ENVIRONMENTAL CAPACITY OF ST ALBANS CITY & DISTRICT: DEFINING A SUSTAINABLE LEVEL OF DEVELOPMENT

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St Albans
City & District Council

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This report has been reviewed by **Pooran Desai** OBE (see Appendix)

Contents

Executive Summary

This report has been commissioned by the Spatial Planning and Design team at St Albans City & District Council. It will form an important part of the Council's evidence base to shape and support local policy. The intention is to better understand the role and importance of undeveloped land in the district, in order to ascertain what a sustainable level of development, in terms of land use, might entail, including in relation to the justification for a locally derived housing target for the District.

This report has been produced with full consideration given to the National Planning Policy Framework (NPPF) and is fully consistent with its objectives and policies.

Much of the St Albans City and District consists of undeveloped land. 82% of the district is Metropolitan Greenbelt, which is largely farmland. As well as providing valuable green space for local people, the District continues to provide land that forms a component for the greenbelt that defines and encircles Greater London, land that is therefore of importance to the citizens of the whole London City-Region. There are also parks, other incidental open spaces, cemeteries and private gardens, which together constitute green infrastructure that permeates the urban areas.

The way in which people describe the functionality of land is changing. The UK Government has recently published the National Ecosystem Assessment (2011), which builds on work undertaken by the UN following the Convention on Biological Diversity (1995), which promotes an ecosystem approach to the integrated management of land, water and living resources. This approach recognises that land is multi-functional and provides us with a wide range of ecosystem services, providing us with food, clean air and water and other services which are essential for our existence. There are now efforts to integrate the ecosystem approach into the planning process. This new approach reinforces important and often long-standing environmental legislation and policy. Decision-making is also being improved through the valuation of ecosystem services, which increasingly involves the assignment of monetary value.

Before this work was undertaken, the Council had already identified problems with projected levels of growth. The Strategic Environmental Assessment of the Core Strategy undertaken in 2009 has identified potential impacts on biodiversity, water, soils and landscape, with increased energy use and increased transport thereby increasing greenhouse gas emissions and lowering air quality. There were also problems associated with a likely increase in water consumption.

Ecological footprinting is a way of quantifying human consumption of natural resources and relating this to land area. Global bio-capacity is currently estimated to be 2.1 ha. per person, however the average per capita ecological footprint of people living in the District is 5.85 ha. This means that the population of St Albans City and District currently requires an area of productive land 50 times the area of the District – a level of consumption that is clearly unsustainable. Most of the energy and resources that support the District come from further afield. Looking in more detail at the various ecosystem services provided within the District confirms that there is insufficient land and water to support current levels of consumption. There are positives however, with the existing green infrastructure able to provide accessible greenspace for most residents and to help to reduce the risk of flood and mitigate the impact of heat waves. The intensification of farming has reduced the ecological value of large parts of the District, however with the restoration of habitat, there is the potential to create ecological networks that will make the landscape more permeable to both wildlife and people. There is also the potential for a multi-functional approach to restoration, important given the problems, including drought and flood, which are predicted to become more frequent with climate change.

There is overwhelming quantitative evidence that the current level of urban development in St Albans is unsustainable and that further urban development will exacerbate problems with water supply and the challenges of biodiversity, landscape, soil and river catchment management and restoration, which are likely to become more difficult with climate change and increasing energy costs. A Compact City approach is likely to be most successful in preserving the District's valuable non-urban areas whilst meeting the needs of future generations.

1 INTRODUCTION & PURPOSE

1 Introduction & Purpose

1.1 This report has been commissioned by the Spatial Planning & Design Team of St Albans City & District Council and prepared by Gary Grant with assistance from Lani Leuthvilay. It has been reviewed by Pooran Desai OBE (see Appendix). The intention is to improve our understanding of the carrying capacity of the non-urban areas of the District in order to justify decisions on the scale of further development and to ascertain whether or not such development is sustainable and in the best long-term interests of people in the local area as well as the wider London metropolis. This document will form an important part of the Council's evidence base

1.2 The Council has recently reconsidered the balance between housing development and Green Belt protection. The previous housing target of 7,200 homes, to be provided between 2001-2021, is no longer a required local target. The Core Strategy Vision comes directly from the St Albans City & District Sustainable Community Strategy[1] and seeks to ensure that the District continues to flourish and maintaining its cherished and unique mix of city, towns and villages, its urban green infrastructure, rural Green Belt and its diverse heritage, while providing new opportunities to support the local economy and social development.

In the St Albans City & District Sustainable Community Strategy, emphasis is given to:

- protecting, proactively managing and enhancing the Green Belt
- delivering the necessary infrastructure to support any housing growth
- providing affordable housing and medium-sized family housing
- improving the District's schools, shops and community facilities
- reducing our carbon footprint, particularly by tackling traffic congestion

Figure 1.1 St Albans and London Context

1.3 The Council needs to consider the question: What is a sustainable level of development for the District? The East of England Plan contained a housing target for St Albans City & District of 360 dwellings per annum, plus the potential to accommodate growth from Dacorum Borough Council (Hemel Hempstead) and Welwyn Hatfield Borough Council (Hatfield) into St Albans District. However, St Albans City & District Council together with Hertfordshire County Council, successfully challenged the transfer of the Hemel Hempstead and Hatfield housing growth targets at the High Court.

1.4 The coalition Government has since outlined its intention to abolish Regional Spatial Strategies and give local planning authorities the power and responsibility to set their own local housing targets. The Government has indicated that its Strategic Environmental Assessment work on the revocation of the Regional Spatial Strategies will be complete in 2012.[2]

1.5 St Albans City & District Council is preparing to publish its pre-submission Core Strategy in 2012. It is important that the decisions made in the Core Strategy are justified by proportionate evidence (see National Planning

Policy Framework paragraph 182). The NPPF also states at paragraph 165 that "Planning policies and decisions should be based on up-to-date information about the natural environment and other characteristics of the area..." This report will form a very important part of the Council's evidence base, particularly with regard to understanding the environmental capacity of land within the District and taking the opportunity to determine a locally defined and sustainable level of development.

1.6 On 27 March 2012 the Government published its National Planning Policy Framework (NPPF). It has come into force as guidance for plan-making and decision making.[3] One main objective of the new guidance is that it will refocus planning policy so that it supports economic growth, with a 'presumption in favour of sustainable development' that will underpin all local plans and decisions, however it will give power to local people and end nationally imposed targets, for example on the development of brownfield land.

1.7 The NPPF (page 2) defines sustainable development using the broad principles provided by Resolution 42/187 of the United Nations General Assembly[4] and the UK Sustainable Development Strategy *Securing the Future*.[5] Resolution 42/187 defines sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. UK Sustainable Development Strategy provides five 'guiding principles' of sustainable development, namely: living within the planet's environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly.

1.8 Given the controversy over what is meant by sustainable development, the pivotal role that the concept appears to take in the NPPF and the uncertainty over what this will mean in practice,[6] it is therefore important that more is done to understand what sustainable development is and to make this as locally relevant as possible.

1.9 The definition of sustainable development in the NPPF is over 200 paragraphs long. There is clearly going to be much debate over how the various aspects of sustainable development – economy, society and environment should be weighted. The final NPPF is clearly more balanced in this regard than the draft version. However, given the pivotal role that the concept of sustainable development takes in the NPPF and the uncertainty over what this will mean in practice, it is therefore important that more is done to understand what sustainable development is and to make this as locally relevant as possible.

1.10 The UK Government's Chief Scientist, Professor Sir John Beddington, has warned of a 'perfect storm,' caused by food, water and energy shortages and climate change by 2030[7] and the UK Government's former Chief Scientist Professor Sir David King in a paper for Nature (co-authored with James Murray) has suggested that a flattening oil supply is fundamentally changing the energy market, with the world entering a new era of energy scarcity and high prices.[8] Global pressures are likely to bring about fundamental adjustments in the way that our cities and their rural hinterlands function. 'Business as usual' is no longer a credible approach.

1.11 This report represents an opportunity to pause and reconsider the conventional approach of incremental urban development, which we have seen in the last few decades as discussed in Chapter 2, which considers how the ecosystem approach may relate to planning. Chapter 3 considers the various environmental policies and regulations, which have been adopted as people have come to realise that current patterns of development and consumption cannot continue without severe consequences. After summarising the situation in St Albans City & District (Chapter 4), the report goes on to consider ecological footprinting and how factors like energy and resource scarcity may relate to land use in the District, including the limits to conventional growth which will be imposed by nature as interrelated planetary systems reach their operational limits (Chapter 5). The various ecosystem services that we depend on (including provisioning, regulating and cultural services) are described and these are then considered in turn as they relate to the District (Chapter 6, 7 and 8). Finally, in Chapter 9, the conclusion relates these considerations to what a sustainable level of development would entail in terms of land take.

ECOSYSTEM APPROACH & PLANNING 2

2 Ecosystem Approach & Planning

Ecosystem Approach

2.1 The Convention on Biological Diversity (CBD) (to which the UK is a signatory), adopted the Ecosystem Approach at Jakarta in 1995, and identified it as a fundamentally important concept for the integrated management of land, water and living resources.[1] The ecosystem approach has been defined as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific approaches to understanding how organisms interact with their environment, however it also recognises that humans, with their cultural diversity, are an integral component of ecosystems. An ecosystem is a natural unit of living things (animals, including humans; plants and micro-organisms) and their environment. These elements function together as an interdependent system – if one part is damaged, it can have an impact on the whole system. Ecosystems can be terrestrial or marine, inland or coastal, rural or urban.

2.2 The CBD has inspired various initiatives, for example National Biodiversity Strategies and Action Plans (the UK Biodiversity Action Plan in this country) however many of these programmes have yet to be fully integrated into policy and planning in a way that might be expected if the ecosystem approach were followed. In many cases programmes associated with the CBD have run in parallel with other more conventional processes.

2.3 The ecosystem approach has not been at the centre of traditional spatial planning, however spatial planning cannot deliver truly sustainable development without consideration of the natural processes that sustain us. Planning has tended to value landscapes as discrete aesthetic, cultural, economic and occasionally, habitat parcels, but has not always considered the interconnectedness of sites and ecosystem goods and services that those sites may provide in combination, as living landscapes. Although spatial planning has adapted to take account of new factors and goals and existing procedures have proven their value in resolving conflicts over land use, new approaches and methods will need to be developed to take account of ecological knowledge and imperatives.

2.4 Defra published 'Securing a healthy natural environment: An action plan for embedding an ecosystems approach'.[2] This document makes it clear that Government wishes to move towards putting the ecosystem approach at the heart of policy-making and decision-making. In terms of local policy making, Defra argues that embedding the principles of the ecosystem approach in the planning system will help with the achievement of sustainable development by:

- Ensuring that positive and negative impacts on ecosystems are considered
- Integrating environmental, social and economic objectives
- Making better information available to planners working in the decision-making process

2.5 Increasing ecological knowledge is being used to plan, design and manage land in a multi-functional way that provides a fuller range and depth of ecosystem services (see figure 2.1 overleaf). The conventional approach has been to maximise single outputs or functions and ignore important benefits which can be provided including the attenuation of flood waters and habitats for wildlife.

Ecosystem Services

2.6 Ecosystem services are provided by the natural environment. These benefits range from the indispensable, including clean air, water and food, to things that improve our quality of life, such as places for recreation. Natural processes, that are often taken for granted, also protect us from the extremes of climate, such as flooding. We are more likely to be exposed to disaster and disease when the natural environment is damaged.

2.7 The UN's Millennium Ecosystem Assessment (see Box 2.1 below), which was published in 2005 (followed by the UK National Ecosystem Assessment in 2011) has categorised ecosystem services as follows:

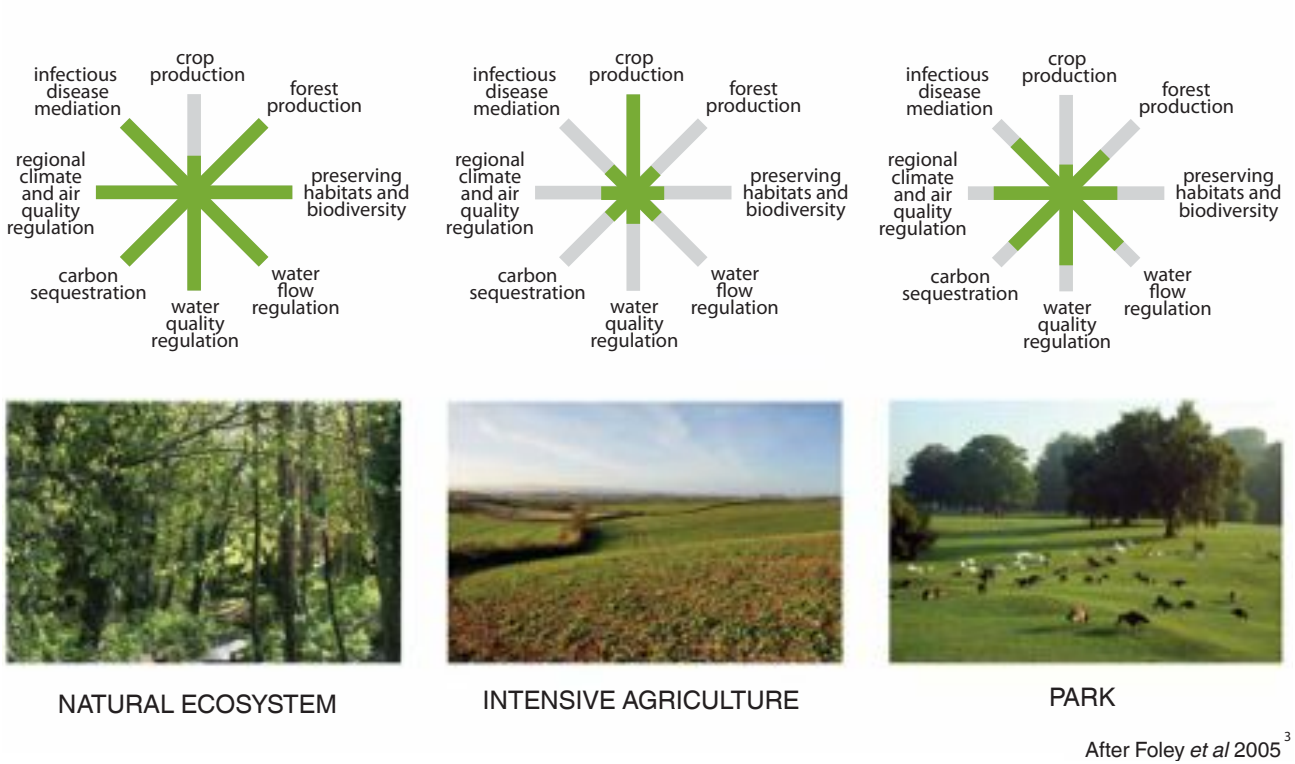
Provisioning services – products obtained from ecosystems, including fresh water, food, fibre (e.g. cotton), genetic resources, biochemicals, natural medicines and pharmaceuticals

Regulating services – benefits obtained from the regulation of natural processes, including air quality regulation, climate regulation, water/flood regulation, erosion regulation, water purification, disease and pest control, pollination, pollution absorption.

