society

British Geological Survey

British Medical Association

British Waterways

Building Research Establishment\*

Cambridge Water plc

Campaign to Protect Rural England

Carbon Trust

Cardiff Foundation of Environmental Research

Centre for Air Transport and the Environment

Chartered Institution of Water and Environmental Management

Civic Trust

Commission for Architecture and the Built Environment – CABE Space\*

Commission for Integrated Transport

Countryside Agency (part of Natural England)

Countryside Council for Wales

Crest Nicholson plc\*

Dee Valley Water plc

Devon Conservation Forum

Dwr Cymru Welsh Water

Encams (Environmental Campaigns)

Energy Saving Trust

Engineering and Physical Sciences Research Council

England Biodiversity Strategy, Urban Working Group

England's Community Forests

English Nature (now Natural England)\*

English Partnerships\*

Environment Agency\*

Folkestone and Dover Water Services Ltd

Forestry Commission

Glasgow City Council\*

Greater Manchester Pedestrian Association

Greenpeace

Groundwork

Habitable Cities Project

Health Environment Network

Health Protection Agency

Heritage Link

Home Builders Federation\*

Institute of Directors

Institute of Historic Building Conservation

Institute of Leisure and Amenity Management

Institute of Water and Environment, Cranfield University, Silsoe

Institution of Highways and Transportation

Land Restoration Trust

Landscape Institute

Levitt-Therivel Sustainability Consultants

Magistrates' Association

Mid Kent Water Plc



National Institute for Health and Clinical Excellence	Sustainable Urban Brownfield Regeneration: Integrated Management
New Deal for Communities*	Sustrans
Northern Ireland Water Service	Swansea Environmental Forum*
Northumbrian-North Water Ltd	Tendring Hundred Water Services Ltd
Northumbrian-South Water Ltd	Thames Water Utilities Ltd
Office for National Statistics	Three Valleys Water Plc
Ofwat (Water Services Regulator)	Town and Country Planning Association
Planning Inspectorate	Transport for London
Planning Officers Society	UK Climate Impacts Programme
Portsmouth Water plc	United Utilities Water Plc
Prince's Foundation for the Built Environment	University of Brighton
Property Investment Managers Ltd	University of the West of England, Bristol
Prudential*	Urban Design Alliance
Royal College of General Practitioners	Urban Splash
Royal College of Physicians	Urban Wildlife Network
Royal Geographical Society	Waste and Resources Action Programme
Royal Incorporation of Architects in Scotland	Water UK
Royal Institution of Chartered Surveyors	Welsh Development Agency*
Royal Society for the Protection of Birds	Wessex Water Services Ltd
Royal Town Planning Institute	Wildlife Trust (Birmingham and the Black Country)
Save Britain's Heritage	Wildlife Trusts
Scottish Environment Protection Agency*	Woodland Trust
Scottish Natural Heritage	World Wide Fund for Nature
Scottish Water	Yorkshire Water Services Ltd
Severn Trent plc	
South East England Development Agency*	<i><b>INDIVIDUALS</b></i>
South East Water Ltd	Professor Richard Ashley
South Staffordshire Water Plc	Professor Jesse Ausubel
South West Water Ltd	Professor Chris Baines
Southern Water	Dr Andy Baker
Southwark Borough Council*	Professor David Banister
Sustainable Development Commission	Dr Brenda Boardman*

Professor David Butler

Ben Cave

Adam Coutts

Dr Richard Cowell

Janet Cuff

Professor Ian Douglas

Sandra Dulson

Ms Alene Dwali\*

Dr John Fairburn

Professor David Fisk\*

Professor Max Fordham\*

Mr Mathew Frith

Professor Colin Fudge

Ms Nicky Gavron\*

Professor Herbert Giradet\*

Dr David Goode\*

Professor Ruth Hall

Professor John Handley

Professor Roy Harrison\*

Samantha Heath\*

Professor Christopher Hood\*

Mr Allan Jones\*

Professor Richard Macrory

Professor Michael Marmot\*

Professor Simon Marvin\*

Professor Mark McCarthy

Dr Liz Mills

Professor Joe Painter\*

Professor Michael Parkinson

Professor Anne Power\*

Professor Jules Pretty

Julie Procter

Professor Yvonne Rydin

Dr Jon Sadler

Professor Elizabeth Shove\*

Professor David Strong\*

Dr Richard Taylor

Professor Luke Thompson

Mr John Twitchen\*

Professor Alan Wenban-Smith\*

Dr John Willoughby\*

## COMMISSIONED STUDIES

Five short literature reviews were commissioned for the report during 2004 to provide information on various aspects of the urban environment; the topics covered were:

- The urban environment
- The benefits of urban living
- Environmental justice
- Urban metabolism
- Urban nature

In addition, more detailed reports were commissioned on the following topics:

- *Reducing the Environmental Impact of Housing*. Dr Brenda Boardman, Environmental Change Institute, University of Oxford
- *Improving the Urban Environment – Facilitating Change at Local Level*. Dr A. Coulson, Institute of Local Government Studies, University of Birmingham
- *Legal and Planning Issues*. Mr D. McGillivray
- *Green Infrastructure*. Dr D. Goode

## VISITS

During the course of the study, Members of the Commission and its Secretariat made a series of visits to:

**April 2004, Belfast** Royal Commission Seminar on Urban Environments. Members toured the city's redevelopment areas and met with officials from the Northern Ireland Civil Service.

