Chapter 9 Environment

9.1 This chapter considers key environmental issues and their current and future impact on the sub-regional economy. The chapter is structured around the following themes:

- Climate change
- Resource efficiency
- Green infrastructure
- Environmental services
- Biodiversity
- Better places
- Geology and minerals
- Summary and SWOT analysis

Climate Change

9.2 The scientific evidence is now overwhelming: climate change, driven by greenhouse gases, presents very serious global risks, and it demands an urgent global response. If we continue as usual, average global temperatures will rise by 2^{o}–3^{o}C within the next 50 years or so. The impacts this will have include:

- Reduction of water supplies for one-sixth of the world's population
- Declining crop yields
- Rising sea levels will result in tens to hundreds of millions more people flooded each year leading to permanent displacement of 200 million people by mid-century
- 15-40% of species facing extinction after only 2^{o}C of warming
- Ocean acidification will have major impacts on marine ecosystems with possible adverse impacts on fish stocks
- Increased damage from extreme weather (e.g. In the UK, annual flood losses alone could increase from 0.1% of GDP today to 0.2–0.4% once increase in global temperatures reaches 3^{o}-4^{o}C).

9.3 The benefits of strong, early action considerably outweigh the costs. If unchecked, our actions over the coming few decades could create risks of major disruption to economic and social activity, later in this century and in the next, and it will be difficult or impossible to reverse these changes. Tackling climate change is the pro-growth strategy for the longer-term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries. The earlier effective action is taken, the less costly it will be. Delay in taking action on climate change would make it necessary to accept both more climate change and, eventually, higher mitigation costs. Weak action in the next 10–20 years would put stabilisation even at 550 ppmCO_2e beyond reach (we are currently at approximately 430 ppmCO_2e) – and this level is already associated with significant risks.

9.4 In Leicestershire, by 2050, according to the UK Climate Impact Profiles 2009 (UKCIP09) scenarios, these impacts are expected to include for medium emissions scenarios (i.e. based on a business as usual scenario):

- Temperature increases of around +2.2^{0}C in winter and +2.5^{0}C in summer

- Similar levels of rainfall overall but more of that rain, +14% in winter and that which falls in summer, -15%, becoming more intense, meaning more summer flooding but also more periods of summer droughts

- Milder winters and longer growing seasons

9.5 Local Authorities in Leicester and Leicestershire are working together to undertake a comprehensive risk assessment and prepare an adaptation plan. This will be based on the climate change scenarios provided by the UK Climate Impact profiles 2009 (UKCIP09)[1].

9.6 The following actions will be important in terms of climate change adaptation:

- Investing in energy efficiency measures – energy efficiency has the potential to be the biggest single source of emissions savings in the energy sector. This would have both environmental and economic benefits: energy efficiency measures cut waste and save money.

- Protecting forests – one third of greenhouse gas emissions are non-energy related and protecting our forests is relatively cheap compared to other forms of mitigation.

- Large-scale uptake of a range of clean power, heat and transport technologies - the power sector around the world will have to be at least 60 – 75% decarbonised by 2050 to stabilise at or below 550ppm CO_2e.

- Adapting land management techniques and supporting sustainable land management – including farming activities.

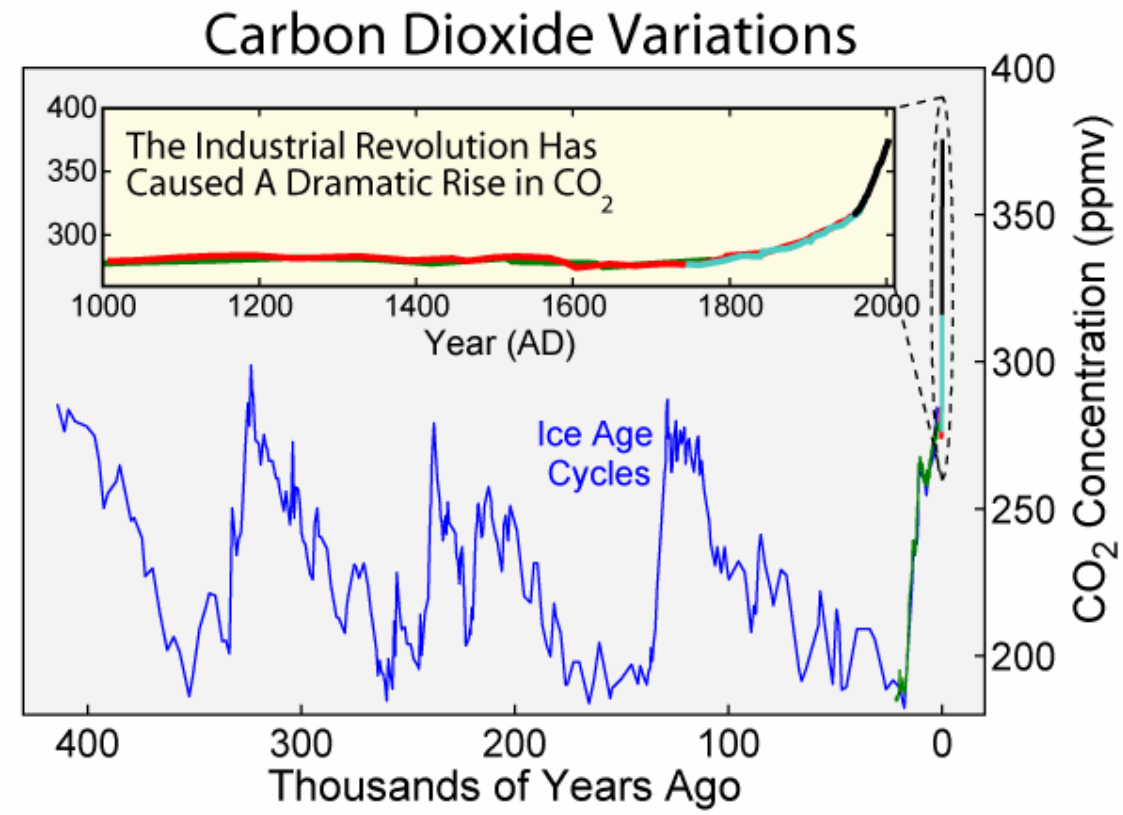
- Carbon trading and pricing – as running through the EU Emissions Trading System and with the Carbon Reduction Commitment.

- Minimum standards – establishing standards such that new developments add as little carbon to the atmosphere as possible over their lifetime.

- Education – ensuring that the public has a good understanding of the issues and the science involved in climate change.