Cultural services – non-material benefits including spiritual enrichment, cognitive development, reflection, recreation and aesthetic enjoyment

Supporting services –necessary for the production of all other ecosystem services, including soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

Figure 2.1 Ecosystem Services in Different Landscapes



After Foley *et al* 2005[3]

Valuation

2.8 In an effort to ensure that the true value of ecosystem services is taken into account in policy decision-making and to quantify costs and benefits to the natural environment of activities, Defra has promoted methodologies that express Total Economic Values of ecosystem services in monetary terms, including both so called use and non-use (passive) values. Methods of monetarising ecosystem services include conventional pricing of extracted materials based on markets and more difficult valuation of indirect use of life supporting processes like nutrient cycling. It is also possible to put prices on ecosystem services that people have an option to use in the future or to ensure that the resource is there for others to use now or in the future. This approach is also designed to be compatible with well-established environment impact assessment methodologies.

2.9 Environmental economists have provided detailed calculations on the monetary value of various benefits of open space and green infrastructure. Since 2008, a consortium which includes Natural Economy Northwest, the Northern Way, Natural England, CABE, Design for London and Tees Valley Unlimited with support from the Department for Environment, Food and

Rural Affairs, the three Regional Development Agencies in the North of England, Advantage West Midlands and the London Development Agency has commissioned work by Genecon LLP to develop valuation tools for assessing the potential economic and wider returns from investment in green infrastructure and wider environmental improvements. This project has made available a toolkit for calculating the monetary value of ecosystem services.[4] Table 2.1 lists the various benefits for which monetary values have been calculated or for which work is currently underway. Further information on how environmental economists elicit monetary values of ecosystem services is also provided in the Defra guide[5] and the UK National Ecosystem Assessment.[6]

2.10 There are now many examples of calculations of monetary value for ecosystem services, with a few summarised here. Jacobs have estimated the total annual value of carbon sequestration by woodland in England as £998 million.[7] Assuming an average sequestration benefit of £771 per hectare, the total annual value of carbon sequestration for woodland in St Albans District, which total 1017 ha is £784,101. For valuation of sustainable urban drainage, some utility companies provide a discount where wastewater is not discharged of £35.33 per year for residential properties.[8] A study for DCLG[9] looking at the value of landscape and visual amenity (but excluding other benefits like climate control and water management has provided the following figures for various land uses:

- £54,000 per hectare per year for an urban park
- £2,700 per hectare per year for urban fringe forestry
- £889 per hectare per year for urban fringe - greenbelt.

Using the last figure, the greenbelt in St Albans District, which totals 13,217 hectares (82% of the district) has an annual minimum value of £11.75 million.

2.11 Although the detailed assignment of monetary value provides valuable information for decision makers or the development of a business case for projects, the assignment of monetary values to ecosystem services provided by land in St Albans City and District is outside of the scope of this study.

Figure 2.2 Ecosystem Services

Table 2.1 Valuation of Green Infrastruction		
Category	**Benefit**	**Monetary value calculation**
Energy & climate change	Shelter from wind	Reduced energy consumption in buildings
		Carbon emission reductions
		Reduced damage from storm
	Reduced urban heat island effect through shading and evapo-transpiration	Reduced peak summer surface temperatures
		Reduced energy consumption and carbon emissions for cooling
	Carbon sequestration and storage	Carbon sequestrated and stored in woodlands and other habitats
Water & flood management	Interception, storage and infiltration of rainwater	Reduced energy consumption and carbon emissions from reduction in storm water entering combined sewers
		Reduced sewerage costs
		Avoided costs of grey infrastructure
Place & community	Catalyst for local pride and activism	Willingness to pay for views
		Increase in participation and volunteering
Healthy & well-being	Opportunities to exercise	Reduction in health costs from exercise
		Reduction in mortality from exercise
	Green views/tranquility	Reduction in stress/ mental illness
	Healing time reduced	Reduction in costs of hospital stay
	Air pollutants removed	Reduced mortality from respiratory disease
		Avoided air pollution control measure costs

Table 2.1 (continued)		
Category	**Benefit**	**Monetary value calculation**
Land & property value	Increase in residential and commercial property values	Comparisons of property prices and rentals
Investment	Attractive setting for investment	Private sector investment attracted
		Jobs created
		Image enhancement
Labour	Reduction in absenteeism	Reduction in days lost
	Increased productivity	Increase in output per employee
	Attraction and retention of staff	Reduction in staff turnover
Tourism	Attractive natural environment	Spending by tourists
		Employment to support tourism
Leisure & recreation	Access to recreational sites and links	Recreational use by local people
Biodiversity	Protected and managed habitats	Public willingness to pay, pollination values.
Land	Food, timber, industrial crops	Conventional market value of products
	Land management	Employment in land management
Mobility & connectivity	Walking, cycling routes	Reduction in transport costs, time savings, health benefits (see above)
Education	Outdoor settings for education	Improvements in educational attainment

A DCLG study looking at the valuation of landscape and visual amenity has assigned a value of £889 per hectare per year for urban fringe. Pictured is Ellenbrook Fields.

Instead, where feasible, this study makes estimates of land take required to provide various ecosystem services for the people of the District – an approach more appropriate in terms of the spatial planning process and the imminent formation of the Strategic Local Plan (to calculate monetary values of all the ecosystem services in the District would require a longer term, more detailed study).

Uncertainty, Resilience and Climate Change

2.12 There is uncertainty surrounding the functioning of ecosystems. Even specialists are uncertain about what services are provided by certain ecosystems and how this may change over time. There are also major uncertainties associated with the way that ecosystems change, with easily predictable linear changes being replaced by previously unknown and sudden, irreversible, step changes which may occur once tipping points are reached. This means that a precautionary approach is advised, meaning that it may be wise to safeguard land and water from urban development, even when there is no evidence of an immediate threat of catastrophic change associated with land use change. The precautionary principle is especially important when considering the potential for local extinction of species or abrupt changes (like those associated with climate change) which may require extra resilience. The precautionary principle was part of the Rio Declaration made at the Earth Summit in 1992 and was expressed as follows:[10]

> 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'

2.13 What the precautionary principle means in practice, is that the burden of proof falls upon project proponents to demonstrate that the development or activity that they are planning will not be harmful. In addition, the planning authority may wish to anticipate problems and take steps to safeguard people and the environment before irreversible damage occurs.[11]

2.14 Climate change is believed to be one of the most serious threats to our environment and therefore our wellbeing. We need to mitigate those effects, through carbon sequestration and using biomass as fuel, but we also need to adapt to change. Climatologists are advising us that some level of climate change is inevitable, with predictions of hotter summers and drought, wetter winters and more storms. The ecosystems approach will be crucial to our response with green infrastructure helping to cool urban areas and deal with surface water flooding, increasing our resilience to what may be difficult changes.

2.15 As the cost of fuel and resources continue to rise, we will also be increasingly expecting more from our local environment. More food will be grown locally and ecosystems and the biodiversity that makes them work will be under more pressure than ever. That is why more effort will be needed to manage our environment using ecological knowledge and principles to ensure multiple benefits. An over-specialisation, whereby the zoning and management of land for one purpose, like recreational, food or fuel only, should be replaced by a new multi-functional approach that mimics nature.

Box 2.1 The UK National Ecosystem Assessment

The UK National Ecosystem Assessment (UK NEA) was the first analysis of the UK's natural environment in terms of the benefits it provides to society and our continuing economic prosperity. It shows in great detail what many of us already suspected – that we have under-valued our natural resources. The intention is for us to value the natural environment properly in order to promote better decision making, wiser investments, new avenues to wealth creation and jobs, and greater human well-being in the challenging times ahead. Part of the Living With Environmental Change (LWEC) initiative, the UK NEA continues work which was begun by the UN Millennium Ecosystem Assessment[12] at a national level. The UK NEA commenced in mid-2009 and published its findings in June 2011. It was an collaborative process involving many government, academic, NGO and private sector institutions and about 500 experts in the natural sciences, economics and the social sciences, under the chairmanship of Professor Robert Watson (Defra's Chief Scientific Advisor and Strategic Director of the Tyndall Centre at the University of East Anglia) and Professor Steve Albon of the James Hutton Institute (formerly the Macaulay Land Use Research Institute).

The Key Messages of the UK National Ecosystem Assessment are as follows:

The natural world's biodiversity and ecosystems underpin our very existence, but are consistently undervalued in conventional economic analyses and decision-making. We depend on ecosystems and the services they deliver to produce our food, regulate water supplies and climate, and breakdown waste products. We also value them for the pleasure and recreational opportunities they bring and the positive impact that nature has on long-term health and happiness.

Ecosystems and ecosystem services, and the ways people benefit from them, have changed markedly in the past 60 years. During the 20th Century, the UK's population grew substantially, living standards increased and technology and globalisation changed patterns of behaviour and consumption. The production of food from agriculture increased, but many other ecosystem services, particularly those related to air, water and soil quality, declined.

The UK's ecosystems are currently delivering some services well, but others are in long-term decline. Many broad terrestrial and aquatic habitat types have been degraded and marine fisheries, wild species diversity and some of the services provided by soils are in decline. Reductions in ecosystem services are associated with declines in habitat extent or condition and changes in biodiversity, although the exact relationship between biodiversity and the ecosystem services it underpins is still incompletely understood.

The UK population is predicted to grow (by 10 million in the next 20 years) increasing pressures on ecosystem services in a future where climate change will have an increasing impact, with more frequent severe weather events and changing rainfall patterns, with implications for agriculture, flood control and many other services. Increasing food production while decreasing the environmental footprint will present a tough challenge.

Decisions and actions undertaken now will have consequences far into the future for ecosystems, ecosystem services and human well-being. Therefore it is important that these are understood. Using economic and participatory techniques it is possible to estimate values for a wide range of ecosystem services, however it is important that we are not guided by market prices alone, because we may miss opportunities to enhance in ecosystem services and improve well-being. Recognising the value of ecosystem services would allow the UK to move towards a more sustainable future, in which the benefits of ecosystem services are better realised and more equitably distributed.

A move to sustainable development will require an appropriate mixture of regulations, technology, financial investment and education, as well as changes in behaviour and adoption of an integrated, rather than conventional sectoral, approach to ecosystem management. This will need the involvement of government, the private sector, voluntary organisations and civil society at large in collaborative dialogues that are open and transparent and allow any necessary trade-offs to be understood and agreed when making decisions.

For further information see http://uknea.unep-wcmc.org/

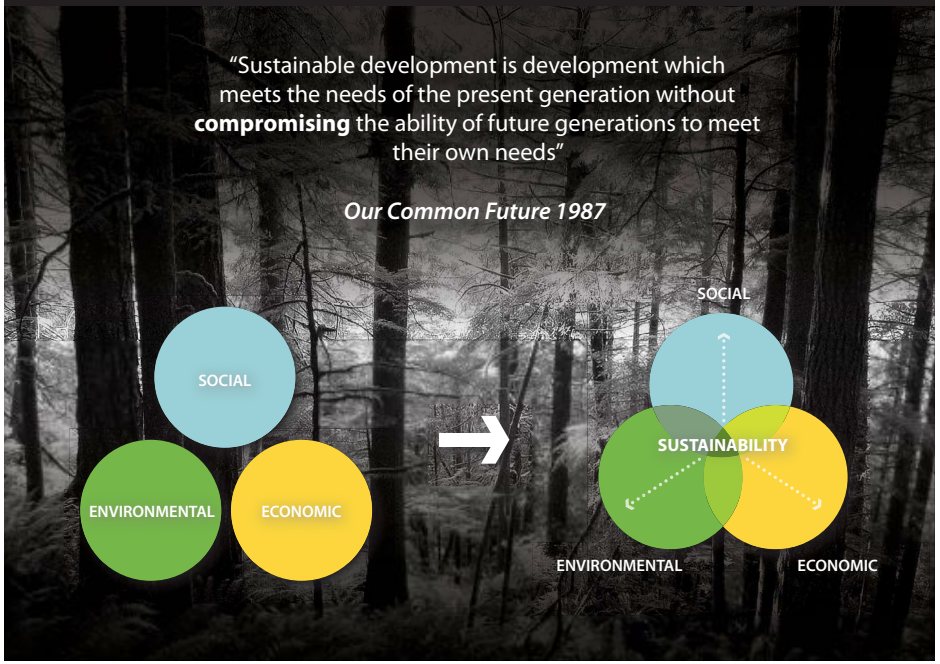
3 ENVIRONMENTAL POLICY & REGULATION IN ST ALBANS DISTRICT

3 Environmental Policy & Regulation in St Albans District

3.1 In 1983, the Secretary General of the United Nations asked the Prime Minister of Norway, Gro Harlem Brundtland, to create a new organisation independent of the UN to focus on environmental and developmental problems and solutions. This new organisation was named the World Commission on Environment and Development – more informally known as the Brundtland Commission. In 1987, the Brundtland Commission published the *Our Common Future*[1] which defined sustainable development and paved the way for the Earth Summit in Rio de Janeiro, Brazil in 1992 and the third UN Conference on Environment and Development in Johannesburg, South Africa in 2002. The Rio meeting spawned a comprehensive plan, known as Agenda 21 which required actions to be taken globally, nationally, and locally. Local authorities, including St Albans City and District implemented their own Agenda 21 programme during the 1990s.