**September 2004, Edinburgh** Visit to the Craigmillar Regeneration Project and a water treatment works. Members also met with Scottish Executive officials over dinner.

**July 2005, Poole** Visit to Poole Harbour and Poundbury in Dorset to witness existing and planned development in the area.

**September 2005, Southwark** Visit to Southwark to see refurbishment of terraced housing, redevelopment of social housing and examples of renewable energy generation.

**January 2006, Ashford (Kent)** Visit to meet representatives of 'Ashford's Future' to discuss the proposed development of the Ashford area.

**February 2006, Swansea** Visit to Swansea Harbour waste management facilities and the redevelopment of an industrial site for housing. Members had lunch with Mr Carwyn Jones, AM, Minister for the Environment, Planning and Countryside and dinner with officials from the Welsh Assembly Government.

**February 2006, Watford** Visit to the Building Research Establishment where the Commission were given several presentations about the English Housing Condition Survey, BREEAM EcoHomes and modern methods of construction.

**May 2006, Glasgow** Visit to examples of sustainable drainage systems and new mixed tenure housing in Glasgow. Members had lunch with representatives of Glasgow City Council and met with Ms Rhona Brankin, MSP, Deputy Minister for Environment and Rural Development over dinner.

**May 2006, Hull** Visit to Yorkshire Forward and Hull City Council

**August 2006, Manchester** Visit to the developer, Urban Splash, and regeneration sites in Salford.

**October 2006, Milton Keynes** Discussion with representatives from Milton Keynes Partnership and visit to urban development regeneration sites.

Additional evidence was gathered from France, Denmark, Brazil and Mexico.

## **SECRETARIAT**

Other members of the Secretariat who made a significant contribution to the content of the report at various stages were Georgina Burney and Jonathan Wentworth. We are also grateful to our technical editor Ilga Nielsen.

# Appendix C

## SEMINAR: URBAN ENVIRONMENTS: WELLBEING AND HEALTH – 31<sup>ST</sup> MARCH 2004

On Wednesday 31<sup>st</sup> March 2004, the Commission hosted a seminar at the Hastings Europa Hotel in Belfast to gather views from interested parties relevant to deciding the scope of the study. Entitled ‘Urban Environments: Wellbeing and Health’, the seminar involved around fifty participants and included speakers from a variety of backgrounds addressing such topics as: social environment and health; people, places and health; the impact of neighbourhood nuisances on community wellbeing; urban environments, wellbeing and health; business in the community, its positive impact on society; and environmental justice and the city. The seminar had the following programme:

### **Introduction**

SIR TOM BLUNDELL, Chair of Royal Commission on Environmental Pollution

### **Session 1:**

STEVE ROBINSON, Facilitator – Aims of day

PROFESSOR STEPHEN HOLGATE, Commissioner – Introduction of speakers

PROFESSOR SIR MICHAEL MARMOT, University College London – Social Environment and Health

ANNE ELLAWAY, Medical Research Council – People, Places and Health

DAVID BIRLEY, Safe Neighbourhoods Unit, London – Ordering Disorder: The impact of neighbourhood nuisances on community wellbeing and what to do about it

### **Session 2:**

STEVE ROBINSON, Facilitator – Agenda Review

Brainstorming session: 3 Groups to address specific topics:

Group 1: Other issues to consider. Dr Susan Owens, Commissioner (Leader), Dr Georgina Burney (Rapporteur).

Group 2: Barriers to change. Professor Jeffrey Jowell, Commissioner (Leader), Mr Andy Deacon (Rapporteur).

Group 3: Helping change to happen. Professor Paul Ekins, Commissioner (Leader), Dr Johnny Wentworth (Rapporteur).