[1] see http://www.ukcip.org.uk

Figure 9.1 Carbon Dioxide in the Atmosphere



Source: Image from Global Warming Art

Table 9.1 Estimated Carbon Dioxide Emission Statistics 2005-07 (tonnes)

Area	Per capita CO_2 emissions 2005	Per capita CO_2 emissions 2006	Per capita CO_2 emissions 2007
Blaby	8.9	8.9	8.6
Charnwood	8.0	7.9	7.7
Harborough	10.4	10.0	9.8
Hinckley & Bosworth	8.7	8.5	8.0
Melton	10.2	9.6	9.3
North West Leics	15.0	14.7	14.1
Oadby & Wigston	5.4	5.3	5.1
Leicestershire	9.5	9.3	8.9
Leicester	7.1	6.9	6.6
Leicester & Leicestershire	**8.7**	**8.5**	**8.2**
East Midlands	9.3	9.2	8.9
UK	8.7	8.7	8.5

Source: DEFRA (Sept 2009)

9.7 As a result of the threat from climate change, the government has committed itself to a range of emission reduction targets including the following:

- To reduce CO_2 emissions, from 1990 levels by 34% by 2020 and by 80% by 2050.
- To produce 15% of our energy needs by 2020 from renewable energy sources.
- Zero Carbon buildings – Proposal that all new residential buildings are required to be zero carbon by 2016 and non-residential buildings by 2019.

Challenges and Issues

9.8 This results in the following challenges and issues for the Leicester and Leicestershire sub-region:

- The government target (subject to any greater targets agreed at the Copenhagen summit) requires us to reduce carbon emissions by at least 3% per annum between now and 2020 and by over 1.5% per annum thereafter. This will be achieved through a combination of energy demand reduction, energy efficiency improvements and by switching power sources towards renewable energy production.
- Whilst a programme of emissions reductions is delivered, there will be a need also to a programme of ongoing adaptation to the changing climate.
- Delivering zero carbon buildings to the government's targets.

Resource Efficiency (Energy, Water, Waste and Air)

9.9 The Climate Change agenda will increasingly demand that we cease to use the environment as a free public good. This, amongst other things, will require that the economy maximises the efficiency with which it uses assets such as energy, water, land and air and thereby reduces the amounts of waste needing to be treated.

Energy

9.10 The imperative to reduce the need for energy, to be more energy efficient and to produce an increasing share of our energy needs from low carbon sources has been considered above.

Water

9.11 The same strictures apply to our use of water. Water supply is not considered to be a significant constraint within Leicestershire. Severn Trent's water supply plans for the next 20 years are included in its Water Resources Management Plan which demonstrates that water resources needs for the planning period can be met. There are, of course, uncertainties that exist

relating to the additional work required on climate change scenarios, housing figures, and potential impact of nitrate pollution. However, contingency plans do exist to ensure an increased supply from the Derwent valley should that be necessary, but this would be at increased energy cost. Disposal of waste water is also expensive and can have substantial impacts on the natural environment. The quality of rivers in Leicestershire is variable. Some key statistics are summarised below:

- 8% of Leicestershire is at risk of flooding (165km^2) with over 24,500 properties at risk. 14,000 of these are in Leicester.

- Water quality in water bodies is generally good or very good with only 1% poor or of bad biological quality. However, nutrient levels are a problem with 61% of water bodies having very high levels.

- In 2005, there were 317 pollution incidents, (of which 53 were in Leicester). 12 of these incidents had a significant impact on the environment, 6 of these were related to waste management operations.

9.12 The following issues have been identified:

- Water resource management will become increasingly important due to potential drought from climate change and potential conflict over use of limited resources.

- There will be potential for increased flooding due to extreme weather events compounded by climate change. These flooding events will be from rivers, from surface water and from lack of capacity in the sewerage network to cope with such loading. There will be a need to ensure the public are aware of these risks and the measures available to cope in emergencies.

- There is a need to tackle diffuse pollution as it affects our rivers and watercourses.

Figure 9.2 Water Courses and Floodplain in Leicester and Leicestershire

Air

9.13 The air we breathe today is better quality than at any time since the industrial revolution started and there is a long-term trend of improvement as a result of improved regulatory standards affecting industry, transport and our homes. However, air pollution still harms health and the environment and it has become clear that some pollutants (such as particulates) are more dangerous than previously thought. Air pollution is currently estimated to reduce human life expectancy, on average, by seven to eight months with an estimated health cost of up to £20 billion each year. It also has detrimental effects on our vegetation and ecosystems. There would be clear gains to be made from further improvements in standards in the way in which we manage air pollution. Air quality objectives are expected to be met in general except for particulates, ozone and nitrogen dioxide and whilst exceedances will generally be small in area they will tend to be in relatively densely populated areas. In the natural environment, critical loads for acidity and/or the fertilising effects of nitrogen are exceeded in over half of the UK's natural and semi-natural habitats. Therefore, as a minimum, we can expect to see regulations and financial incentives introduced to ensure tighter European vehicle emissions standards, improved uptake of lower emissions vehicles and, internationally, reduced emissions from ships.

9.14 In Leicester and Leicestershire Air Quality Management Areas have been introduced in the following areas:

Table 9.2 Air Quality Management Areas

District	Area	Air Quality Issue
Blaby	Narborough Rd South and Fosse Park	NO2
	M1 Enderby and Narborough	NO2
	M1 Thorpe Astley and Kirby Muxloe	NO2
	B4114 Foxhunter Roundabout and Fosse Park	NO2
	Enderby Road, Whetstone	NO2
	A46/A50 Junction – Branting Hill, Groby	NO2
Charnwood	Loughborough – Arterial routes	NO2
	Syston Main Road	NO2
	Great Central Railway, Loughborough	SO2
Harborough	Lutterworth	NO2
Leicester	City centre and Arterial Routes	NO2
North West Leicestershire	Kegworth – Trunk Road	NO2
	M1 – residential properties near Kegworth	NO2
	Castle Donington High St	NO2
	Coalville – Bardon Road	NO2
	Copt Oak	NO2

9.15 Programmes to tackle air quality issues in the designated Air Quality Management Areas in Leicester and Leicestershire will need to be enhanced through the next review of the Local Transport Plans. Programmes that increase support for sustainable transport will need further support.