3.2 The Brundtland definition of sustainable development includes three pillars: economic growth, environmental protection and social equality. It is argued that all three considerations must be addressed for sustainable development to be possible, however there is evidence that globally, the overwhelming majority of administrations put economic growth on the forefront of their efforts and neglect environmental protection and social equality. The major problem with economic growth is that it has been achieved through an over-reliance on resource extraction, which leads to environmental damage. The Brundtland Commission has sought to emphasise the need for economic activity that does not rely on resource extraction, with some success, however the total worldwide consumption of resources continues to increase. Great progress has been made in environmental protection, with all signatory nations promulgating environmental legislation and private sector investment in green technologies, including renewable energy, water conservation, smart grids, energy efficient lighting and appliances has grown rapidly during the past two decades. The social equality pillar of sustainable development focuses on social well-being. A growing gap between rich and poor is evident throughout the world. The richest 1% of the world's population own 40% of the wealth and the poorest 50% own around 1% of the world's wealth. On the positive side, there has been a reduction in the number of people living in extreme poverty – something that has been attributed to economic growth in China and India.

Figure 3.1 Brundtland's Vision of Sustainable Development



3.3 The United Nations Conference on Environment and Development (UNCED), also known as the Rio Summit or Earth Summit was a major United Nations conference held in Rio de Janeiro in 1992. The meeting scrutinised the production of toxic pollutants (eg lead in petrol), promoted alternative sources

of energy to replace fossil fuels, which are linked to global climate change, looked at reduction in vehicle emissions, city smog and water scarcity. The Convention on Biological Diversity (CBD) and the Framework Convention on Climate Change (UNFCC) were opened for signature and three documents were issued, namely the *Rio Declaration on Environment and Development, Agenda 21* and *Forest Principles*.

3.4 The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCC). It was adopted in Kyoto, Japan, in 1997 and entered into force in 2005.[2] The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialised countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. The major distinction between the Protocol and the Convention is that while the Convention encouraged industrialised countries to stabilize GHG emissions, the Protocol commits them to do so. The 18th session of the Conference of the Parties (COP18) to the UNFCCC and the 8th session of the Conference of the Parties (CMP8) serving as the Meeting of the Parties to the Kyoto Protocol will take place in December 2012 in Doha, Qatar.

3.5 Mirroring the UK Government's commitment to tackling climate change, St Albans City & District signed the Nottingham Declaration on Climate Change, a national pledge to systematically tackle climate change both within the Council and across the District.[3] As a signatory to this pledge, the Council set itself a target of a 3% year on year reduction in carbon dioxide emissions along with a plan of action to achieve it. Examples of projects that have been completed as part of the Council's programme of action, include energy audits of Council owned premises, the installation of solar photovoltaic panels at the Civic Centre, installation of energy-efficient boilers in the Council's offices and insulation of council-owned residential properties. Between 2008/09 and 2010/11 the Council saved 97 MWh of electricity - equivalent to 47 tonnes of CO_2 and bringing savings of £11,000.

3.6 In 2007, the Council took part in the Carbon Trust Local Authority Carbon Management Programme to tackle its own emissions. Through this specialist programme of support and consultancy the Council was able to develop a Carbon Management Strategy and Implementation Plan.[4] This plan is predicted to reduce CO_2 emissions by 25% by 2013 (from a baseline year of 2006/07) and save around £1.16 million. In 2009, the Council won a place on the Energy Saving Trust's support programme for local authorities. Two years of training and support will continue to help the Council to reduce carbon emissions across the whole District. This will culminate in the production of a Climate Change Strategy for St Albans.

3.7 The Convention on Biological Diversity (CBD), was opened for signature at the Rio Summit in 1992 and came into effect in 1993.[5] The Convention aims to conserve biological diversity (biodiversity, sustainable use of biodiversity and fair and equitable sharing of benefits arising from genetic resources. It is seen as the key document regarding sustainable development. 2010 was the International Year of Biodiversity marking the 10th Conference of Parties

The Water Framework Directive requires river basin management plans and strict enforcement of water quality standards.

(COP10) to CBD in Nagoya, Japan. In 2010, the UN declared the period from 2011 to 2020 as the UN Decade of Biodiversity.

3.8 The UK Government responded to the call in the CBD for the production of Biodiversity Strategies and Action Plans through the UK Biodiversity Action Plan,[6] which cascaded down into a series of habitat action plans, species action plans and local action plan (LBAPs). St Albans District as part of Hertfordshire, has its own LBAP[7] which has identified key sites and priority habitat and species for conservation action (see also 7 Biodiversity).

3.9 The European Union (EU) is active in sustainable development and environmental protection, both at the international level and through its member states. The Habitat Directive (92/43/EEC of 1992 on the conservation of natural habitats and of wild fauna and flora) has established a network of protected sites (Natura 2000 or European Sites) throughout Europe. These include Special Areas for Conservation (SACs) designated under the Habitat Directive and Special Protection Areas (SPAs) designated under the Wild Birds Directive (2009/147/EC on the conservation of wild birds 2009). St Albans City & District has no European Sites, however there are European Protected Species, listed under the Habitat Directive which occur within the District.[8] Examples include all species of bat and the great crested newt.

3.10 A key piece of EU legislation relating to the protection and management of water is the Water Framework Directive (2000/60/EC of the European Parliament and of the Council of 2000 establishing a framework for Community action in the field of water policy). This Framework-Directive, which came into force in 2003 in the UK, aims to prevent and reduce pollution, promote sustainable water usage and environmental protection, improve aquatic ecosystems and mitigate the effects of floods and droughts. Its ultimate objective is to achieve "good ecological and chemical status" for all Community waters by 2015.[9] The Flood & Water Management Act (2010) requires local authorities to prepare surface water management plans and to promote and adopt sustainable drainage systems (SuDS).[10]

3.11 The EU has also set upper limits for atmospheric pollutants (Directive 2001/81/EC of the European Parliament and of the Council of 23 October

There are locations in busy, narrow, city centre streets where air pollutants exceed standards.

2001 on national emission ceilings for certain atmospheric pollutants). The Directive covers emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia. The Environment Act 1995 requires local authorities to review and assess air quality. Where exceedences are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an action plan. Air quality in the District generally meets targets, however there are currently 3 AQMAs at busy roads in St Albans City & District , all of which exhibit mean NO_2 concentrations which have exceeded target levels. Monitoring of NO_2 throughout the district is done by means of diffusion tubes at 37 sites, mostly within the City of St Albans.[11]

3.12 Waste is addressed by EU Directive 2008/98/EC. This legislation promotes a hierarchy in order of priority as follows: prevention; preparing for reuse;

recycling; other recovery, notably energy recovery and disposal. Recognising that the UK consumes resources at an unsustainable rate and generates 280 million tonnes of waste each year, the Government has recently issued the findings of a review of waste policy (June 2011).[12] Measures considered include waste prevention, voluntary schemes for the hospitality, direct mail, textile and construction waste sectors, encouraging councils to sign new Recycling and Waste Services commitments, recovery targets for packaging and landfill restrictions for wood waste and other materials.

3.13 The EU is developing a strategy for the conservation of soil, with a proposal for a Soil Directive, which will introduce measures to protect soil and to preserve its capacity to perform its functions in environmental, economic, social and cultural terms. The strategy includes setting up a legislative framework for the protection and sustainable use of soil, integrating soil protection into national and EU policies, improving knowledge in this area and increasing public awareness. It will identify problems, prevent soil degradation and remediate polluted or degraded soil, with measures tailored to local needs.[13]

3.14 The EU requires Strategic Environmental Assessment (SEA) under Directive 2001/42/EC.[14] In England, Strategic Environmental Impact Assessment (SEA) is usually carried out as part of a Sustainability Appraisal. The UK's strategy for sustainable development,[15] defines sustainable development in terms of four objectives:

- social progress which recognises the needs of everyone
- effective protection of the environment
- prudent use of natural resources
- maintenance of high and stable levels of economic growth and employment.

These headline objectives are usually applied to districts in order to asses the impact of the plan or program.

3.15 St Albans City & District commissioned a Sustainability Appraisal (incorporating a SEA) of its Emerging Core Strategy which was published in 2009.[16] The appraisal considers the various Strategic Objectives in the Core Strategy against a wide range of sustainable development criteria including biodiversity conservation, water quality, flood risk, soils, air quality, greenhouse gases, health, equity and other quality of life factors. The major challenges identified relate to policies SO6 and SO7.

3.16 Policy SO6 is: *Provide more affordable homes and support a diverse housing market which provides access to good quality housing for all the district's residents*. This strategic objective was identified as being incompatible with the objectives for biodiversity, water, soils, landscape, greenhouse gas emissions and air quality. Housing development is likely to lead to increased energy use and increased transport thereby increasing greenhouse gas emissions and other pollutants to air. Housing development is also incompatible with water as it is likely to increase water consumption. Housing development on greenfield land is incompatible biodiversity, landscape and soils. There is also potential for flood risk at one potential strategic housing site and also potential for impacts on historic assets depending on the location and design of the housing developments.

3.17 Policy SO7 is: *Support for a sustainable, prosperous and diverse economy and build the district's economic competiveness by responding positively to economic change*. This strategic objective was identified as being incompatible with the objectives for biodiversity, soils, landscape, greenhouse gas emissions and air quality. Economic development is likely to lead to increased energy use and increased demand for transport thereby increasing greenhouse gas emissions and other pollutants to air. Employment development on greenfield land is incompatible with biodiversity, landscape and soils. Several uncertainties were also identified, for example there is potential for flood risk and impacts on historic assets depending on the location and design of the employment developments.

3.18 A further Sustainability Appraisal (incorporating a SEA) Working Note was published alongside the Council's Core Strategy consultation on the Strategy for Locating Future Development in the District, in December 2010. The Working Note considered the sustainability implications of a reduction in the Council's housing target from 360 dwellings per annum to a proposed new target of 250.

3.19 With regard to environmental considerations the SA Working Note stated that:

> "The lower levels of growth now proposed will mean that there will be less pressure on greenfield sites in the Green Belt as much of the development will be provided in urban brownfield sites. This will have positive effects in terms of reducing impacts on biodiversity, protecting local landscapes, avoiding the reduction of gaps between settlements, and resulting in lower levels of soil loss. The lower growth will also mean that there will also be less pressure on transport infrastructure which will help to avoid increases in greenhouse gas emissions as well as resulting in lower levels of any increase in air pollution from vehicles" (p.6)

3.20 The SA Working Note does also state that the reduction in the quantum and scale of development could reduce the environmental benefits given through green infrastructure and landscape enhancements. But with the forthcoming introduction of Community Infrastructure Levy the impact of this is likely to be reduced.

ST ALBANS CITY & DISTRICT IN BRIEF 4

4 St Albans City & District in Brief

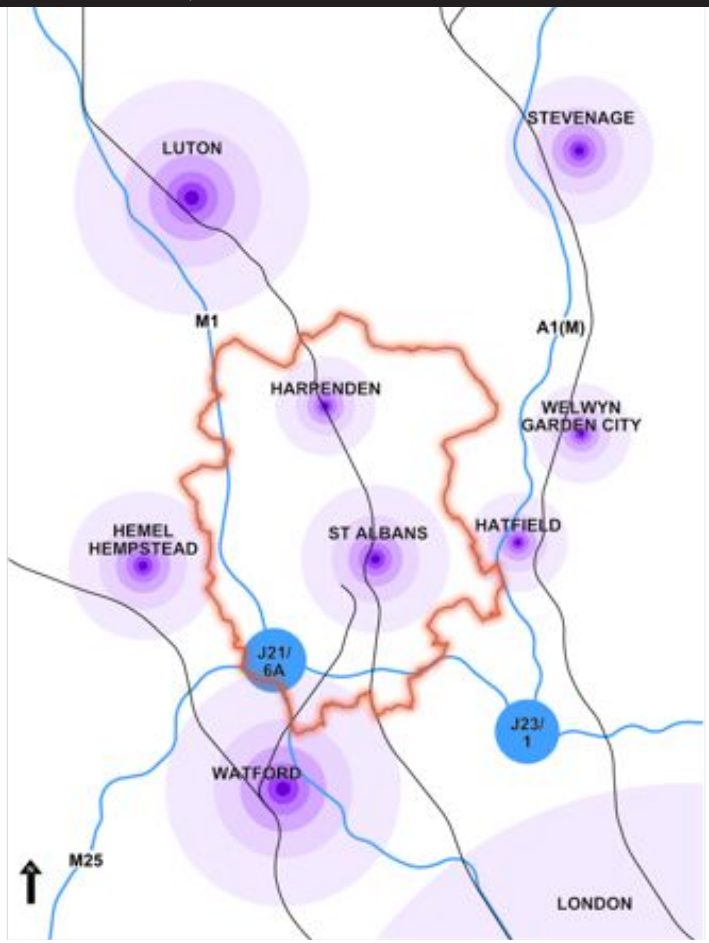
4.1 St Albans City & District is located within the county of Hertfordshire just north of London. It is a largely rural District with a network of settlements linked by generally good strategic transport connections, and poorer local ones. The District has a rich heritage, a strong local character, good local services and delivers a good quality of life. Consequently it has high property values and strong development pressure.