STEVE ROBINSON, Facilitator – Leaders report back to Plenary

**Session 3:**

Observations, The Way Forward and Next Steps

SIR TOM BLUNDELL Concluding remarks

In addition to the speakers and Members of the Commission, other participants included:

Name	Organisation
Mr C.J. Murphy	Chartered Institution of Waste Management
Ms Dianne Keys	Conservation Volunteers Northern Ireland
Ms Joyce Bridges	Department for Environment, Food and Rural Affairs (Defra), London
Miss Bronwen Jones	Defra, London
Ms Judena Goldring	Department of the Environment Northern Ireland (DOENI), Environmental Policy Division
Mr Tim Irwin	DOENI, Environmental Policy Division
Peter Cush	DOENI
Brian Johnson	Environmental Campaigns (Encams)
Simon Hughes	Environment Agency, Bristol
Dr Roy Ramsay	Environment and Heritage Service
John Woods	Friends of the Earth Northern Ireland
Mr Paul Bramhill	Greenspace
Miss Caterina Goodman	Groundwork Northern Ireland
Dr Richard Mills	National Society for Clean Air and Environmental Protection
Ms Nerys Jones	National Urban Forestry Unit
Anna Whitworth	Office of the Deputy Prime Minister
Professor David Cope	Parliamentary Office of Science and Technology
Helen Fitzshannon	Planning Service Northern Ireland
Tom Wilde	Scotland and Northern Ireland Forum for Environmental Research (Scotland)
Dr Scott Ferguson	Scottish Natural Heritage
Alastair Adair	University of Ulster
Alan Strong	University of Ulster

# Appendix D

## MEMBERS OF THE ROYAL COMMISSION

### CHAIRMAN

#### **Professor Sir John Lawton CBE FRS**

President, Council of the British Ecological Society, 2005-

Chief Executive, Natural Environment Research Council, October 1999-March 2005

Director (and founder), Natural Environment Research Council Centre for Population Biology at Imperial College, Silwood Park, 1989-1999

Member, Royal Commission on Environmental Pollution, 1996-1999

Lecturer, Senior Lecturer, Reader, Professor of Biology, University of York, 1972-1989

Departmental Demonstrator in Zoology, University of Oxford, 1968-1971

Chairman, Royal Society for the Protection of Birds, 1993-1998

Vice-President, Royal Society for the Protection of Birds, 1999-

Vice-President, British Trust for Ornithology, 1999-

Trustee, WWF-UK, 2002-

### MEMBERS

#### **Professor Nicholas Cumpsty FREng**

Head of Department of Mechanical Engineering, Imperial College

Professor of Mechanical Engineering, Imperial College

Member, Defence Science Advisory Council

Visiting Professor, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology

Chief Technologist, Rolls-Royce plc, 2000-2005

Lecturer, Reader, Professor, University of Cambridge, 1972-1999

Director of the Whittle Laboratory, University of Cambridge, 1989-1999

#### **Professor Michael H. Depledge PhD DSc CBiol FIBiol FRSA**

Professor of Environment and Human Health, Peninsula Medical School (Universities of Exeter and Plymouth)

Keeley Visiting Fellow, Wadham College, University of Oxford, 2006-

Senior Science Advisor, Plymouth Marine Laboratory, 2005-  
Chief Scientific Advisor, Environment Agency, 2002-2006  
Vice-Chairman, Science Advisory Committee, European Commission, DG-Research, 2006-  
Board Member, Natural England, 2006-  
Member, NERC Council, 2003-2006  
Honorary Professor, School of Earth Sciences and Engineering, Imperial College, 2002  
Visiting Scientist, School of Public Health, Harvard University, US 2000-2003  
Visiting Professor, Portobello Marine Laboratory, University of Otago, New Zealand, 1993  
Professor (Chair of Ecotoxicology), Odense University, Denmark, 1987-1994  
Senior Lecturer in Physiology, Medical School, University of Hong Kong, 1983-1987

**Professor Paul Ekins MPhil MSc PhD**

Head, Environment Group, Policy Studies Institute, 2000-  
Professor of Sustainable Development, University of Westminster, 2002-  
Associate Director, Forum for the Future  
Senior Consultant, Cambridge Econometrics  
Member, Environmental Advisory Group, Ofgem  
Member, Sustainable Energy Policy Advisory Board  
Trustee and Special Advisor, Right Livelihood Awards Foundation  
Chairman, Judging Panel, Ashden Awards for Sustainable Energy

**Dr Ian Graham-Bryce CBE DPhil FRSC FRSE**

Principal Emeritus, University of Dundee  
Chairman, East Malling Trust for Horticultural Research  
Principal and Vice-Chancellor, University of Dundee, 1994-2000  
Convener, Committee of Scottish Higher Education Principals, 1998-2000  
President, Scottish Association for Marine Science 2000-2004  
President, British Crop Protection Council, 1996-2000  
Member, NERC Council, 1989-1996  
Head, Environmental Affairs Division, Shell International, 1986-1994  
President, Association of Applied Biologists, 1988-1989  
Director, East Malling Research Station, 1979-1986  
President, Society of Chemical Industry, 1982-1984