Waste

9.16 In 2003-04, over four million tonnes of waste needing to be dealt with by waste management facilities was produced in Leicestershire and Leicester. About 11% was municipal waste, 35% commercial and industrial waste (C&I), 53% construction and demolition waste (C&D), with the remaining 1% comprising principally clinical, hazardous and controlled agricultural wastes. As at the beginning of 2008, there were a number of facilities within the framework area for managing waste. These were:

- Materials recovery facilities (MRFs) at Whetstone and Melton
- A mechanical biological treatment (MBT) facility at Bursom
- Anaerobic digestion at Wanlip
- Seven composting sites
- Around 40 transfer stations throughout the City and County
- Approximately 32 construction and demolition recycling sites
- Around 40 scrap metal sites
- 16 Recycling and Household Waste Sites
- Landfills for non-hazardous waste at Cotesbach and New Albion
- Principal landfills for inert waste at Lockington, Huncote, and Husbands Bosworth and a variety of other smaller inert landfill sites

9.17 In accordance with European Directives, government policy is to reduce reliance on landfill as a means of managing waste and, consequently, a significant change is needed in the way waste is managed. The National Waste Strategy 2007 suggests that following the prime objective of reducing waste, it should be seen as a resource where it is produced. Decisions on the means of dealing with waste should be based on the following order of preference (the waste hierarchy):

- Reduction
- Reuse
- Recycling & Composting
- Energy Recovery
- Disposal

Future Waste Issues

9.18 The National Strategy establishes the following targets for the management of municipal waste:

- To recover value from 53% of municipal waste by 2010
- To recover value from 67% of municipal waste by 2015
- To recover value from 75% of municipal waste by 2020

9.19 Performance on recycling in Leicestershire was 52% in 2008/09 and 30.6% in Leicester. With regard to C&I waste, the National Waste Strategy expects a reduction of 20% in the amount sent to landfill in 2010 when compared to that landfilled in 2004. Consideration is also being given to a target to halve C&D waste going to landfill by 2012 compared to that disposed of in 2004.

9.20 The need to produce less waste and to use it as a resource, wherever possible, is reinforced within the government's Planning Policy Statement 10: Planning for Sustainable Waste Management (PPS10) published in July 2005. The statement makes clear that management of waste must be moved up the waste hierarchy and that disposal is a last resort.

9.21 The Regional Waste Strategy (RWS), published January 2006, is based on the following principles:

- Working towards zero growth in waste by 2016
- Reducing the amount of waste sent to landfill
- Exceeding government targets for recycling and composting to continue to achieve levels of current best practice
- Taking a flexible approach to other forms of waste recovery on the basis that technology in this area is developing very quickly

9.22 The Regional Spatial Strategy (RSS) identifies apportionments of the waste management capacity required for the three main waste streams by sub-region for the period until 2020; repeated from those published in the RWS. These apportionments are given below. The total quantities are split into categories of recycling/composting requirement, landfill diversion, reuse and disposal. They anticipate zero growth from 2016 and assume recycling rates for municipal waste in line with the RSS, plus 42% C&I waste recycling/composting, 49% C&D waste recycling and 38% C&D waste reuse.

Table 9.3 East Midlands Regional Waste Strategy indicative waste management capacity requirements for Leicester, Leicestershire and Rutland in 2009/10, 2014/15, 2019/20 (thousand tonnes) – figures published January 2006

Year		Recycling/ Composting	Landfill Diversion [1]	Re-use [2]	Disposal [3]	Total
2009/ 2010	MSW ~22% of regional total	184	131	-	298	613
	C&I ~24% of regional total	628	-	-	868	1,505
	C&D ~ assumed 23% of regional total	1,227	-	950	307	2,485
2014/ 2015	MSW ~22% of regional total	333	152	-	181	667
	C&I ~24% of regional total	624	-	-	862	1,495
	C&D ~ assumed 23% of regional total	1,290	-	999	323	2,611
2019/ 2020	MSW ~22% of regional total	333	195	-	139	667
	C&I ~24% of regional total	608	-	-	840	1,457
	C&D ~ assumed 23% of regional total	1,290	-	999	323	2,611

Source: East Midlands Waste Strategy

1 Landfill Diversion includes energy recovery and alternative technologies such as mechanical and biological treatment (MBT). For MSW (Municipal Solid Waste), it represents the minimum required for achievement of LATS allocations.

2 Re-use of C&D waste represents landfill engineering, use on sites exempt from waste licensing and backfill of quarry voids.

3 Disposal does not include residues from treatment facilities and is assumed to be largely landfill.

Green Infrastructure

9.23 Green Infrastructure, as defined in the Regional Spatial Strategy, comprises the networks of multi-functional greenspace which sit within, and contribute to, the type of high-quality natural and built environment required to deliver 'sustainable communities'. Delivering, protecting and enhancing these networks requires the creation of new assets to link with river corridors, woodlands, nature reserves, urban greenspace, historic sites and other existing assets. An assessment of people's access to Green Infrastructure based on the ANGSt (Access to Natural Green Space standard) has been

prepared for the 6Cs[2] area and is shown in figure 9.3. This graphically illustrates the pressing need for additional access to greenspace for residents in and around Leicester and other urban areas and the major contribution that the National Forest and Charnwood Forest make to access requirements in those parts of the County. The relationship of greenspace and where people live in and around Leicester is also shown in figure 9.3.

9.24 The 6Cs GI strategy identified for the Leicester area:

- Deficiency of sites over 2 Ha (within 300m of inhabitants) for almost all of Leicester's population. Residents in a small area in the north and discrete areas in the south have access to sites.
- Deficiency of sites over 20 Ha (within 2km of inhabitants) for all of Leicester's population. Residents in the north have access to sites.
- Deficiency of sites over 100 Ha (within 5km of inhabitants) for all of Leicester's population
- Deficiency of sites over 500 Ha (within 10km of inhabitants) for all of Leicester's population

9.25 A Green Infrastructure Strategy and Action Plan has been prepared for the 6Cs area and highlights priorities for improved Green Infrastructure, particularly linked to Growth Point developments in the following areas:

- Soar Valley – Leicester – Loughborough,
- Charnwood Forest
- The Countryside edge around Leicester and other urban areas