4.2 The District is close to the A1(M) to the east, and the M1 runs north-south close to the western boundary. The M25 London orbital motorway runs through the southern part of the District. St Albans is on the Thameslink-main-line railway connecting Bedford with Brighton, providing links with Luton Airport, Gatwick Airport, London St Pancras and the City of London. There is also a rail link to London Euston via Watford Junction.

4.3 The main settlements in the District are St Albans City and Harpenden. The population of St Albans is 64,000 and Harpenden 27,600, with the population of the District currently estimated to be 138,800.[1] Substantial settlements occur close to the District, including Hatfield to the east, Watford to the south, Hemel Hempstead to the west and, further afield, Luton, to the north. The District has lower than national average unemployment and higher than average levels of education, with more than 35% of the population educated to degree level – one of the highest rates in the country. The majority of property in the area is owner-occupied.

4.4 Approximately 20% of local residents travel to work in London to work in service industries. The local economy is made up of employment in research and development, office (including headquarters and financial and business services industries) and retail sector. Major local employers include the Building Research Establishment (BRE), AECOM, Premier Foods, Rothamsted Research, Deloitte, PricewaterhouseCoopers and KPMG, amongst others. Approximately 50% of residents work locally. A large proportion of businesses are small, including freelance and consultancy. St Albans City is a destination for tourists and shoppers.[2]

Figure 4.1 St Albans City & District Context



4.5 The underlying solid geology of the District is the Upper Chalk of the Cretaceous and in the south the Reading Beds, a mixture of sands and clays.

Figure 4.2 St Albans City & District Transportation

Table 4.1 Rothamsted Climate Data[4]

	Max Temp	Min Temp	Rainfall	Days of Rainfall ≥ 1mm
Month	°C	°C	mm	days
Jan	6.3	0.9	69.5	12.2
Feb	6.7	0.7	47.3	9.2
Mar	9.5	2.3	54.0	11.3
Apr	11.9	3.6	53.1	10.0
May	15.7	6.3	49.8	9.1
Jun	18.6	9.2	60.4	8.9
Jul	21.4	11.4	41.2	6.8
Aug	21.4	11.4	53.6	7.9
Sep	18.0	9.5	60.9	8.9
Oct	13.8	6.7	74.4	10.5
Nov	9.4	3.3	66.0	10.9
Dec	7.2	1.9	67.6	11.5
Year	13.4	5.6	697.8	117.2

Superficial more recent Quaternary deposits are more variable and formed by glaciation and the Thames, when it flowed through the Vale of St Albans. These deposits are largely clays and gravels.[3]

4.6 The Met Office publishes climate data for Rothamsted, which is in the north of the District.[4] Average annual rainfall is 697.8mm, with rain falling throughout the year. Winters are usually mild with temperatures usually remaining above freezing. Summer maximum temperatures are usually a comfortable 21C. Climate change is predicted to bring wetter winters and hotter summers, with droughts more likely. Weather is expected to become stormier, with sudden downpours and localised surface water flooding occurring more frequently than at present.

4.7 The River Lea flows across the north of the District from Luton in the north,

at 140m AOD, in a south-easterly direction past Harpenden and Wheathampsted before leaving the District near Hatfield. In St Albans District the Lea is a small watercourse and the floodplain is not extensive. The River Ver enters the District near Redbourn at 130m AOD and flows through St Albans before joining the River Colne at Bricket Wood. The River Ver is a chalk stream which has been canalised in the Verulamium Park section.[5] It is vulnerable to over abstraction and upper sections have dried up on occasion in recent years. The floodplains of the Ver and Colne are not extensive, however there are several areas in the south of the District where dwellings and infrastructure are at risk from fluvial and some very localised groundwater flooding.

4.8 The agricultural land of the District is dominated by arable fields, with occasional fields of improved grassland and scattered woodlands. Wetlands, heathlands, species-rich grasslands and ancient hedgerows do occur, but have declined in line with national trends as the result of changes in farming practices. The countryside in the north of the District is relatively untouched by development, however the southern section is more affected by major roads, including the M25, quarrying, some industrial development and a more dispersed pattern of development.

4.9 Key areas for biodiversity in St Albans District, as defined in the Biodiversity Action Plan for Hertfordshire[6] are:

- **Upper Colne Valley** (wetlands and heath) – most of this area is within Hertsmere DC
- **Bricket Wood/Moor Mill** (wetlands, woodlands and heath)
- **River Ver/Gorehambury** (wetlands and woodlands)
- **Upper Lea Valley** (wetlands, woodlands and heath)

4.10 Green Belts were first devised in the 1930s. The first Green Belt around London was proposed by the Greater London Regional Planning Committee in 1935. The 1947 Town and Country Planning Act included a provision for local authorities to incorporate Green Belts in their first development plans. The concept moved beyond London in 1955 with the promulgation of a circular, which invited other local planning authorities to consider the establishment of Green Belts. The idea spread both within the UK and overseas. Nowadays Green Belts approved through structure plans cover approximately 1,556,000 hectares, which is about 12 per cent of England. Across England here are 14 separate Green Belts, varying in size from 486,000 hectares around Greater London to 700 hectares at Burton-on-Trent.

Figure 4.3 St Albans District & the Metropolitan Green Belt

4.11 The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the essential characteristics of Green Belts are their openness and their permanence (National Planning Policy Framework paragraph 79). As well as this fundamental aim, the Government has identified five purposes of Green Belt:

- to check the unrestricted sprawl of large built-up areas;
- to prevent neighbouring towns merging into one another;
- to assist in safeguarding the countryside from encroachment;
- to preserve the setting and special character of historic towns; and
- to assist in urban regeneration, by encouraging the recycling of derelict and other urban land.

The NPPF goes on to explain that, once Green Belts have been defined, local planning authorities should plan positively to enhance the beneficial use of the Green Belt, such as looking for opportunities to provide access; to provide opportunities for outdoor sport and recreation; to retain and enhance landscapes; visual amenity and biodiversity; or to improve damaged and derelict land (paragraph 81).

4.12 The District is located within the Metropolitan Green Belt, which was devised in the 1930s to limit urban sprawl around Greater London. Therefore the countryside around St Albans District has a regional role as well as great importance to the District itself. Approximately 82% of the District is designated Green Belt and a number of the larger settlements excluded. The Green Belt in St Albans City & District is generally synonymous with the countryside (as the Green Belt generally covers everywhere which is not urban).[7]

4.13 St Albans City & District's Green Belt and other incidental non-urban areas are particularly valued locally, as has been evidenced through previous consultations on the Core Strategy (2006, 2007, 2009, and 2010).[8] This land is vitally important in fulfilling the purposes of the Green Belt and the fundamental aim of maintaining openness - within an increasingly congested and development pressurised area.[9] In addition, this land has a critical role in helping to ensure a sustainable balance in the District and the wider sub region.

Figure 4.4 St Albans City & District Green Belt

5 ECOLOGICAL FOOTPRINT OF ST ALBANS CITY & DISTRICT

5 Ecological Footprint of St Albans City & District

5.1 Ecological Footprint is a concept developed by Wackernagel and Rees in the early 1990s and described in their book *Our Ecological Footprint*, which was published in 1996.[1] The idea of ecological footprinting is to quantify human consumption of natural resources and services (including waste absorption) in terms of biologically productive areas of land and water, so that we can compare our actual consumption with the biosphere's ability to provide these goods and services. Ecological footprint analysis can be used to characterise and measure the sustainability of lifestyles, particular activities or processes.

5.2 Footprint values are comprised of various categories, including energy, food, building materials, water and space for waste disposal and living, amongst others. There have been controversies over the years, with disagreements over how to account for fossil fuels and nuclear power and how space for biodiversity needs to be allowed for. It is outside of the scope of this report to explain in detail how footprints are calculated or to debate differences in approach, however a wide consensus regarding methodology has been reached and since 2006 there have been published standards for the calculation of ecological footprint.[2] According to the standardised methodology, ecological footprint is reported as global hectares per capita (gha).

5.3 In 2010, a sustainable level of per capita utilisation of the earth's 13.6 billion hectares of biologically productive land and water has been calculated to be 2.1 gha by Rees.[3] In the same document, the world average per capita footprint was estimated to be 2.7 gha, which means that civilisation has exceeded the earth's carrying capacity and that we are using up natural capital – a concept often described as 'overshoot'. Although global per capita footprint is calculated to be 2.7 gha figures for developing countries and more specifically, Hertfordshire and St Albans, are much higher than this. Table 5.1summarises various published figures for ecological footprints.

Table 5.1 Various Ecological Footprints

Study	Per Capita Ecological Footprint Global Hectares (gha)
Global Bio-capacity[3]	2.1
Global Average (2010)[3]	2.7
US[4]	9.4
China	2.1
UK	5.3
Hertfordshire[5]	5.5
St Albans[4]	5.85
Findhorn Eco-village (Low UK)[6]	2.71

Table 5.2 St Albans District and UK Ecological Footprints

In gha/person	UK	St Albans
Government	0.41	0.41
Capital Investment	0.74	0.76
Holiday Activities	0.12	0.14
Services	0.32	0.38
Consumable	0.65	0.62
Housing	0.18	0.15
Travel	0.72	1.15
Energy	0.9	0.95
Food and Drink	1.34	1.3

Box 5.1 Nine Planetary Boundaries

Johan Rockström and his colleagues at the Stockholm Resilience Centre have identified nine planetary systems that are essential for maintaining the biosphere in a state comparable to the stable pre-industrial condition. Our current reliance on fossil fuels and industrialised agriculture is undermining these systems. Rockström and his colleagues have proposed threshold levels for each of these systems, above which abrupt and potentially disastrous changes could occur.

The table lists the planetary systems and the boundaries under consideration. Three of the parameters or boundaries have already been breached, namely Biodiversity Loss, Climate Change and Nitrogen (the amount of nitrogen removed from the atmosphere for human use).

Biodiversity loss is measured in terms of extinction rates. Extinction of species is a natural process - the fossil record shows that the background extinction rate for marine life is 0.1–1 extinctions per million species per year and for mammals it is between 0.2–0.5 extinctions per million species per year. Today, the rate of extinction of species is estimated to be 100 to 1,000 times more than this. Human activities, including land use changes and the introduction of alien species, are causing this. Biodiversity losses can have profound effects on how the biosphere functions, with ecosystems interacting with several other planetary boundaries. Loss of biodiversity can cause ecosystems to tip into undesirable states when they are disturbed and ecosystems that depend on single species for critical functions (keystone species) are more vulnerable to disturbances, such as disease, and at a greater risk of tipping into undesirable states.

The Nitrogen and Phosphorous Cycles have been seriously altered by the manufacture of fertiliser and the cultivation of legumes (nitrogen fixing plants). Humans convert around 120 million tonnes of N_2 from the atmosphere per year into reactive forms. Much of this ends up in the wider environment through run-off, polluting waterways and coastal water, reducing biodiversity and creating greenhouse gases like nitrous oxide.

Human induced climate change is caused largely by the burning of fossil fuels. International negotiations to limit the production of greenhouse gases are working towards limits that will contain rises in global temperatures to no more than 2 °C above pre-industrial levels, which would require atmospheric CO_2 levels to be maintained below 350 parts per million by volume (PPM). Current levels are 387 ppm. The reasons for wishing to maintain global temperature changes below 2 °C include fears over the possibility of an acceleration in the rate of change caused through positive feedback processes if large scale losses of vegetation, soils and ice caps occur.

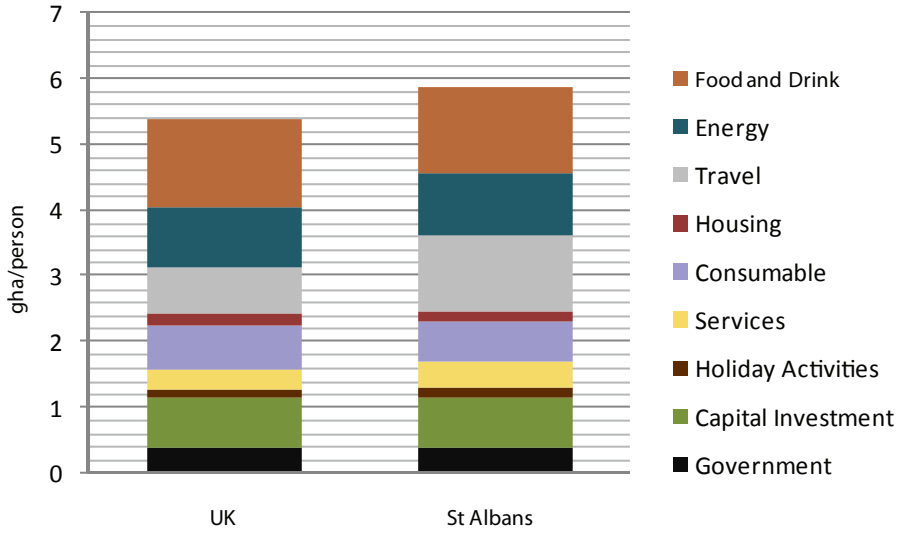
Earth-system process	Parameters	Proposed boundary	Current status	Pre-industrial value
Climate change	(i) Atmospheric carbon dioxide concentration (parts per million by volume)	350	387	280
	(ii) Change in radiative forcing (watts per metre squared)	1	1.5	0
Rate of biodiversity loss	Extinction rate (number of species per million species per year)	10	>100	0.1–1
Nitrogen cycle (part of a boundary with the phosphorus cycle)	Amount of N_2 removed from the atmosphere for human use (millions of tonnes per year)	35	121	0
Phosphorus cycle (part of a boundary with the nitrogen cycle)	Quantity of P flowing into the oceans (millions of tonnes per year)	11	8.5–9.5	~1
Stratospheric ozone depletion	Concentration of ozone (Dobson unit)	276	283	290
Ocean acidification	Global mean saturation state of aragonite in surface sea water	2.75	2.90	3.44
Global freshwater use	Consumption of freshwater by humans (km^3 per year)	4,000	2,600	415
Change in land use	Percentage of global land cover converted to cropland	15	11.7	Low
Atmospheric aerosol loading	Overall particulate concentration in the atmosphere, on a regional basis	To be determined		
Chemical pollution	For example, organic pollutants, plastics, endocrine disrupters, heavy metals and nuclear waste	To be determined		

Red shaded areas are for those planetary systems where boundaries have already been exceeded .