**Professor Stephen Holgate MD DSc FRCP FMedSci FRSA**

Medical Research Council Clinical Professor of Immunopharmacology, University of Southampton

Honorary Consultant Physician, Southampton University Hospital Trust

Former Advisor, House of Lords Select Committee on Science and Technology

Chairman, Expert Panel on Air Quality Standards

Member of various Department of Health and Food Standards Agency Advisory Committees including the Committee on the Medical Effects of Air Pollution (COMEAP)

Member, World Health Organization Scientific Advisory Committee on Clean Air For Europe (CAFE), 2002-2004

Chairman, Science in Health Group of the Science Council

Chairman, Physiological Systems and Clinical Sciences Board, Medical Research Council

**Professor Jeffrey Jowell QC**

Professor of Law, University College London

UK Member of the Council of Europe's Commission for Democracy Through Law ("The Venice Commission")

Non-executive Director, Office of Rail Regulation

Chair, British Waterways Ombudsman Committee

Vice-Provost, University College London, 1993-2001

Dean, Law Faculty, University College London, 1981-1989, 1999-2002

**Professor Peter Liss FGS FIMarEST**

Professor of Environmental Sciences, University of East Anglia, 1985-

Chair, Scientific Committee of the International Geosphere-Biosphere Programme, 1993-1997

Member, NERC Council, 1990-1995

Independent Member, Inter-Agency Committee on Marine Science and Technology

Chair, Royal Society Global Environmental Research Committee, 2007-

Council Member, Marine Biological Association of the UK

Chair, Higher Education Funding Council's Research Assessment Exercise Panel in Earth and Environmental Sciences, 2001

Guest Professor, Ocean University of Qingdao, China

President, Challenger Society for Marine Science, 2006-

Member, Science Council

Chair, International Scientific Committee for Surface Ocean – Lower Atmosphere Study (SOLAS)

**Professor Susan Owens OBE AcSS FRSA FRGS HonMRTPI**

Professor of Environment and Policy, University of Cambridge, Department of Geography and  
Professorial Fellow of Newnham College

Member, Sub-Panel H31 (Town and Country Planning), Research Assessment Exercise 2008, 2005-

Member, Steering Committee, Economic and Social Research Council/Department for Transport,  
Collaborative Transport Research Centre, 2006-

Member, Steering Committee, Office of Science and Innovation Review of Science in Defra,  
2005-2006

Member, Countryside Commission, 1996-1999

Member, UK Round Table on Sustainable Development, 1995-1998

Member, Deputy Prime Minister's Expert Panel during preparation of 1998 Transport White Paper,  
1997-1998

**Professor Judith Petts AcSS FRSA FRGS**

Head, School of Geography, Earth and Environmental Sciences, University of Birmingham

Professor of Environmental Risk Management, University of Birmingham, 1999-

Member, NERC Council, 2000-2006

Member, Royal Society Science in Society Group, 2005-

Member, EPSRC Societal Issues Panel, 2005-

Member, Higher Education Funding Councils' Research Assessment Exercise Panel in Geography and  
Environmental Studies, 2005-

Member, OSI Sciencewise Strategy Group, 2004-

Member, Environmental Advisory Group, Onyx Environmental Plc, 1999-

Former Specialist Advisor House of Commons Environment, Transport and Regional Affairs  
Committee and House of Lords Sub-Committee C

**Professor Jane Plant CBE FRSA FRSE FRSM FIMM CEng FGS<sup>1</sup>**

Former Chief Scientist, British Geological Survey

Professor of Geochemistry, Imperial College

Visiting Professor, University of Liverpool

Council Member, Parliamentary and Science Committee

Chairman, Advisory Committee on Hazardous Substances

Member, Chemicals Stakeholder Forum

<sup>1</sup> Served on the Royal Commission until July 2006.

**Professor Steve Rayner FRAI FRSA FAAAS FSfAA**

Director, James Martin Institute for Science and Civilization, Professor of Science and Civilization, Saïd Business School, University of Oxford, and Professorial Fellow, Keble College

Professor of Environment and Public Affairs, Columbia University, US, 1999-2003

Chief Scientist, Pacific Northwest National Laboratory, US, 1996-1999

Director, Economic and Social Research Council Science in Society Programme

Member, Intergovernmental Panel on Climate Change

Past President of the Sociology and Social Policy Section of the British Association

**John Speirs CBE LVO MA MBA FRSA**

Director, The Carbon Trust, 2001-

Managing Director, Norsk Hydro (UK) Ltd, 1981-2001

Chairman, Dramgate Ltd, 1991-

Member, Management Committee of the Prince of Wales's Business and Environment Programme, 1996-2004, and Chairman of its UK Faculty, 1993-2002

Chairman, Merton, Sutton and Wandsworth Family Health Services Authority, 1989-1995