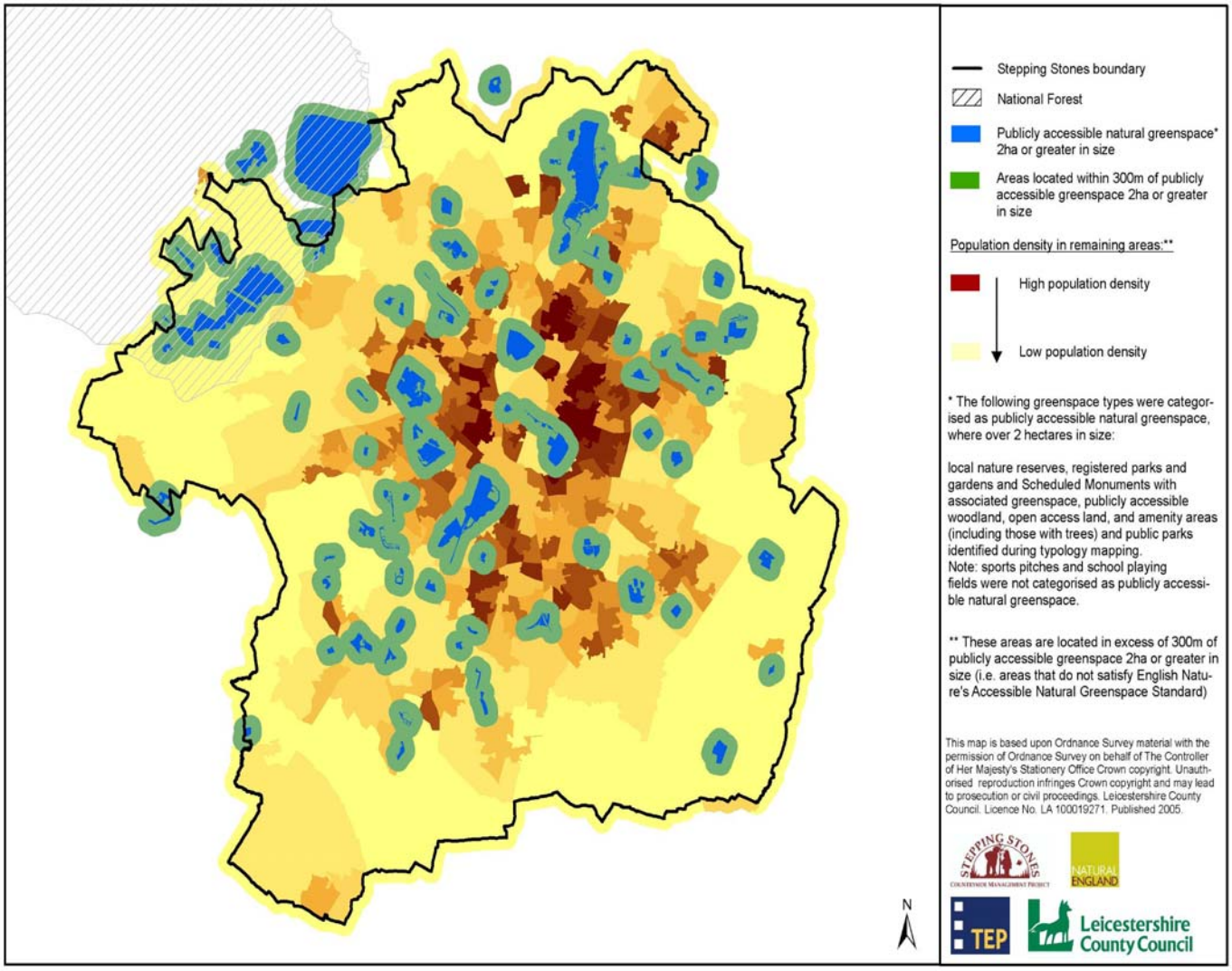
9.26 The National Forest has developed impressively over the past 15 years. Woodland cover in the area in 1995 was around 6%, equating to around 3,000 hectares of mature woodland. This has now increased to over 18%, with over 6,000 hectares of new woodlands having been created and the intention is to continue woodland creation at a rate of 200-250 hectares annually. As these woodlands grow, so the potential for their economic use increases, through thinning and felling and in providing recreational opportunities for local people and visitors and through links to the proposed growth points in the area, as part of a wider approach to sustainable development. However, in order to fulfil the current and long-term economic potential of the forest, there is a need to foster the development of the woodland economy. This is recognised as a priority for the National Forest Company. As the forest grows, so too does the tourism potential as visitor numbers increase and the number of attractions and accommodation stock become increasingly varied.

9.27 There are plans in the River Soar and Grand Union Canal Strategy to transform a 23 mile stretch of the River Soar and its associated canals between Loughborough and Kilby Bridge. Mini-masterplans are to be drawn up for seven key points, including Leicester City, Aylestone and Barrow-upon-Soar. Other plans include a £1M visitor centre at Watermead Park, canal-side picnic areas in South Wigston and a white-water canoe centre in

[2] 6 Cs area comprises Leicester City, Leicestershire, Derby City, Derbyshire, Nottingham City, Nottinghamshire

Aylestone. Plans for Loughborough include riverside homes and businesses and the linking of the canal to the university.

Figure 9.3 Distribution of Publicly Accessible Greenspace in and around Leicester



9.28 The benefits of investing in Green Infrastructure include the following:

- **Climate change**. GI improvement to help microclimate control for urban areas – shade in the summer reducing the need for air-conditioning in buildings; reduced wind effects on homes and workplaces lowering heating costs; evapotranspiring surfaces (i.e. vegetated and water) helping provide for urban cooling and reduced impacts of higher rainfall through flood mitigation resulting from canopy and greenspace cover.
- **Flood alleviation and water management**. Absorption levels being higher where there is more 'soft surfacing'; enhanced land values and enhanced house prices (flood risk will depress both); controls on the risk

of diffuse pollution; and restoration of wetlands slowing down water flows and creating reservoirs for flood water.

- **Quality of Place**. Improved access to greenspace for formal and informal recreation; greater tourism and leisure expenditure; improved attractiveness of place for investment; reduction in noise levels from road and industry; and improved visual amenity.

- **Health and Well-being**. Improved public health, reduction in long-term limiting illness and a more productive workforce; stress reduction through access to greenspace and green environment; and improved opportunities for walking and cycling as alternatives to motorised travel.

- **Land and Property Values**. Increased property and land values associated with access to high-quality greenspace provision stimulating regeneration.

- **Tourism**. Increased tourism activity related to the natural environment resulting in new / secured jobs; and increased attractiveness of urban centres for tourism brings new visitors and new / secured jobs.

- **Recreation and Leisure**. Increased attractiveness of urban centres for retail and leisure activity bringing new customers and new /secured jobs; added value activities to farming and forestry sector through diversification; and opportunities to improve quality of life through improved access to high quality greenspace.

- **Land and Biodiversity**. Increased activity in conservation and land management resulting in new / secured jobs; and creating economic opportunity by developing a vibrant and sustainable biomass industry.