The people of St. Albans City & District contribute towards the most severe of these global problems, climate change, through activities like domestic heating and lighting and the use of motor vehicles, that result in the release of carbon dioxide into the atmosphere. Agriculture in the District is also responsible for the use of substantial quantities of nitrogen fertilisers, some of which run-off into watercourses. Biodiversity losses have probably stabilised locally, however the issue continues to be a concern because agricultural practices are subject to change.

For further information see http://www.stockholmresilience.org/research/researchnews/tippingtowardstheunknown/thenineplanetaryboundaries.4.1fe8f33123572b59ab80007039.html

Figure 5.1 St Albans District and UK Ecological Footprints Comparison



5.4 Figure 5.1 shows that the per capita ecological footprint of people in St Albans is higher than the UK average. The higher than average footprint is attributed to high car use and high household energy consumption, especially for heating.[4]

5.5 Table 5.2 shows how the ecological footprint of St Albans is broken down. A particular concern is the high car use, which is 60% higher than the national average. St Albans has a better than average record of recycling.[5]

5.6 Taking the population of St Albans City and District (138,800)[7] and multiplying this by the per-capita ecological footprint of the area (5.85) gives an estimate of the biologically productive land required to support the District, that is 811,980 hectares (8119.8 km^2). This is an area approximately equivalent to Hertfordshire, Bedfordshire, Buckinghamshire and Essex combined - or fifty times the area of the District of St Albans (161.18 km^2). Allowing for the food component alone (1.3 gha) would require 180,440 hectares (1804.4 km^2) – an area 11 times the size of the District. Figure 5.2 illustrates this, with the District of St Albans compared to Hertfordshire, Bedfordshire, Buckinghamshire and Essex combined.

5.7 Clearly the current patterns of consumption being observed in St Albans City and District, cannot be supported by the land within the District. The lifestyle enjoyed by most people in the District is only possible because of imported (from outside the District) fossil fuels, food, water and materials. Indeed most of the energy and resources come from outside of the country.

5.8 Whilst trade is an essential activity, it is likely that, in the future, as energy and resource scarcity continues to increase through global population growth and increases in living standards in developing countries, consumption patterns at home will be affected by cost increases. Land within the District will become ever more important, with people increasingly reliant on ecosystem goods and services provided closer to home.

5.9 It is essential that land is conserved and it is likely that concern over the impacts of changes in land use (whether classified as permitted development or not) will grow. The following sections of this report consider various categories of ecosystem goods and services as they relate to the District.

Figure 5.2 St Albans Ecological Footprint

Taking the population of St Albans City and District (138,800)[7] and multiplying this by the per-capita ecological footprint of the area (5.85) gives an estimate of the biologically productive land required to support the District, that is 811,980 hectares (8119.8 km^2).

This is an area approximately equivalent to Hertfordshire, Bedfordshire, Buckinghamshire and Essex combined - or fifty times the area of the District of St Albans (161.18 km^2).

Allowing for the food component alone (1.3 gha) would require 180,440 hectares (1804.4 km^2) – an area 11 times the size of the District. The District of St Albans is compared to Hertfordshire, Bedfordshire, Buckinghamshire and Essex combined to give an idea of scale.

ECOSYSTEM SERVICES AND THE DISTRICT 6

6 Ecosystem Services & the District

6.1 Introduction

6.1.1 The following chapter considers the various ecosystem services as described in the UN Millennium Ecosystem Assessment and the UK National Ecosystem Assessment in the context of St Albans City & District. The intention is to understand how the District currently provides these services to local people and how the land management might be modified in the future to provide more ecosystem services locally as society adjusts to energy and resource scarcity and climate change. The services are divided into four categories, namely supporting services, provisioning services, cultural services and regulating services, with biodiversity considered separately.

6.1.2 **Supporting services** describe the fundamental processes that underpin all life. They include primary production (that is photosynthesis, whereby plants use sunlight to build complex molecules), soil formation and the global cycling of water and nutrients (bio-geochemical cycles). All other ecosystem services rely on these processes. Humans rely on these processes, however impacts on our everyday life are indirect and often large-scale and long-term. For example, fertile soils are produced by long-term activities, which begin with glaciation or volcanic eruption and continue with the action of forest organisms over centuries. Supporting services involve a complex interaction of poorly understood physical, chemical and biological processes.

6.1.3 **Provisioning services** result in the goods people obtain from ecosystems, including food, fresh water, materials like fibre and fuel (in the form of wood or other biomass). Since the Neolithic Period, many of these goods have come from intensively managed ecosystems like farms or plantations, whilst others are wild (like fisheries or game). The availability of ecosystem goods is dependent to some degree on supporting services (like photosynthesis or soil formation) and regulating services (like pollination – see below) but has been boosted since the industrial revolution through the input of energy from fossil fuels and nutrients in form of artificial fertilisers. For centuries, the development of provisioning services has shaped the landscape of the District.

6.1.4 **Cultural services** are derived from the places where people interact with each other and with nature. In addition to their natural features, landscapes like those found in St Albans have been profoundly altered by centuries of farming, settlement and industry. Cultural services are considered in terms of local features like parks and nature reserves and the wider countryside, where distinct landscapes are recognised. Such culturally defined places are accessed for recreation, learning, relaxation or contemplation or enjoyed at a distance for their beauty or peace of mind. People's engagement with environmental settings may have important meaning and can affect behav-

Farmland is important for provisioning services (food) but is also a cultural landscape.

iour and change values. Development and changes in the way that land is managed and therefore its appearance, can have far-reaching impacts on the way that people value and benefit from cultural ecosystem services.

Soil plays an important role in several ecosystem services including recycling of nutrients, production of food and reducing the risk of flood.

6.1.5 **Regulating services** provided by ecosystems are extremely variable. They include pollination and processes that regulate diseases and pests that affect the production of food, fibre and biomass. Climate and hazard regulating services contribute towards the amount and quality of freshwater. Regulating services are related to each other and to supporting services. For example, water quality is determined by ecosystem services provided throughout a catchment by interlinked processes taking place in the air, water bodies, soil, flora and fauna. Wherever these processes are interrupted or overwhelmed, water quality deteriorates.

6.1.6 **Biodiversity** is the wealth of species, plants, animals and microbes, that in webs, chains and interactions of growth, consumption and decomposition, combine to provide the various ecosystem services. Unfortunately, when natural ecosystems are simplified to maximise productivity for food or materials, or when the water cycle is modified, for example when rivers are straightened, biodiversity is reduced and the ability of the landscape to provide the full range of ecosystem services is compromised.

Provisioning Services

6.2 Crops

6.2.1 Much of the Green Belt in St Albans District is comprised of farms, operated in 77 different holdings. Most of that farmland is arable (68% of the farmland), with much of the remainder under grass (see section on livestock below). There is a relatively small area (7ha) given over to fruit and vegtables – see Table 6.1. Output from the arable farmland in St Albans is estimated at 28,000 tonnes, providing enough calories to support about 120,000 people for a year,[2] equivalent to 86% of the District's population. This crude estimate does not take account of waste, crops that are used to feed livestock, beer making and biofuels, so it is clear that, in common with the UK as a whole, the District falls short of self-sufficiency in food.

6.2.2 In line with trends throughout lowland England, more land is being converted to crops in St Albans and these crops are being chosen for financial returns, with a smaller range of crops planted than in the past, prices for produce have risen sharply in recent years, as global demand continues to grow – for example the price of milling wheat has risen from £74 per tonne in 2000 to £122 per tonne in 2009.[3] Crops planted in St Albans District include wheat, barley, oilseed rape, sugar beet, linseed, beans, potatoes and maize amongst others (see Table 6.2). Most of the crops are grown on a rotation to prevent the build up of disease. Much of this goes for processing for inclusion in foodstuffs and animal feed, but some of the wheat and oilseed rape crops goes to produce fuels (bioethanol and biodiesel). About one third of the barley crop goes into the production of malt for beer making. Maize is grown as a food stock for animals.

6.2.3 Problems associated with intensive agriculture include a severe reduction in biodiversity, associated with the cultivation of monocultures and the use of pesticides, abstraction of groundwater for irrigation, heavy reliance on oil (diesel) to run machinery and transport produce and heavy use of fertilisers (for certain crops), which can have a negative impact on watercourses.

Oilseed rape field

Table 6.1 Crop Areas in St Albans District[1]	
	Hectares
Total area	7102
Cereals	3308
Arable (not cereals) 2010	1489
Fruit & veg	7
Grassland	1834
All figures are for 2010 except fruit and veg which is for 2007	

Table 6.2 St Albans District Crops		
Crop	Yield (tonnes/ha)	Price £/tonne (2009)
Wheat	7.1-8.3	122
Barley	5.3-6.0	125
Oilseed rape	2.6-3.4	510[4]
Sugar beet	47.0-74.0	29
Beans	3.4-4.5	364
Potatoes	41.4-48.0	113.20

6.2.4 The Water Framework Directive, which aims to protect freshwater, is expected to lead to the restriction of use of certain pesticides and herbicides, which are thought to be essential for the profitable cultivation of crops like oilseed rape.[4] The predicted water shortages, which could be exacerbated by climate change (see water supply below), could have an impact on the production of crop irrigation. Arable farming is subject to market volatility, regulatory changes, the trend for fuel and fertiliser costs to increase, as well proposed changes to the EU Common Agricultural Policy and the subsidies provided through that regime. Therefore the farming landscape will continue to change rapidly in response to these drivers, however consideration should be given to the development of long term constant objectives like catchment management and ecological connectivity (see Section 6.14 and 7 Biodiversity below).

6.2.5 As well as large-scale commercial crop production, St Albans District has some small scale growers and allotment holders, growing a wide range of fruits and vegetables, often according to organic, permaculture and other environmentally friendly principles. After decades of decline, allotments are growing in popularity, with people interested in the benefits associated with exercise and community engagement as well as the fresh produce. St Albans City & District Council has 11 allotment sites, with a total of 671 plots covering approximately 20 ha.[5] In addition local town and parish councils provide another 26 allotment sites across the District. There are a number of other projects, which involve crop cultivation including project like Earthworks St Albans,[6] where people with learning difficulties or mental health problems can grow produce, some of which is available at the local Farmers Market. Interest in allotment and small-scale vegetable gardening is likely to continue to grow and there may be opportunities to establish new sites. There is also

Allotments provide valuable fresh food and greenspace

Box 6.1 Ecological Footprint of Food and Drink in St Albans District

1.3gha of the total per capita ecological footprint of 5.85 gha is attributed to food and drink. For the whole population of 138,800, this is equivalent to 180,440 ha (More than 11 times the 16,118 ha area of the District). This figure makes allowance for production, preparation and delivery.

In recent years food retailing has become dominated by a small number of large retailers, who control over 75% of the market. Food is transported from farm to production facilities, on to distribution centres and back to supermarkets, where it is usually collected by private car. This has greatly increased the resource consumption associated with food supply and has created a system which will be vulnerable to increases in fuel costs.

a large number of private gardens in the District. Although relatively few people currently grow food in their gardens now, this may change as general interest in vegetable cultivation increases and clubs are established to swap produce. Projects like Landshare, which matches people with unused gardens to others who seek places to cultivate, show a number of willing participants in the District.[7]