Member, Government's Advisory Committee on Business and the Environment, 1991-1995

Member of the Aluminium Federation Council, 1992-2002, and President, 1997-1998

Member, Chemical Industry Association Council, 1993-2002, and Chairman of its Public Affairs Committee, 1993-2000

Member, Science and Engineering Research Council, 1993-1994

President, National Society for Clean Air and Environmental Protection, 2002-2003

**Professor Janet Sprent OBE DSc FRSE FRSA FLS**

Emeritus Professor of Plant Biology, University of Dundee

Board Member, Scottish Natural Heritage

Member, Scottish Higher Education Funding Council, 1992-1996

Member, NERC Council, 1991-1995

Governor, Macaulay Land Use Research Institute 1990-2000, and Chairman, 1995-2000

Honorary Member, British Ecological Society

Fellow, Macaulay Land Use Research Institute

Research Fellow, Scottish Crop Research Institute

Council Member, Scottish Association of Marine Science

Member, Strategic Science Advisory Panel, SEERAD

**Professor Lynda Warren PhD FiBIOL**

Emeritus Professor of Environmental Law, University of Wales Aberystwyth

Former Board Member, Environment Agency

Board Member, British Geological Survey

Member, Committee on Radioactive Waste Management

Former Member, Radioactive Waste Management Advisory Committee

Chair, Salmon and Freshwater Fisheries Review, 1998-2000

Former Member, Countryside Council for Wales

Member, Joint Nature Conservation Committee

Trustee, Field Studies Council

Trustee, Association of Rivers Trusts

Trustee, Wildlife Trust of South and West Wales

Former Trustee, WWF-UK

# Appendix E

## EXAMPLES OF REGULATORY CONTROLS ON THE URBAN ENVIRONMENT<sup>1</sup>

Area		Controlled by	Controlled under
Town and country planning	General	Local authorities Planning Service (Northern Ireland)	Town and Country Planning Act (TCPA) 1990  Planning and Compulsory Purchase Act 2004  Town and Country Planning (Scotland) Act 1997; Planning etc (Scotland) Act 2006  Planning (Northern Ireland) Order 1991
	Derelict land — amenity notices	Local authorities	s.215 TCPA 1990
	Tree preservation orders	Local authorities	TCPA 1990, Part VIII
Environmental Impact Assessment		Local authorities	Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999  Numerous other implementing regulations in England and Wales, and in devolved administrations
Strategic Environmental Assessment		(mainly) central government	Assessment of Plans and Programmes Regulations 2004  Environmental Assessment (Scotland) Act 2005  The Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004

Industrial process control	Part A(1) installations (the most polluting processes)	Environment Agency (EA) Scottish Environment Protection Agency (SEPA) Environment and Heritage Service – Northern Ireland (EHS (NI))	Pollution Prevention and Control Act 1999 Environment (Northern Ireland) Order 2002 The Pollution Prevention and Control Regulations (Northern Ireland) 2003
	Part A(2) (less polluting); Part B installations (air pollution control only)	Local authorities SEPA EHS (NI)	
Air quality	Air quality strategy, management and planning	Local authorities Department of the Environment Northern Ireland (DOENI)	Environment Act 1995 Environment (Northern Ireland) Order 2002
	Smoke control areas	Local authorities	Clean Air Act 1993
Traffic pollution	Local transport plans	Local authorities	Transport Act 2000
	Traffic reduction targets	Local authorities	Road Traffic Reduction (National Targets) Act 1998
	Traffic regulation orders (which may be used to achieve air quality objectives)	Local authorities	s.1 Road Traffic Regulation Act 1984
	Traffic regulation conditions (encompassing air and noise controls)	Local authorities (through traffic commissioners)	s.7 Transport Act 1985
Historically contaminated land	Special sites (the most heavily contaminated)	EA SEPA DOENI	Environmental Protection Act (EPA) 1990, Part IIA Waste and Contaminated Land (Northern Ireland) Order 1997, Part III (not yet in force)
	Non special sites	Local authorities DOENI	
Water pollution	General	EA SEPA EHS (NI)	Water Resources Act 1991; various enactments implementing EC Directives The Water Environment (Controlled Activities) (Scotland) Regulations 2005 Water (Northern Ireland) Order 1999
	Statutory nuisances from certain water bodies or watercourses	Local authorities	s.259 Public Health Act 1936