- **Products from the Land**. Creating economic opportunity by developing a vibrant and sustainable biomass industry; and new markets for agriculture for biofuels production.

- **Sustainable Transport**. Increased travel, both for work and recreation, by foot and bike; increased use by children and young adults of segregated routes providing safe travel routes to school and work; reduced number of accidents involving walkers and cyclists; and reduced carbon emissions.

Figure 9.4 6Cs Growth Point Green Infrastructure Strategy

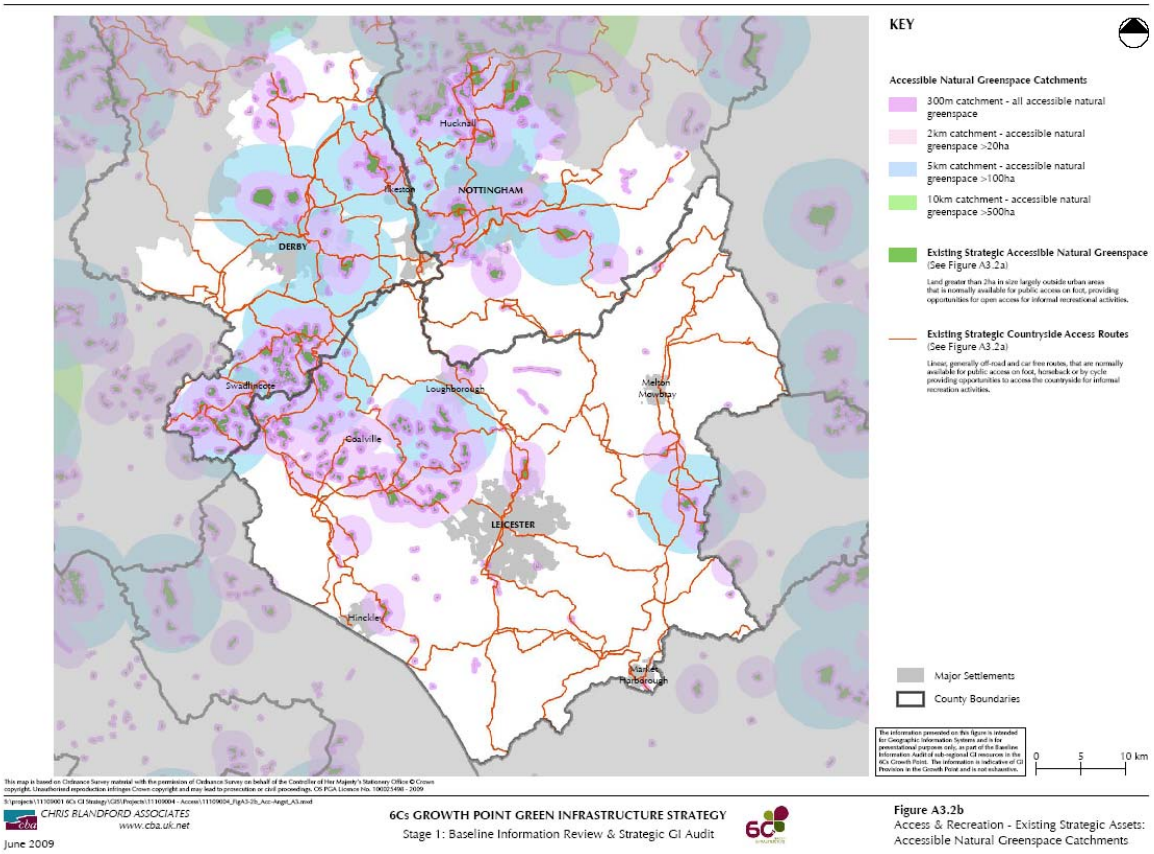
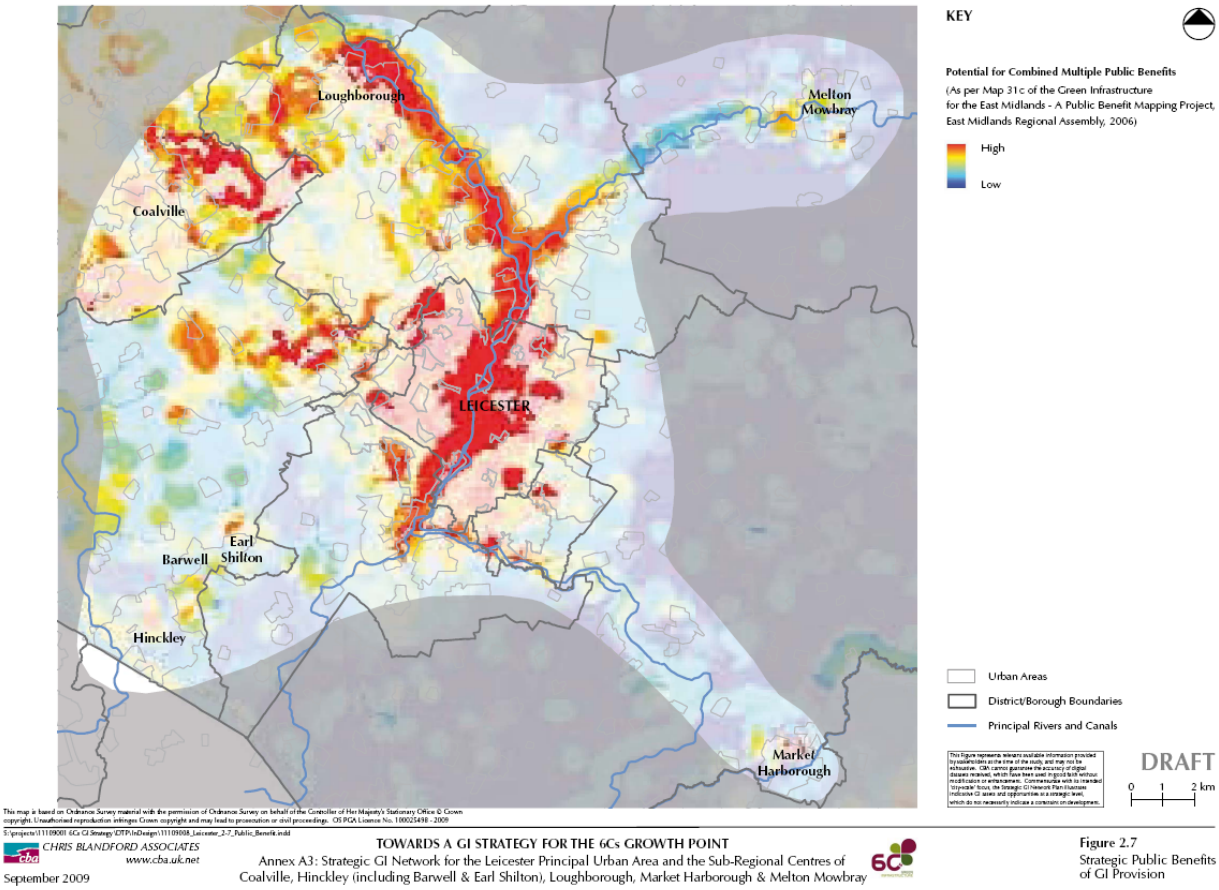