Figure 6.1 St Albans District Agricultural Land

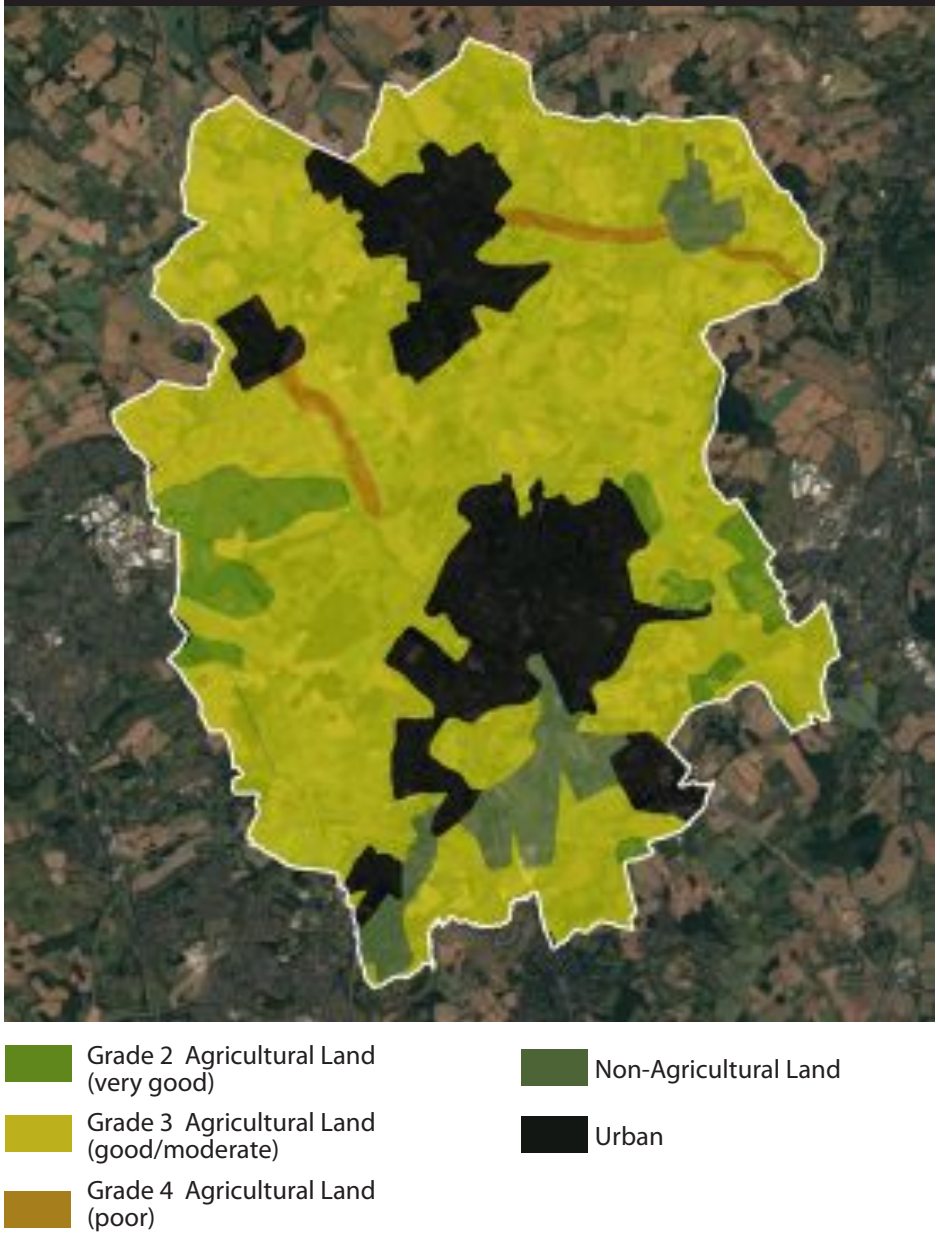
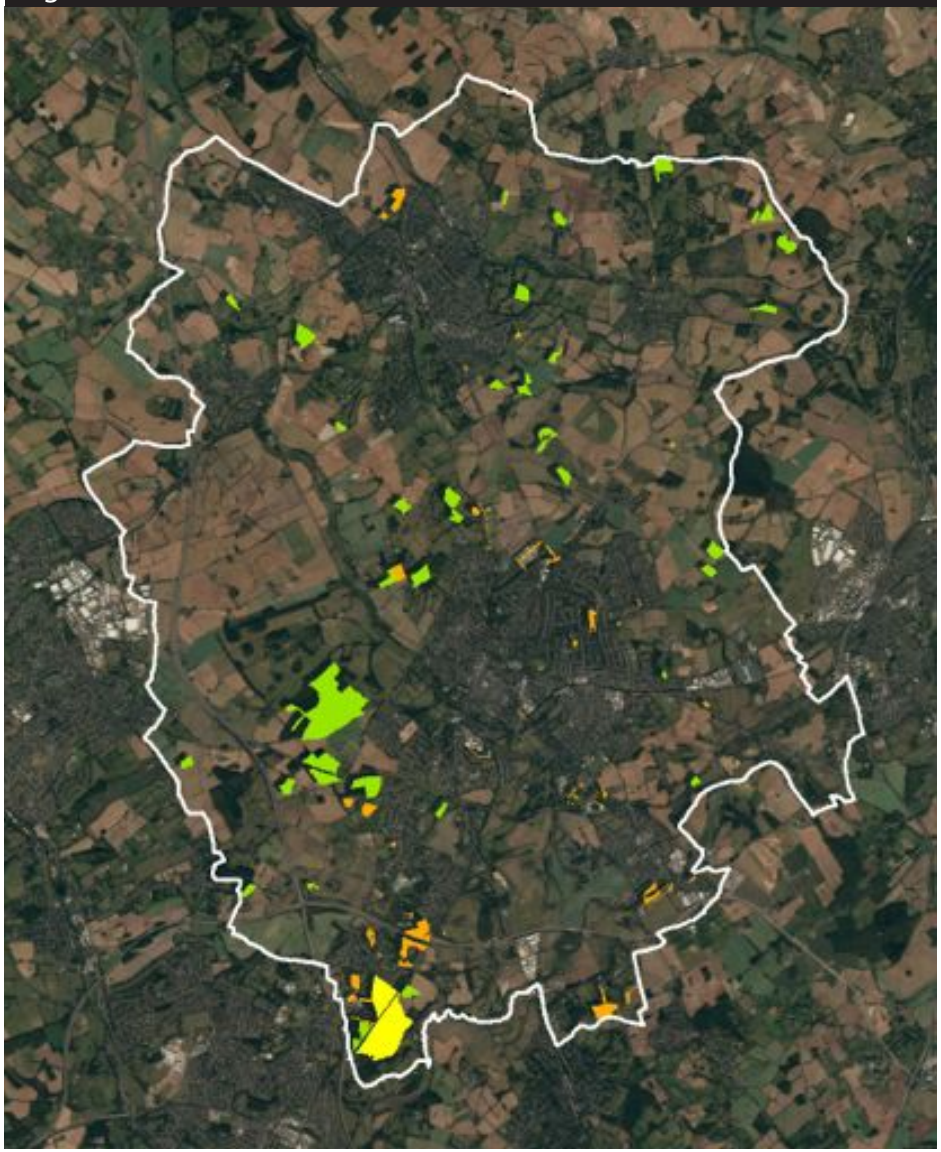


Figure 6.2 St Albans District - Woodlands



Ancient Woodland Inventory

SSSI (Bricket Wood)

6.3 Livestock

6.3.1 Most of the farming in the District is arable (see Crops) and the cattle and sheep herd is relatively small and the number of sheep declining. This means that the majority of the meat consumed in the District is a net import.

Table 6.3 Livestock in St Albans (2010)[8]

Livestock Category	Quantity	Change since 2007
Cattle	701	+4
Sheep	2263	-23
Poultry	284	-19

6.4 Fish

6.4.1 There is no commercial fishery or fish farming industry in the District, however there is potential for the establishment of fish-farming businesses locally.

6.5 Trees, standing vegetation

6.5.1 There are approximately 1017 ha of woodland in the District covering 6.3% of the land of the District. Most of these are scattered, privately owned farm woodlands, although the council manages 12 woodlands (and wooded commons) totaling 142 ha.[9] Many of the woods are former coppices, dominated by oak, ash and hornbeam, although there are a number of conifer plantations. The Watling Chase Community Forest[10] was established in 1991 and includes a large part of the south of the District, an area affected by mineral workings. The Woodland Trust is in the process of planting the Heartwood Forest, which will cover 347 ha to the north of Sandridge.[11] Trees and woodland in the District are currently managed for their amenity (see Section 6.7 and 6.8) and nature conservation value (see 7 Biodiversity), with no significant production of thinnings and other cut material to be used to

produce firewood and woodchip fuel for heating and electricity production. The District currently makes an insignificant contribution towards the requirement of its residents for wood, although there is potential for this.

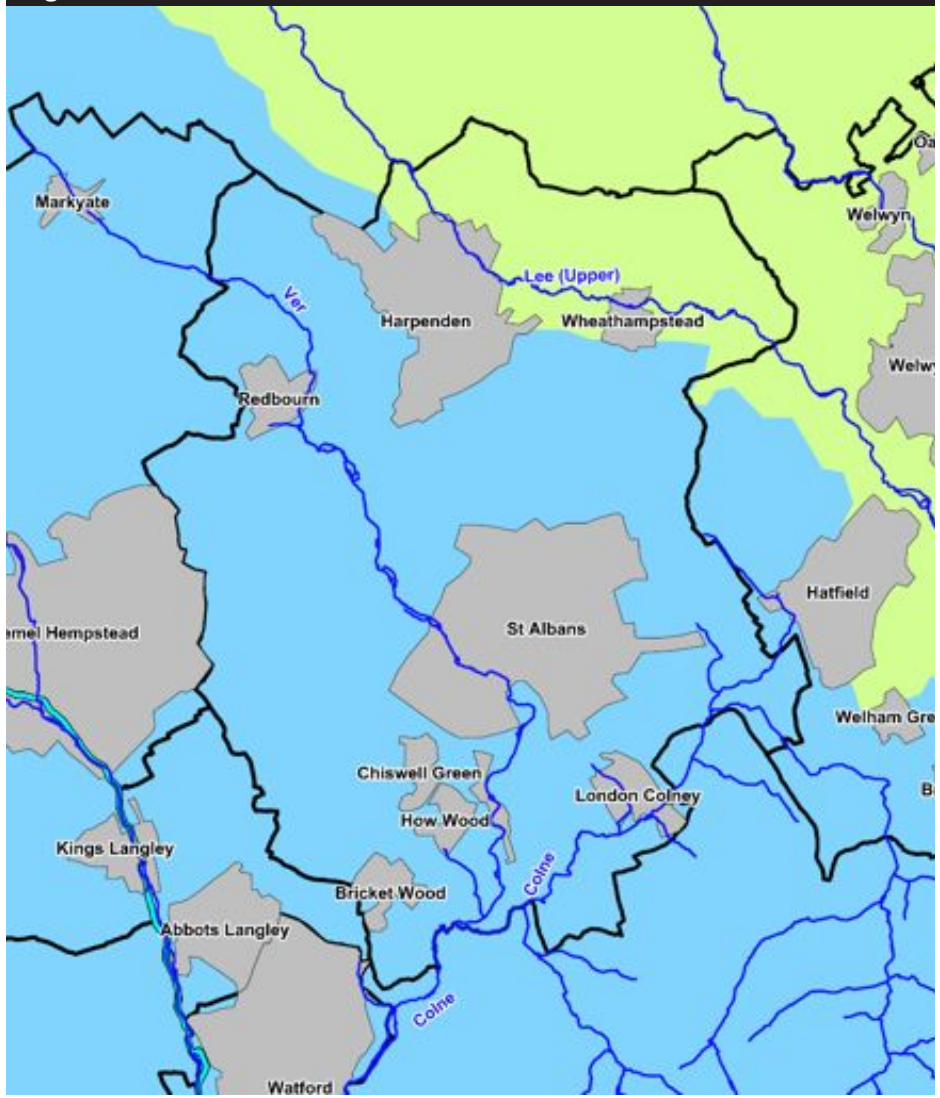
6.5.2 Currently more than 92% of the UK's total energy supply (for transport, electricity, industry and domestic use) consists of fossil fuels, mainly natural gas and petroleum and about half of this is imported.[12] In 2010, Biofuels made up just over 2% of our energy supply, although this has grown and will continue to grow:The government's Low Carbon Transition Plan (2009) aims at 30% of electricity generation to be from renewables by 2020 and biofuels are likely to form a substantial part of that.[13]

6.5.3 Before the switch to oil at the beginning of the twentieth century, wood was a primary source of energy and woodlands were actively managed to provide firewood as well as building materials. Local transport relied on draught animals, fueled primarily by grasslands. Although woodlands persist in the landscape, many were neglected during the twentieth century and others converted plantations of fast growing conifers, designed as a strategic reserve, to be used in coal mines and for construction.

6.5.4 Now there is increasing interest in using farmland to provide biofuels, in the form of fast growing trees like willows and poplars, grown in short-rotation coppice (SRC). Chipped material from new plantations can be mixed with material removed from existing woodland and plantation and thinnings from street trees and municipal plantings (the urban forest). The increase in efficiency that this will bring will be useful however there will be pressures on the countryside, with an affect on the output of food and changes to biodiversity.

6.5.5 It is also important to note that locally grown SRC (or other biofuel sources) would not be able to satisfy current demands for energy for the people that live in the District, on the farmland that lies within the boundaries of the District - Box 6.2 illustrates the problem.

Figure 6.3 St Albans District and River Catchments



Box 6.2 Short Rotation Coppice (SRC), Energy and St Albans District

All figures are for 2009[14]
1 GWh = 1,000,000 kWh
1 GWh = 1,000 MWh
Consumption and production figures are per annum

Total population	138,800
Electricity consumption	259 GWh
Gas Consumption	980 GWh
Total Domestic Energy Consumption	1239 GWh
Output of SRC per hectare[15]	46 MWh
Area of farmland in District	7102 ha
Energy output if all farmland planted with SRC	326,692 MWh
	= 326.692 GW

If all farmland in the District were to be planted with SRC this could provide 26% of the current domestic energy consumption within the District.

To provide 100% of current domestic energy consumption would require an area covering 27,315 ha, 1.7 times the area of the entire District of 16,118 ha.

16,118 ha

St. Alban City & District

27,315 ha

Area of SRC Required to Support St Albans City & District Domestic Energy Consumption

6.6 Water Supply

6.6.1 Not all of the rainfall that falls on the local catchment is available for human consumption. In a typical catchment, less than 50% of the rain that falls within the local catchment percolates through the surface into the groundwater. About 10% runs off into watercourses and the remainder, about 40%, is evaporated from soil or transpired through vegetation.[16] Although the local catchment is largely undeveloped (greenfield), during the twentieth century, modifications like improved field drainage, river straightening and highway and urban drainage have almost certainly increased the rate of run-off and reduced the ability of the landscape to re-charge groundwaters (see also sections 6.10 Hazard (flood), 6.14 Water Quality and 9 Conclusion). This is a particular concern in the District because potable water supply is heavily reliant on groundwater in the chalk aquifer, which is pumped, under licence from the Environment Agency, through 250 boreholes by the water company, Veolia Water Central. Approximately 60% of the water abstracted from the Colne Catchment Abstraction Management Strategy (CAMS) area is for the public water supply, the remainder is used for agriculture and industry.

6.6.2 Groundwater depths vary according to prevailing rainfall patterns, however shortages can occur following two consecutive dry winter seasons. In the event of drought, the water companies have the ability to move water through a strategic mains network, if necessary bringing water from outside of the immediate area, where river water or water stored in reservoirs may be available.[17] The East of England is the driest part of the UK and water is over-abstracted across most of the region. The region is already in a position where it cannot meet its own water needs and many sub-regions, including the one that the District falls within, already import water from adjacent areas, which are themselves under stress.[18]

6.6.3 Many of the watercourses in the local catchment are chalk streams, which are vulnerable to ecological damage caused by low flows, which occur when groundwater levels are low following excessive groundwater abstractions. The EA's Catchment Abstraction Management Strategy for the Colne indicates that the underlying chalk aquifer is over abstracted. Although

River Ver is vunerable to over abstraction

rivers act as valuable ecological corridors the river no longer support the full range of species (including brown trout) because of agricultural practices and over abstraction.[19] The amount of water that enters the aquifer or is stored in the soil or in local reservoirs could be increased by interventions in the catchment, however much of the future effort to address the difficulties of water shortages is likely to centre around efforts to reduce consumption.