Sewerage	Discharges to sewers	Sewerage undertakers (England and Wales) Scottish Water Department for Regional Development Northern Ireland (Water Service)	Water Industry Act 1991 (England and Wales) Water Industry (Scotland) Act 2002
	Discharges from sewers	EA SEPA EHS (NI)	Urban Waste Water Treatment Regulations (England and Wales) 1994 The Water Environment (Controlled Activities) (Scotland) Regulations 2005 Urban Waste Water Treatment Regulations (Northern Ireland) 1995
	Statutory nuisance (e.g. smell)	Local authorities	EPA 1990, Part III
Water resources	Water abstraction	EA SEPA DOENI	Water Resources Act 1991, Part II The Water Environment (Controlled Activities) (Scotland) Regulations 2005 Water (Northern Ireland) Order 1999
Statutory nuisances	From premises; of smoke etc; street noise (excluding traffic noise); 'accumulations and deposits' etc	Local authorities	EPA 1990, Part III
Litter		Local authorities	EPA 1990, Part IV, as amended by Clean Neighbourhoods and Environment Act (CNEA) 2005, Part III
Noise	Noise from premises etc (ambient controls)	Local authorities (under statutory nuisance law)	EPA 1990, Part III
	Noise from premises (building controls on non-detached properties)	Local authorities	Building Regulations 1991
	Street noise; construction sites; noise abatement zones	Local authorities	Control of Pollution Act 1974

Noise	Power to designate quiet roads	Local traffic authority	s.268 Transport Act 2000
	Aircraft noise control (by controlling the frequency and timing of flights at designated airports)	Secretary of State	s.78 Civil Aviation Act 1982
	Night noise	Local authorities	Noise Act 1996; CNEA 2005 Anti-Social Behaviour etc (Scotland) Act 2004
	Noise from tenants	Social and private landlords	Housing Act 1996
	Audible intruder alarms	Local authorities	CNEA 2005, Part VII (England and Wales only)
	Noise from certain products		EC Directive 2000/14 on noise emission by outdoor equipment
	Noise mapping	Department for Environment, Food and Rural Affairs; Welsh Assembly Government	Measures to implement EC Directive 2002/49 relating to the assessment and management of environmental noise
Light pollution	May be a statutory nuisance if from (mainly) domestic premises <sup>1</sup>	Local Authority	EPA 1990, Part III
Waste	Waste collection	Waste collection authority (Local Authority)	EPA 1990, Part II
	Waste disposal	Waste disposal authority (Local Authority) (county council)	EPA 1990, Part II
	Prevention of fly tipping	Local Authority	Control of Pollution (Amendment) Act 1989
	Site waste	Local Authority	s.54 CNEA 2005

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<sup>1</sup> Information supplied by D. McGillivray, December 2006.



# Appendix F

## SICK BUILDING SYNDROME

- F.1 Sick Building Syndrome is the name used to describe symptoms attributed to the physical environment and air quality of specific buildings. However, isolating the features responsible has proven difficult.<sup>1</sup> Sick Building Syndrome is especially common after moving into a new office building, with employees complaining of symptoms such as eye irritation, sore throat and cough as well as a range of non-specific symptoms such as headache, tiredness, fatigue and flu-like symptoms.<sup>2</sup> Separate from this are well defined, usually respiratory, diseases exacerbated by particular indoor environments including asthma, allergic rhinitis, conjunctivitis and sinusitis, all of which are associated with sensitisation to specific indoor allergens including those from dust mites, domestic pets and fungi.
- F.2 A third category is the ‘toxic mould syndrome’ which results from exposure to indoor mould spores and mycotoxins. One recent study on 100 patients who had been exposed to toxic moulds in their homes revealed a high degree of allergic sensitisation to mould allergens, both T and B lymphocyte abnormalities and abnormal brain scans linked to neuropsychological disorders.<sup>3</sup> Moulds are found in indoor environments where there is defective ventilation and increased condensation.<sup>4</sup> Although fungal allergens are undoubtedly linked to allergic rather than toxic responses,<sup>5</sup> the extent to which the indoor bioaerosol explains the non-specific symptoms of Sick Building Syndrome remains unclear.<sup>6</sup>
- F.3 Other factors may contribute to the symptoms associated with poor indoor air quality, including the presence of organic compounds causing sensory irritation or an unpleasant odour,<sup>7</sup> and airborne bacteria and their products including endotoxins.<sup>8</sup> Using a combination of eight pollutants and two comfort variables (Indoor Environmental Index) in a simple linear regression model, a US study has reported that this model is able to account for 67-79% of the symptoms of Sick Building Syndrome.<sup>9</sup> Indoor air temperature and humidity have also been shown to be important<sup>10</sup> and the influence of personality and personal vulnerability are considered to be important predisposing factors.<sup>11</sup> Finally, work satisfaction and work stress should not be ignored as a cause for work-related symptoms erroneously attributed to the built environment.<sup>12</sup>