Figure 9.5 Green Infrastructure in Leicestershire



Source: A Public Benefit Mapping Commissioned by East Midlands Regional Assembly

Environmental Services

9.29 Although ecosystem services benefit both private citizens and commercial businesses, this dependence is not always apparent to those who receive benefit. This is in large part due to the fact that, although some services such as clean water and fibre are bought and sold, most ecosystem services, such as climate regulation and flood control, are public goods. They are provided at no charge to a diverse range of beneficiaries; but those who own land or waters which provide the service receive no payment or other reward. Typically, ecosystem services are open to over exploitation or degradation. The cost of an unhealthy environment is high. For example, the annual national cost of removing agricultural contaminants in drinking water is £128 million, and air quality impacts to result in an estimated health cost of £20 billion per annum.

9.30 In Leicester and Leicestershire, we can expect issues relating to protection of the public good, represented by ecosystem services, to receive greater prominence. This will be achieved through increased regulation, through measures designed to ensure that such services are not damaged and through additional work being undertaken to ensure that we understand ecosystem services better. Alongside this, significant effort will be needed to

ensure that individuals understand how they depend upon the natural environment. This is a critical issue as the absence of such understanding can inhibit meaningful decisions being made on behalf of society.

9.31 Ecosystem services are the benefits people obtain from ecosystems. These include provisioning, regulating and cultural services that directly affect people and the supporting services needed to maintain other services. Many of the services listed here are highly interlinked (Primary production, photosynthesis, nutrient cycling and water cycling, for example, all involve different aspects of the same biological processes). This list is not comprehensive and omits the health benefit of the natural environment, and the cultural value of biodiversity and landscape.

Figure 9.6 Millennium Ecosystem Assessment Classification of Ecosystem Services

Provisioning services. These are the products obtained from ecosystems, including: • Food • Fibre • Fuel • Genetic resources • Biochemicals, natural medicines, and pharmaceuticals • Ornamental resources • Fresh water	**Regulating services**. These are the benefits obtained from the regulation of ecosystem processes including: • Air quality regulation • Climate regulation • Water regulation • Erosion regulation • Water purification and waste treatment • Disease regulation • Pest regulation • Pollination • Natural hazard regulation
Cultural services. These are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences, including: • Cultural diversity • Spiritual and religious values • Knowledge systems (traditional and formal) • Educational values • Inspiration • Aesthetic values • Social relations • Sense of place • Cultural heritage values • Recreation and tourism	**Supporting services**. These underpin the production of all other ecosystem services: • Soil formation • Photosynthesis • Primary production • Nutrient cycling • Water cycling

Source: Natural England: The True Value of Nature

Biodiversity

9.32 The biodiversity levels of both the County and City are comparatively weak and impoverished compared to other areas of the country. However, there are small pockets of significant interest. The recent history of management of land within Leicestershire has resulted in the loss of natural and semi-natural habitats and their associated species. Consequentially, Leicestershire is one of the 'poorest' counties in terms of the biodiversity that it supports. For example, Leicestershire has 2% of its land area notified as Sites of Special Scientific Interest compared to an average of 7.5% elsewhere in England. This has come about following urban and industrial expansion, agricultural intensification and the decline in traditional land management. In an agricultural county such as Leicestershire, this was particularly marked.

9.33 Despite this, there are a number of important habitats that remain and these include:

- 1075 Wildlife Sites totalling approximately 2800 hectares
- 76 Sites of Special Scientific Interest
- 3 National Nature Reserves: Charnwood Lodge, Cribbs Meadow and Muston Meadows
- One Special Area of Conservation at River Mease/Gilwiskaw Brook.

9.34 Habitats that are beneficial for wildlife in the City include: small areas of woodland and wetland, meadows, pasture, hedgerows and spinneys, managed green spaces including parks and private gardens, allotments, cemeteries and school grounds. There are also more typical urban habitats, such as buildings and structures, disused railway land, road verges/banks, bare ground and disused or abandoned land. The River Soar and Canal Corridor is a very important natural feature in the City for wildlife.

9.35 The Regional Spatial Strategy identifies two areas as Biodiversity Conservation Areas: Charnwood Forest and Leighfield Forest. It also identifies one Biodiversity Enhancement Area - The National Forest - together with a network of opportunities represented by strategic river corridors.

9.36 In the wider countryside there are a number of initiatives to attempt to ensure land is managed for wildlife – these are summarised in the table below:

Table 9.4 Wildlife Management Initiatives

Scheme	No	Area	% of area	£m
Countryside Stewardship	259	4,554	2.27	1.48
Entry level and Organic Entry Level	856	123,718	61.56	4.01
Higher Level Stewardship	32	5,977	2.97	0.75
Wildlife Enhancement Schemes	36	484	0.24	0.07
All Schemes	1,183	134,731	67.03	6.31

9.37 To support positive action for wildlife the following is required:

- Support the implementation of the Biodiversity Action Plan
- Support for the planned development of the Environmental Records Centre
- Maximising habitat creation opportunities through appropriate development
- Supporting the development of Green Infrastructure to help join up fragmented wildlife sites
- Support large 'Living Landscape' schemes in the Soar Valley, Charnwood Forest and the National Forest

Better Places

9.38 People care about the quality of the places in which they live, work and pass their leisure time. Nationally, nearly 90% of people said that better quality buildings and public spaces improved their quality of life, according to MORI research (2004). (Although the East Midlands figure reduces to 75% of people). It is therefore important that new development is of high enough quality to protect places of existing high-quality and to enhance other areas. Furthermore, it is disappointing to report that a 2006 housing audit by CABE (Commission for Architecture and the Built Environment) concluded that, in the East Midlands, over half the developments were assessed as poor. No schemes rated good, and only one was very good.