6.6.4 The Hertfordshire Quality of Life Report 2010[20] notes that consumers without meters have increased their level of water consumption to an average of 179 litres per person per day. Water usage by consumers with meters used less - 147 litres per person per day. Assuming an average per capita consumption of 179 litres, the 138,800 people in St Albans consume 24.845 million litres (24,845 m^3) each day (UK average per capita water consumption is 150 litres per day).

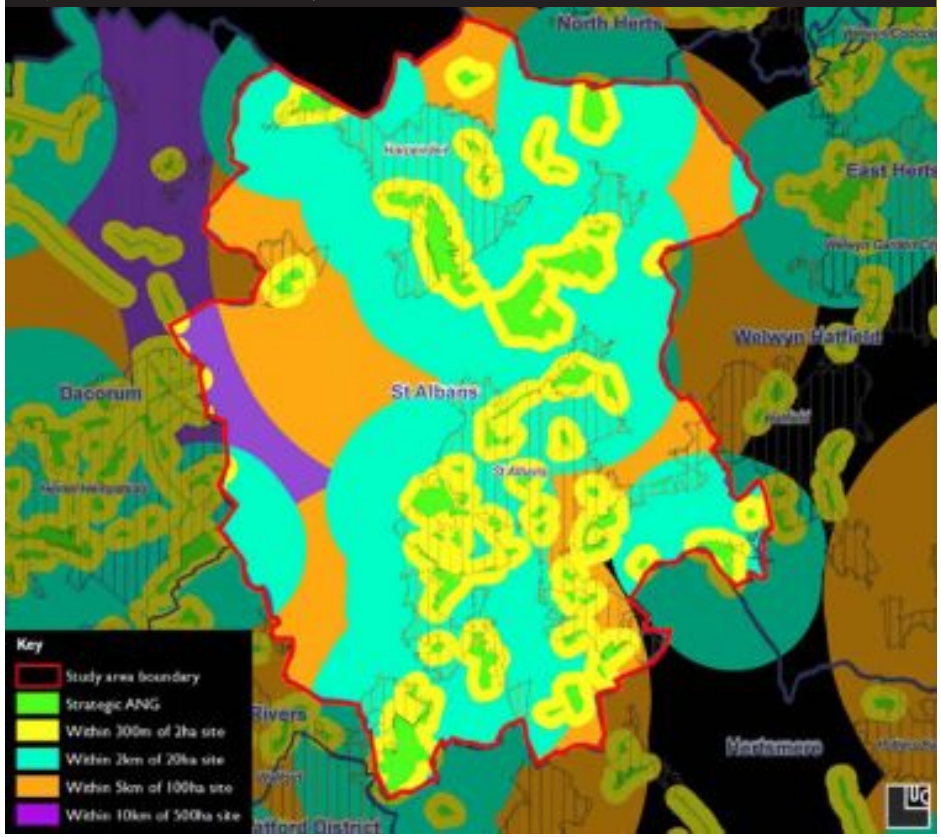
6.7 Local Settings

6.7.1 The Millennium Ecosystem Assessment describes cultural services as 'the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences.' Cultural services provided by the natural environment are believed to make an important contribution towards people's needs and encounters with the natural world continue to be a source of fascination and satisfaction. There is also widespread concern that some contemporary urban lifestyles which centre around indoor activity and consumerism can lead to depression, mental illness, obesity and family breakdown. There is evidence that these problems can be countered by providing ready access to local greenspace.[21]

6.7.2 Many residents in St Albans City & District benefit from private gardens and generally speaking there is excellent provision of parks and other open spaces. St Albans City and District Council is responsible for more than 70 green spaces across the District including three main parks, Verulamium Park and Clarence Park in St Albans, and Rothamsted Park in Harpenden. Verulamium Park is 40 hectares of parkland close to the city centre and is a popular attraction throughout the year. Clarence Park is located on 10 ha. between the mainline railway and Hatfield Road. Rothamsted Park covers an area of 23 ha. close to Harpenden town centre.[22] There are also a number of historic parks & gardens of national and local importance within the District which contain important landscapes which should be protected, restored and public access improved. As well as traditional municipal parks, there are commons, with more informal and biodiverse landscapes. Bricket Wood Common, consists of 78.5 ha of woodland, grassland and heath close to the M25 and M1. Nomansland Common is 52 ha. of woodland and grassland close to Wheathampstead.[23] The Woodland Trust is also creating the Heart-wood Forest, 347 ha of new accessible woodland close to Sandridge.[24]

6.7.3 Although the District is well provided with parks, there are a number of specific locations where analysis using Natural England's Accessible Natural Greenspace standards (ANGSt) indicates deficiencies. In Harpenden and Wheathampstead there are neighbourhoods where access to 2 ha and 500ha category sites is deficient. In St Albans City, in particularly densely developed neighbourhoods, there are residents without ready access to 2 ha category greenspaces and the wider countryside.[25] In addition Redbourn has been identified as a settlement where some residents lack access to 20 ha and 500 ha category sites. In Redbourn there is also a concern over the M1 motorway hampering access to to the wider countryside. These issues

Figure 6.4 St Albans City & District ANGSt



Graphic extracted from St Albans Green Infrastructure Plan 2011 (Land Use Consultants)

are being addressed by improved links to the wider countryside and initiatives like the Heartwood Forest in the north of the District and the Radial Greenway in St Albans. Increasing pressure is being placed on green infrastructure assets as population increases. Many of these assets are unique to St Albans City & District and irreplaceable.

6.7.4 The District is also provided with a number of cycling routes,including The Alban Way, part of NCN Route 61, which connects Albans and Hatfield. This route also forms a valuable ecological corridor. Another cycling and walking route that follows a former railway is the Nickey Line, part of NCN Route 57, which connects Harpenden, Redbourn and Hemel Hempstead. The Ayot Greenway is open to equestrians as well as cyclists and walkers. It links Welwyn Garden City and Wheathampstead and is part of NCN Route 12.[26]

6.7.5 There are places in the District where 'moderate health deprivation' is indicated, in Batchwood, Colney Heath, Sopwell and Cunningham wards, with the suggestion that improvements to local accessible green infrastructure could form part of the response to this.

6.8 Landscapes

6.8.1 As well as local settings, which are usually close to the places where people live and work, cultural ecosystems services can be experienced or perceived at a landscape level. Relatively few travel great distances on foot or by bicycle, but most will be aware of the landscape setting, viewing it from the car, bus or train. Perception of landscapes is highly subjective and changeable and may depend as much upon memory as physical appearance, however it does have an important role in determining how people feel about any area, its attractiveness and ultimately, value, both emotionally and in a monetary sense. One difficulty however, is that given the disconnection that exists between most people's daily lives and the rural landscape, in appreciating landscapes, there is a strong emphasis on appearance and sometimes a lack of understanding of the functionality of the ecosystems from which they are comprised. One helpful role of the ecosystem approach is that it improves our understanding of how we depend for

Verulamium Park

our existence on the landscapes that surround us.

6.8.2 Although perception of landscape is variable between individuals and cultures and is changeable, there is a high degree of consensus over what is important and attractive and this enables experts to make detailed assessments and propose initiatives to repair areas where there is a perception of damage.

6.8.3 Natural England has divided the country into 159 distinctive character areas and is currently considering new evidence on ecosystem services in order to define objectives for landscape quality.[27] St Albans District includes two of these National Character Areas, namely the Chilterns in the area to the north and west of St Albans City and the Northern Thames Basin in the area to the south and east of St Albans City.

6.8.4 The Chilterns consist of chalk hills and numerous and often intimate dry valleys.[28] The agricultural landscape includes hedges, trees and small woodlands and scattered villages and farmsteads, some of medieval origin, with

consistent use of traditional building materials.

6.8.5 That part of the District within the Northern Thames Basin is characterised by fragmentation and urban influences, with networks of major roads, railway lines, high tension lines and pylons, mineral workings and flooded gravel pits. The closer to London, the greater the loss of tranquility and dark skies, with more problems with noise pollution, light pollution and poor water and air quality (see Section 6.9).

6.8.6 Hertfordshire County Council has undertaken a county-wide assessment and sub-divided these national character areas into a series of District-scale units where particular valleys and other distinctive areas are described.[29] Close attention should be paid to existing landscape character and the underlying ecosystems that support those landscapes when working towards a more sustainable approach to land use planning and management.

Near Wheathampstead

Regulating Services

6.9 Climate

6.9.1 Ecosystems operate at two levels in the regulation of climate. At the large scale, woodlands, grasslands and wetlands act as a carbon sink by removing carbon dioxide from the atmosphere through photosynthesis and incorporating the carbon into wood or organic matter in the soil. When vegetation and soils are removed or degraded, carbon dioxide is released into the atmosphere, increasing the quantity of greenhouse gases. As water vapour and other substances are released into the atmosphere from ecosystems through evaporation and transpiration, they can reflect and absorb sunlight, thereby affecting the earth's energy budget. At the local scale, soil and vegetation can create improved microclimates. An example of this is how local parks cool urban areas by reflecting sunlight and providing evaporative cooling.

6.9.2 St Albans District as a whole is dominated by agricultural ecosystems, where over long periods of time, the soil and landscape has become drier through the loss of organic matter and artificial drainage. Grasslands have been converted to arable fields, tree cover has been reduced, hedges removed and wetlands drained. In the urban areas of the District changes in microclimate are even more marked, with the centres of conurbations several degrees warmer than the surrounding countryside. This occurs because sealed surfaces and urban drainage removes rainfall to watercourses rapidly, reducing the amount of evaporative cooling. In addition exposed, often dark, and dense materials like masonry and asphalt, absorb the sun's rays and warm up during the day and re-radiate heat at night, creating the phenomenon known as the urban heat island. Climate change is predicted to bring hotter, drier summers, which will increase the urban heat island effect and exacerbate problems for vulnerable people living in town centres.

6.9.3 St Albans District does not suffer from these problems to the extent of major conurbations and the extent of the problem locally has not been quantified, however further deterioration should be halted and addressing these issues

Green spaces help reduce the urban heat island effect

will bring other benefits, because many of the regulating services associated with ecosystems are interconnected.

6.10 Hazard (Flood)

6.10.1 The loss of soils and vegetation which occurs when agriculture is intensified or urban development occurs, reduces the ability of the landscape to buffer the effects of stormy weather and protect us from flood and further soil erosion. Climate change is predicted to increase the frequency and intensity of rain storms, leading to localised flooding, not only from rivers, but also from surface run-off, especially in urban catchments. Healthy soils and vegetation act as a sponge, soaking up and storing rainfall. Generally speaking, the deeper the soil and the thicker the vegetation, the better the ecosystem will be in slowing runoff – a characteristic mimicked by those designing sustain-

Figure 6.5 Flood Risk in St Albans District

River Colne in Flood at London Colney

able drainage systems (SuDS). Thick vegetation is also better at intercepting sediments, dust and protecting places from strong winds. In combination, spread across whole catchments, areas of natural vegetation can protect homes and property from flooding.

6.10.2 St Albans District does not have large rivers with extensive flood plains, however, tree removal in the catchment, river engineering and urban drainage have combined to create a number of areas at risk from fluvial flooding. The River Colne has caused flooding in the past and a reported 1400 homes are at risk in the District.[30] Flood waters can also cause problems outside of the the District, downstream, in Watford.[31] In addition localised intense rain storms can cause problems wherever there is a preponderance of sealed surfaces and areas vulnerable to these events are not shown on EA flood maps. An informed approach to dealing with these issues will be the restoration of natural features within the catchment, sometimes some distance away from where the problems are felt.

6.11 Disease and Pests

6.11.1 Pests and diseases originate in nature, of course, however in healthy ecosystems, these problems tend to be kept in check by predators and competition from other organisms. Once ecosystems are simplified with the loss of checks and balances, pests and pathogens emerge and spread. An example of this phenomenon is the spread of Lyme disease into American suburbs. Forest clearance leads to the loss of predators, which boosts the numbers of mice. These mice are hosts for ticks, which become more numerous and infect more people with Lyme disease.[32]

6.11.2 We are fortunate in England in that our countryside poses relatively few threats of disease or pest infestation, however we must be vigilant and increase our resilience to the increasing threat predicted by climate change. This will involve the restoration of biodiverse green infrastructure, often in places where we currently have simplified ornamental ecosystems. This is counterintuitive to many, who assume that sterility reduces the risk of disease, however in the wider outdoor environment sterility is not achievable – only ecological simplification which can help pests and diseases to thrive, often in unexpected ways.

6.12 Pollination

6.12.1 Twenty percent of the UK's cropped land holdings is comprised of pollinator-dependent plants, and most wild flowering plants depend on insect pollination. Pollination is undertaken by honey-bees, but primarily by wild pollinators (including wild bees and hoverflies).

6.12.2 Pollinating insects are in severe decline for the last 30 years mainly because of the use of pesticides and the loss of flower-rich grasslands and it is likely that this trend will continue without a concerted effort to address the causes. However, the overall extent of pollination limitation in crops and wildflowers has not been quantified in the UK. The value of pollinators to UK agriculture is conservatively estimated to be £430 million per annum.[33]

6.12.3 St Albans District is typical of the lowland UK in terms of the loss of pollinators, with the countryside dominated by single-species arable crops treated with pesticides and urban areas often lacking in wild flowers, being dominated by species-poor amenity landscapes.