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# Appendix G

## STRESS AND DEPRESSION IN AUGMENTING COMPLEX HUMAN DISEASE

- G.1 It is clearly established that chronic stress and depression predispose people to certain diseases such as cancer, however, the mechanisms involved are complex.<sup>1</sup> Beyond observational associations, prospective epidemiological studies have confirmed a strong link between environmental stressors and coronary heart disease, type 2 diabetes, metabolic syndrome and disability.<sup>2</sup> Some, but not all, features of the neighbourhood environment are also associated with self-rated health and are indicators of important disease causal pathways that could provide a focus for public health intervention.<sup>3</sup> The association between psychiatric disorders and chronic ill health is driven by the way higher centres in the brain influence metabolism and immune responses involving neuronal and hormonal pathways.
- G.2 Central to the way the brain influences peripheral body functions is the influence of stress hormones, especially corticosteroids, catecholamines and neuropeptides on shaping the immune response.<sup>4</sup> The interrelationship between the higher centres, the hippocampus, hypothalamus and limbic systems of the brain and the neuroendocrine effector mechanisms is complex and involves the release of peptide transmitters such as corticotrophin releasing factor that triggers the anterior pituitary gland to release hormones to increase steroid secretion from the adrenal cortex, while stimulation of the limbic system activates the autonomic nervous system with release of the fight and flight hormone adrenaline.<sup>5</sup> In animal models<sup>6</sup> and in humans there is ample evidence that these neural and endocrine pathways have major effects on immune cells, especially T lymphocytes and the soluble signalling molecules (cytokines) that they release.<sup>7</sup> While exposure to stressors such as urban pollutants can reduce immunity,<sup>8</sup> environmental intervention such as enriched housing during adolescence can beneficially affect immunity<sup>9</sup> as can increasing a subject's ability to cope with stress.<sup>10</sup>

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# Appendix H

## BROWNFIELD AND PREVIOUSLY DEVELOPED LAND

- H.1 Brownfield land is the common name for what is technically known as previously developed land. This is defined as land that “is or was occupied by a permanent structure ... and associated fixed surface infrastructure. The definition covers the curtilage of the development.”<sup>1</sup> Such land includes “land and buildings that are vacant or derelict as well as land that is currently in use but which has potential for redevelopment”.
- H.2 This definition excludes land in built-up areas that has not previously been developed, such as parks, allotments and recreation grounds, but includes private gardens that fall within the curtilage of existing buildings. Previously developed land may also include derelict, contaminated or vacant land. Derelict land can be defined as “land so damaged by industrial or other development that it is incapable of beneficial use without treatment. Treatment includes demolition and levelling”, while contaminated land is so polluted that “significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled waters is being, or is likely to be caused”.<sup>2</sup> Vacant land can be described “as land on which some previous productive use has ceased for a significant period of time and also land which would benefit from development or improvement”.<sup>3</sup>

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# Appendix I

## SUMMARY OF THE RELATIONSHIP BETWEEN INTEGRATED SPATIAL STRATEGIES, THE CURRENT PLANNING SYSTEM AND ENVIRONMENTAL MANAGEMENT PLANS

- I.1 Our Twenty-third Report on Environmental Planning recommended that reform of the planning system should provide for the development of Integrated Spatial Strategies, one of the purposes of which was to combine spatial and environmental planning in an integrated way. The government did not accept this recommendation and, in the subsequent Planning and Compulsory Purchase Act (2004) for England and Wales, provided for spatial planning issues to be dealt with through Regional Spatial Strategies (RSS) and Local Development Frameworks (LDFs), which are subject to Strategic Environmental Assessments (SEAs) for plans and programmes, Sustainability Appraisals (SAs) for policies, plans and programmes, and Environmental Impact Assessments (EIAs) for projects at the local level. Arrangements in Scotland, Northern Ireland and in London, differ somewhat, but many of the principles are broadly the same. The table below summarises our recommended approach, the government's response to our recommendation and the current situation with respect to the planning system and Environmental Management Plans.
- I.2 We recognise the need to work within the new framework of RSSs and LDFs, but continue to think it vital that environmental planning should be properly integrated with spatial planning, especially in urban areas. Our recommendation for central government and the devolved administrations to enter into an environmental contract with local authorities is intended to complement the new spatial planning arrangements. This would be implemented through a delivery plan which would deal systematically with the whole range of environmental issues (box 6B), and would provide an overarching environmental policy framework and context for SAs, SEAs and EIAs, and the means whereby their conclusions and recommendations could be put into effect.