9.39 Our city and town centres are the focus of our communities. The distinctive identity of the historic environment helps to define the quality of these places. They have also undergone significant changes in function and form. In many instances, these changes have meant that the 'heartbeat' of the centres has been reduced. Programmes of action to ensure that employment, retail activity and sense of place are not only retained, but also developed, are highly desirable.

9.40 There are at least 12 local authority museums in Leicestershire and Leicester and around 50, mainly volunteer-run museums, which, together with the County Record Office, attract over 1 million visitors per year. They employ directly around 150 people. They make a significant contribution to the tourism offer and therefore to the visitor economy.

9.41 There are a number of heritage sites that are particularly significant. These include:

- Bosworth Battlefield, the subject of current, significant media interest and with enormous international tourism potential and won the Small Visitor Attraction Gold Award at the 2009 East Midlands Tourism Enjoy England Excellence Awards
- National Space Centre in Leicester has built an international reputation and attracts some 250,000 visitors every year, it received the Large Visitor Attraction Award for 2009
- Snibston Discovery Museum (which has strong connections with the plans for Coalville town centre)
- Twycross Zoo is a major visitor attraction with 500,000 visitors per year

9.42 The report "Contribution of Heritage to the East Midlands Economy" gave evidence that the heritage sector directly employs between 3,925-4,710 people in the region. Including associated employment – i.e. that which is visitor spend related, together with indirect and induced jobs – it is estimated that the heritage sector supported some 10,000 people.

9.43 It also made the point that volunteers in the sector also make a significant contribution to the economy with approximately 1,200 people actively involved in running heritage assets across the East Midlands, equating to an economic contribution of between £18.7 million and £26.7 million per annum.

9.44 The report points out that heritage also makes a highly significant contribution to tourism in the region, with eight of the top ten attractions (paid and free) being heritage based[3]. The available evidence base also serves to underline the role of the heritage assets as educational and community resources, as important elements in the regeneration process and as a contributor to quality of life.

9.45 Environmentally-led regeneration through the National Forest initiative has demonstrated the success that focussed programmes of activity can achieve. Whilst such significant levels of landscape change are not required in much of Leicester and Leicestershire, where policies of protection of existing character are more appropriate, there are some areas where more focussed activity would be beneficial to fully realise their environmental and economic potential. As well as the city and town centres and the continuation of the National Forest project, these include:

- The River Soar corridor
- The countryside in and around Leicester and other urban areas
- Charnwood Forest

9.46 The built heritage of Leicestershire is a unique and finite asset which is valued highly by communities. The distinctive identity of the historic environment helps to define quality places and is of vital importance to the perception of the county as an outstanding place in which to live, work, visit and invest. In the case of historic market towns and sites, well-maintained, attractive traditional buildings are an integral part of their branding and tourism marketing strategy.

9.47 There are strong links between the physical character and condition of historic towns and villages and the commercial activities they can sustain. Co-ordinated re-investment in the fabric of such areas helps to keep buildings in use, enhances consumer choice by accommodating a range of services, and is vital to income generation. Together, these are significant in determining the overall well-being and future prosperity of local economies. There is a specific opportunity to demonstrate this approach within Leicester's Strategic Regeneration Area, where there are 14,950 square metres of redundant historic floor space across 29 buildings.

[3] Visits to Visitor Attractions Survey
Contribution of Heritage to the East Midlands Economy, Ecotec, February 2007 for the East Midlands Heritage Forum

9.48 Built heritage is not immune from the effects of global warming. The core of our historic settlements evolved as relatively low-energy economies. Measures taken to preserve and strengthen these special places will contribute to the action being taken on climate change. Good conservation practice, which promotes the adaptation, repair and recycling of historic buildings and materials, ensures the efficient use of their embodied energy and contributes to environmental sustainability. Helping to maintain the demand for local heritage craft skills and building materials will help ensure the preservation of local distinctiveness. It will also reduce the need for unnecessary journeys. Preserving and further developing these skills could also benefit the local and regional economy.

9.49 The tangible benefits of preserving, enhancing and promoting the historic environment has been assessed in a number of recent publications (see Bibliography). Heritage-related investment has the potential to contribute to the effective delivery of key regional policy agendas and priorities.

Geology and Minerals

9.50 Leicestershire is richly endowed in minerals and is a significant producer of a range of minerals with some 1,381 people employed in the industry in 2006. Leicestershire produced some 14.5 million tonnes of igneous rock in 2006 (some 65.7% of England's production). With each main quarry site being rail-connected, the Leicestershire quarries represent an important national supplier and have some 397 million tonnes of identified permitted reserves. Overall, Leicestershire's aggregate production represents 47% of the East Midlands total (limestone 1.7 million tonnes, sand and gravel 1.3 million tonnes). Clay and shale sales at 680,000 tonnes represent some 50% of regional production. Fireclay sales from Leicestershire represent 31% of total sales in England. Gypsum production at 650,000 tonnes per annum represents more than one third of English production. Whilst deep-mine coal production has ceased, the County also produces variable quantities of opencast coal and oil from Long Clawson.

9.51 Overall, this is a rich geological heritage and minerals production makes an important contribution to the Leicestershire economy. Whilst mineral working has an environmental impact, particularly the accumulative impact of igneous quarries on the Charnwood Forest, it is also true to say that it has made significant contributions to the creation of the National Forest and some 40% of the County's SSSIs are based on former mineral sites – this is partly indicative of the impoverished state of biodiversity in Leicestershire but also indicates the potential that sites have, once workings have finished, to contribute to Green Infrastructure and become positive social and environmental, as well as economic, assets.

Challenges and Issues

9.52 Whilst society and the economy continue to demand the products associated with mineral production in Leicestershire, we can expect to see a continued need for minerals working. In land-use planning terms, this will be much

easier to accommodate where it can be seen that public assets are being created through the early identification of appropriate after-uses for such sites.

Summary of Key Issues

Climate Change - Mitigation

9.53 Carbon emissions must be reduced by at least 80% by 2050 against 1990 levels. This requires per capita emissions to be reduced in Leicestershire from eight to two tonnes. This will be achieved by measures that:

- Reduce energy demand
- Deliver improved energy efficiency
- Switch power sources to renewable energy

9.54 Such responses should be supported, wherever possible, as they reduce costs, reduce waste and help to mitigate the impact of climate change.

9.55 There is an increasing need to accept that the design of how buildings and machines work in carbon terms will need to become relatively more important and that this will bring aesthetic design challenges for society:

9.56 There will be a range of business and education opportunities in delivering energy reduction, energy efficiency and renewable energy schemes, which may need seed corn funding.

Climate Change - Adaptation

9.57 There will need to be a Leicester Shire Climate Change Adaptation Strategy prepared and delivered to ensure the impacts of climate change are managed in an appropriate fashion.

9.58 The risk of flooding affecting homes and businesses is already a significant issue in the sub-region. Historically, this has been from rivers bursting their banks. Whilst this risk will increase with climate change, there is also likely to be increased surface-water flooding from the increased intensity of rainfall. Such flooding incidents are harder to forecast and can occur over a much wider area of the City and County.

Resource Efficiency

9.59 Programmes of support for resource efficiency improvements will be particularly beneficial in that savings generated go straight to the bottom line, reduce waste and reduce impact on the environment. They also reduce the regulatory burden on business that is otherwise expected to increase as the real costs of environmental services will be increasingly charged. Water resource management will become increasingly important due to potential drought from climate change and potential conflict over use of limited resources.

9.60 There will be potential for increased flooding due to extreme weather events compounded by climate change. These flooding events will be from rivers,

from surface water and from lack of capacity in the sewerage network to cope with such loading. There will be a need to ensure the public are aware of these risks and the measures available to cope in emergencies.

9.61 There is a need to tackle diffuse pollution as it affects our rivers and watercourses.

9.62 Programmes to tackle air quality issues in the designated Air Quality management areas in Leicester and Leicestershire will need to be enhanced through the next review of the Local Transport Plan. Programmes that increase support for sustainable transport will need further support.

9.63 Waste Management will be based on the following principles:

- working towards zero growth in waste by 2016
- reducing the amount of waste sent to landfill
- exceeding government targets for recycling and composting to continue to achieve levels of current best practice
- taking a flexible approach to other forms of waste recovery on the basis that technology in this area is developing very quickly

Green Infrastructure

9.64 There is a need to improve the quality and accessibility of some of the greenspace in and around Leicester. This would have multiple benefits for wellbeing, physical and mental health, biodiversity, air quality, flood management, climate change adaptation, and sustainable transport. Particular priority areas linked to Growth Point developments have been identified for:

- Soar Valley
- Charnwood Forest
- Burbage Common and Woods
- The countryside edge in and around Leicester and other urban areas

Environmental Services

9.65 In Leicester and Leicestershire, we can expect that issues relating to protection of the public good represented by ecosystem services to receive greater prominence through increased regulation, through measures designed to ensure that such services are not damaged and through additional work being undertaken to ensure that we understand ecosystem services better. This will be coupled by significant effort to ensure that individuals understand how they depend upon the natural environment. This is a critical issue as the absence of such understanding can inhibit meaningful decisions being made on behalf of society.

Biodiversity

9.66 Whilst biodiversity levels of both the County and City are comparatively weak and impoverished compared to other areas of the country, there are small pockets of significant interest. Leicestershire has suffered a significant loss of biodiversity over the last 50 years. It is therefore important to protect and

enhance the rich sites that remain. Elsewhere, programmes of nature conservation enhancement will be needed. Existing programmes will need continued support in the National Forest, Charnwood Forest, Leighfield Forest and in the Strategic River Corridors of the Soar, Trent and Welland and their tributaries.

9.67 Habitats that are beneficial for wildlife in the City include: small areas of woodland and wetland, meadows, pasture, hedgerows and spinneys, managed green spaces including parks and private gardens, allotments, cemeteries and school grounds. There are also more typical urban habitats, such as buildings and structures, disused railway land, road verges/banks, bare ground and disused or abandoned land. The River Soar and Canal Corridor is a very important natural feature in the City for wildlife.

Better Places

9.68 The quality of much recent development in Leicester and Leicestershire has been unacceptably poor (according to CABE). There is a pressing need to ensure the design quality of new development improves.

9.69 Our city and town centres are the focus of our communities. The distinctive identity of the historic environment helps to define the quality of these places. They have also undergone significant changes in function and form. In many instances these changes have meant that the 'heartbeat' of the centres has reduced. Programmes of action to ensure that employment, retail activity and sense of place are retained and developed are highly desirable.

9.70 Heritage sites around the City and County contribute significantly to employment, tourism and people's sense of place, quality of life and civic pride.

9.71 Environmentally-led regeneration through the National Forest initiative has demonstrated the success that focussed programmes of activity can achieve. Whilst such significant levels of landscape change are not required in much of Leicester and Leicestershire, where policies of protection of existing character are more appropriate, there are some areas where more focussed activity would be beneficial to fully realise their environmental and economic potential. As well as the City and Town Centres and the continuation of the National Forest project, these include:

- The River Soar corridor
- The Countryside in and around Leicester and other urban areas
- Charnwood Forest

Geology and Minerals

9.72 Leicestershire is very rich in minerals. The geology of Charnwood Forest is nationally important and the associated palaeontology (Charnia fossils) is internationally important as the first evidence of life in the fossil record. Mineral operators are significant employers and contributors to the local economy. However, the side effects of quarry operations can involve additional traffic, noise, dust and landscape change. Future mineral

operations need to work in ways which minimise deleterious impacts, and, when restored, maximise community and environmental benefits. As society and the economy continue to demand the products associated with mineral production in Leicestershire, we can expect to see a continued need for minerals working. In land use planning terms, this will be much easier to accommodate where it can be seen that public assets will be created through the early identification of appropriate “after uses” for such sites.

9 SWOT Environment

9.73 The preceding analysis has been summarised into the following SWOT framework.

Strengths	**Weaknesses**
• Pleasant and attractive environment • Developing National Forest with good access • Nationally important geological and biological resource of Charnwood Forest	• Relatively poor levels of biodiversity compared to other areas of the country • The quality of greenspace in and around Leicester varies and it is not evenly distributed. • Low quality of recent development
Opportunities	**Threats**
• Climate Change – Business opportunities in resource efficiency including: renewable energy generation; fitting energy efficiency measures to new and existing buildings and vehicles; water conservation; air quality; waste management reduction, reuse and recycling • Scale of mineral resource provides opportunities through planned restoration to provide improved biodiversity and Green Infrastructure. • Regeneration of city and town centres • Greater opportunities for partnership working on environmental imperatives • River Soar and the Grand Union Canal development potential	• Climate Change – general trend to drier hotter summers, wetter winters, more intense rainfall leading to increased flooding and an increased risk of more extreme weather events • Need to reduce per capita CO2 emissions to two tonnes by 2050 while still providing good quality of life for all • More expensive and regulated environmental services

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