<b>Integrated Spatial Strategies (proposed by our Twenty-third Report, 2001)<sup>1</sup></b>	<b>Government response to Twenty-third Report<sup>2</sup></b>	<b>Environmental Management Plans (EU Urban Thematic Strategy, 2006)<sup>3</sup></b>
<p><i>England (not London)</i></p> <ul style="list-style-type: none"> <li>• All spatially related activities <i>and</i></li> <li>• All spatially related environmental activities</li> <li>• Comprehensive coverage of land use and environmental issues</li> <li>• Sub-regional scale in advance of formalisation of regions and assemblies</li> <li>• Conversion of both regional planning guidance and structure plans until the formalisation of regions</li> <li>• Potential focus for major conurbations and planning of towns in major hinterlands</li> </ul>	<p>Regional Spatial Strategies and Local Development Frameworks are adequate for purpose with Sustainability Appraisal/Strategic Environmental Assessment to cover environmental aspects</p> <p><b>Current planning system (2006)</b></p> <p><i>England</i></p> <ol style="list-style-type: none"> <li>1. National Planning Policy Statements (PPSs) and guidance</li> <li>2. Regional Spatial Strategies (Spatial Development Strategy in London) lasting 10-15 years; can allow for sub-regional planning</li> <li>3. Local Development Framework + Local Development Scheme + Local Development Documents + Statement of Community involvement</li> </ol> <p><i>Scotland</i></p> <p>Scottish Planning Policies (SPPs) and guidance (Planning Advice Notes)</p> <p>National Planning Framework + four city region plans (Aberdeen, Dundee, Edinburgh, Glasgow)</p> <p><i>Wales</i></p> <p>Wales Planning Policies (PPWs) and guidance (Technical Advice Notes)</p> <p>Wales Spatial Plan</p> <p><i>Northern Ireland (NI)</i></p> <p>Planning Policy Statements (PPSs) and guidance</p> <p>Regional Development Strategy for NI + sub-regional plans</p>	<p>Larger urban areas</p> <ul style="list-style-type: none"> <li>• Covers whole town or city</li> <li>• Links different environmental issues (energy, greenhouse gas emissions, water use, waste, noise, air quality, nature and biodiversity, transport and mobility, risks, related health issues, quality of life) in an integrated and co-ordinated way</li> <li>• Provides information on the current environmental situation, sets targets for improvement and actions to meet targets</li> </ul>

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## ABBREVIATIONS

- AECB** – Association for Environment Conscious Building
- BAP** – Biodiversity Action Plan
- BIDs** – Business Improvement Districts
- BRE** – Building Research Establishment
- BREEAM** – BRE Environmental Assessment Method
- CABE Space** – Commission for Architecture and the Built Environment
- CHP** – Combined Heat and Power
- CO<sub>2</sub>** – carbon dioxide
- COMEAP** – Committee on the Medical Effects of Air Pollutants
- DCLG** – Department for Communities and Local Government
- Defra** – Department for Environment, Food and Rural Affairs
- DfT** – Department for Transport
- DH** – Department of Health
- DOENI** – Department of Environment Northern Ireland
- DTI** – Department of Trade and Industry
- EA** – Environment Agency
- EC** – European Community
- ECI** – Environmental Change Institute
- EHS** – Environment and Heritage Service
- EIA** – Environmental Impact Assessment
- EMPs** – Environmental Management Plans
- EMS** – Environmental Management System
- EPBD** – Energy Performance of Buildings Directive
- EU** – European Union
- GB** – Great Britain
- GIS** – geographical information system
- HIA** – Health Impact Assessment
- HMT** – Her Majesty's Treasury
- ICLEI** – International Council for Local Environmental Initiatives
- IUDM** – integrated urban drainage management



- LGA** – Local Government Association
- LSPs** – Local Strategic Partnerships
- LZC** – low and zero carbon technologies
- NAO** – National Audit Office
- NGOs** – non-governmental organisations
- NHS** – National Health Service
- NI** – Northern Ireland
- NO<sub>x</sub>** – nitrogen oxides
- NPPG** – National Planning Policy Guidance (Scotland)
- NSCA** – National Society for Clean Air and Environmental Protection
- Ofgem** – Office of Gas and Electricity Markets
- Ofreg** – Office for the Regulation of Electricity and Gas (NI)
- Ofwat** – Water Services Regulation Authority
- PFI** – public finance initiative
- PM<sub>10</sub>** – particulate matter less than 10 microns in diameter
- PPG** – Planning Policy Guidance (England)
- PPP** – public private partnerships
- PPS** – Planning Policy Statement (England)
- RPG** – Regional Planning Guidance
- SA** – Sustainability Appraisal
- SARS** – Severe Acute Respiratory Syndrome
- SEA** – Strategic Environmental Assessment
- SEPA** – Scottish Environment Protection Agency
- SSSI** – Site of Special Scientific Interest
- SuDS** – sustainable drainage systems
- TAN** – Technical Advice Note (Wales)
- TCPA** – Town and Country Planning Association
- UK** – United Kingdom
- UN** – United Nations
- US** – United States of America
- VAT** – Value Added Tax
- VOCs** – volatile organic compounds
- WHO** – World Health Organization

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