Wool Carder Bee - wild solitary bees are more efficient pollinators than honeybees

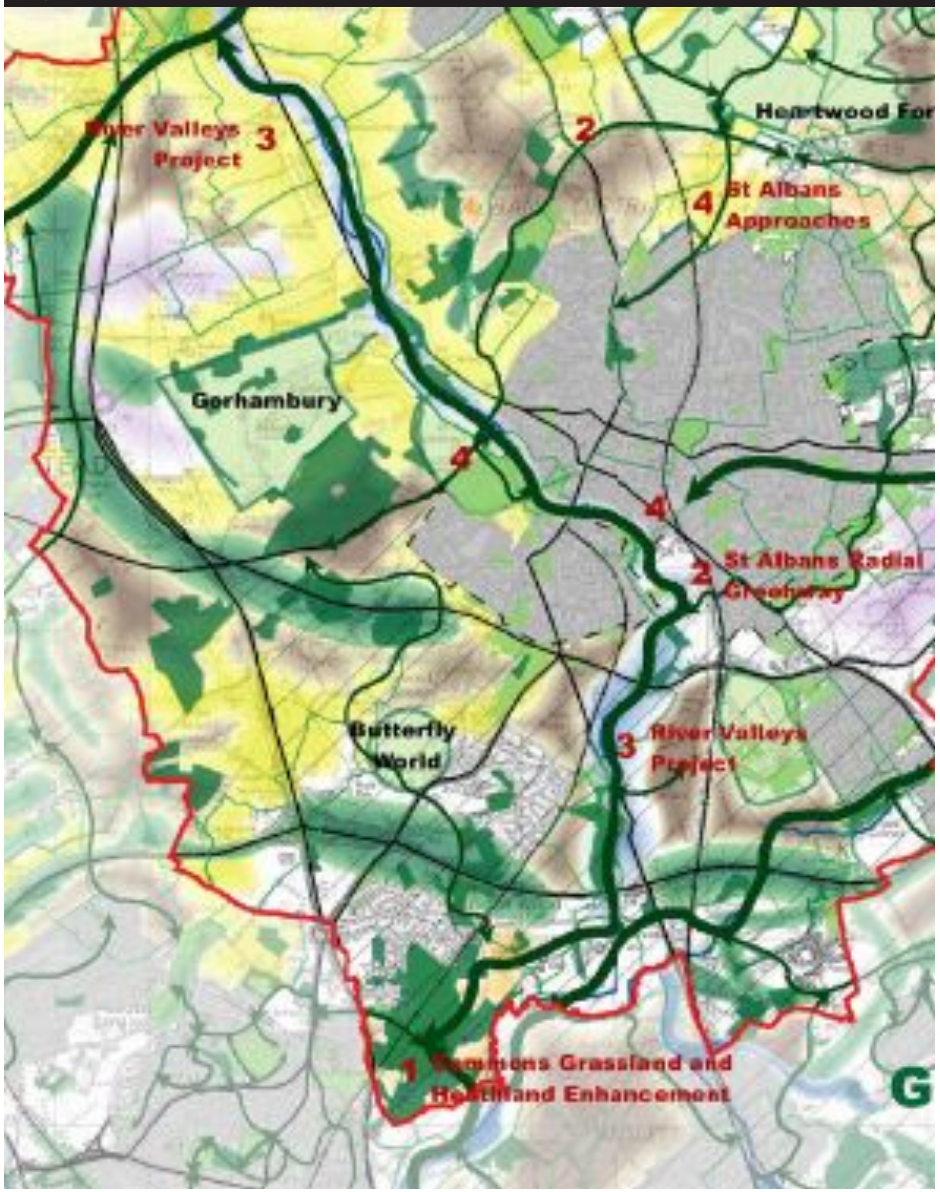
6.13 Noise

6.13.1 Noise can have a negative effect on human health and well-being, with reports of hearing loss, stress, sleep deprivation, cardio-vascular impacts and immune system problems.[34] In addition, some species of birds are disturbed by noise and may avoid areas that would otherwise suit them. Problems with noise have tended to increase with urbanisation, especially where road traffic is heavy. Ecosystems help to reduce the impact of noise, notably through the use of vegetated earth bunds and the planting of tree belts.[35] In towns, features like green roofs have been shown to reduce noise.[36]

6.13.2 St Albans District includes a number of major highways, including the M25, M1 and M10, where noise is persistent. The St Albans District Green Infrastructure Plan (2011) shows proposed large scale woodland planting along these corridors, for the purposes of screening and noise abatement.[37]

6.13.3 Rural landscapes, in particular, provide important areas of calm and tranquillity. The CPRE has produced mapping which displays the different levels of tranquillity experienced across the country, including the St Albans District.[38] It is important that the tranquillity of an area of landscape is given the importance it deserves when making planning decisions. "Planning policies and decisions should aim to: …identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason" (NPPF para 29).

Figure 6.6 Proposed Green Infrastructure Network



Woodland planting along major highways will help to reduce noise pollution

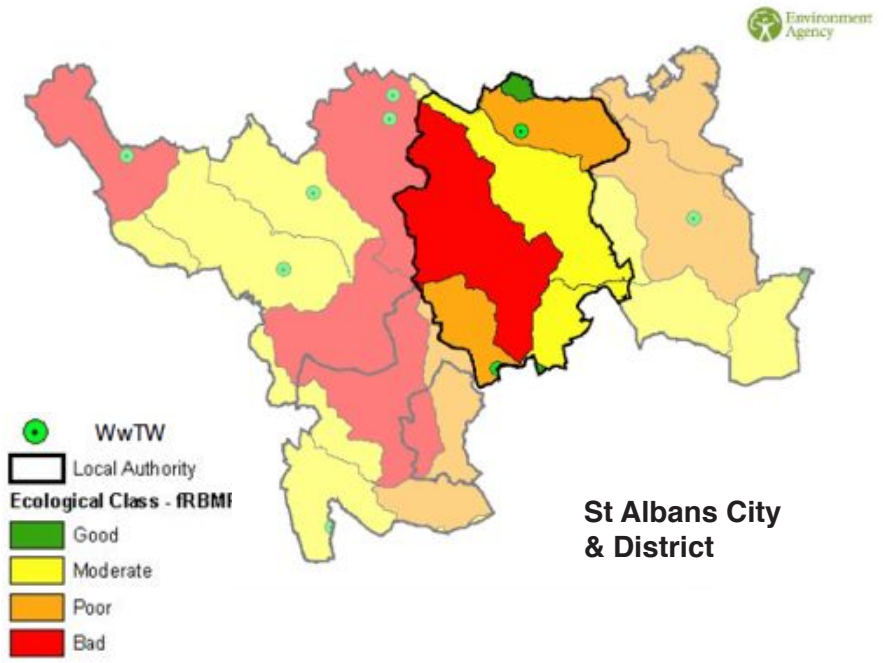
6.14 Water Quality

6.14.1 During the last few decades new legislation has enabled the authorities to require factories and other point sources of pollution, like sewage treatment plants, to take steps to clean up their effluent. This has led to improvement in water quality in many rivers, however water quality continues to be a problem in most rivers because of non-point source pollution emanating from both farms and urban areas. In addition, problems with poor water quality can be exacerbated by low flow rates which are exacerbated by over-abstraction.

6.14.2 The EA reports that the rivers Ver and Colne have poor ecological status and suffer from partly urban catchments and straightening works during the twentieth century which tend to cause losses in water quality as riparian vegetation is removed. The section of the Lea, which flows through the north of the District is less badly affected, because it is in a more rural catchment, however it is affected by agricultural run-off, which tends to promote the growth of algae, which causes a reduction in dissolved oxygen and losses of river organism that rely on clean water.

6.14.3 It is now becoming clear that an ecosystem approach to this problem is needed. Run-off from farms and urban areas can be intercepted by natural features, which can catch sediment and provide soil microbes that break down pollutants before they enter watercourses. In the countryside, strategically placed and planted buffer zones can protect streams and in urban areas, run-off can be channeled into rain gardens, swales and other elements as part of sustainable drainage systems.

Figure 6.7 Ecological Status of Watercourses



6.15 Soil Quality

6.15.1 Soil is linked, either directly or indirectly, to almost all other terrestrial ecosystem services, including the production of food and wood, water quality and climate regulation). Soil is important, however relatively little is know about it. However the UK National Ecosystem Assessment reports that soil has been degraded over the past 50 years, both by pollution and inappropriate land management practices.[39] If soils are degraded, their ability to cycle nutrients, store carbon, attenuate floods and clean water are comprised and there are fears that climate change could accelerate declines.

6.15.2 Given the importance of soil it is important that more attention is given to the protection of soil from development, the conservation and creation of soil and that farming in the rural areas is undertaken with proper consideration of the wider role of soil in catchment management and providing ecosystem services.

Heavy traffic can cause air quality problems, which can be eased by large scale planting.

6.16 Air Quality

6.16.1 Vegetation can intercept and absorb moderate levels of pollutants and soils can break them down. Dense foliage can slow down air flows, causing particulates to fall to the ground and sticky or hairy leaves can trap material. Gaseous pollutants can be absorbed through the stomata of leaves and broken down. There have been significant improvements in UK air quality over recent decades, with a reduction in sulphur dioxide produced from power plants, for example, however current concentrations and deposition rates still occasionally exceed official thresholds set to protect human health. In St Albans District air pollution is monitored as part of the Hertfordshire and Bedfordshire Air Quality Monitoring Network.[40] Pollutants monitored include: Particulates -small smoke particles (PM10), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO) and sulphur dioxide (SO_2). Although air quality is improving overall, there are still problems. The number of days each year when air quality is moderate or bad, depends on the weather conditions, but typically varies between 4 and 15.[41]

6.16.2 In St Albans District, most air pollution is caused by vehicle emissions and the highest concentrations of road vehicles occur along the major highways, with problems most likely to occur on hot, still days. Whilst ultimately problems with vehicle emissions will probably be solved by a switch to cleaner modes of transport and cleaner fuels or electrical power, diesel will continue to be the preferred fuel for goods vehicles for some time to come and the planting of trees and other vegetation for the purpose of reducing the spread of air pollutants towards residential areas should be considered. Tree planting is already one of the interventions identified in the Council's action plan for improving air quality.[42] There are other benefits associated with this approach, including noise abatement and water quality improvements. In urban areas, the desirability of improving air quality, gives an added impetus to tree planting and the adoption of innovative interventions like living walls.

7 BIODIVERSITY

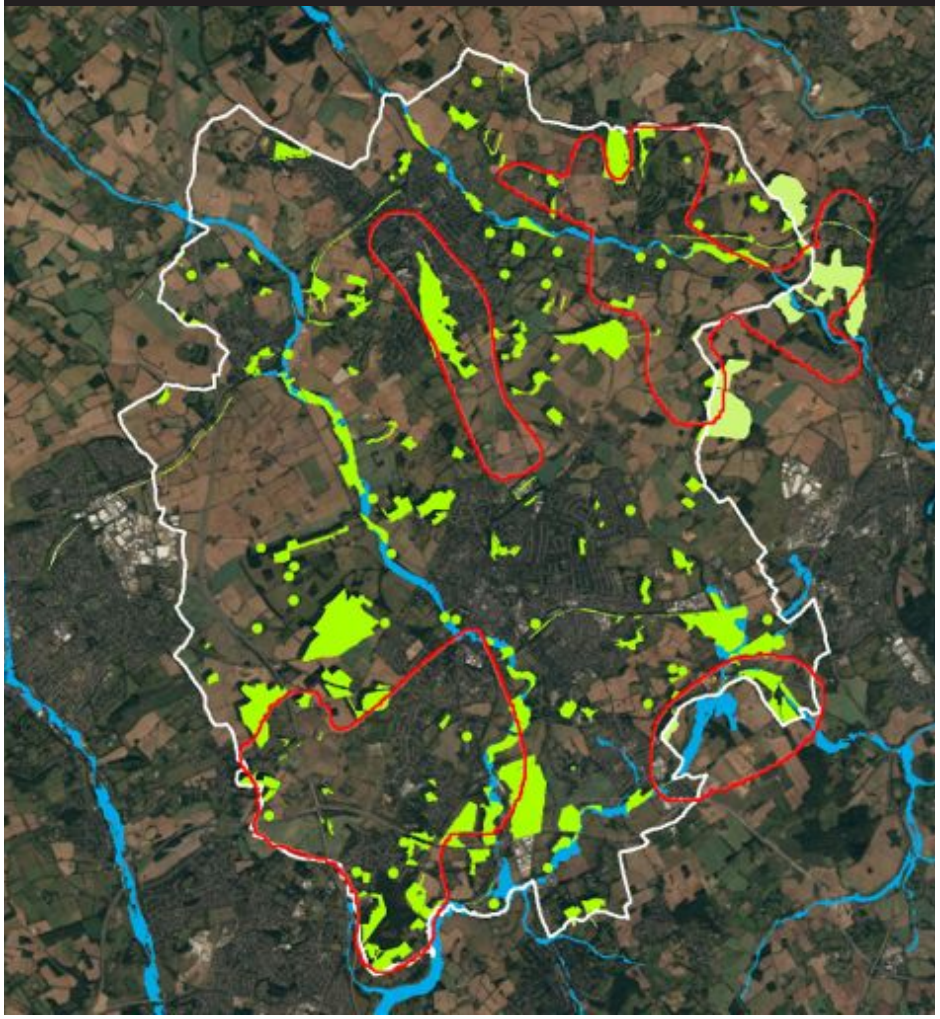
7 BIODIVERSITY

7.1 The conservation of biodiversity has often been supported for its beauty or by virtue of its importance as part of our heritage. There is usually a focus on the conservation of so called 'charismatic' attractive-looking species. Whilst these may be noble and worthy causes, there is now a body of evidence to show that biodiversity (that is, the full range of plants, animals and microbes) interact to provide all the ecosystem services that have been described. Biodiversity provides the food webs that allow the movement of energy through ecosystems and drive the processes that support life. Losses in biodiversity result in losses of ecosystem services. We can overcome these losses to some extent with technology, but technology as currently applied uses large quantities of fossil fuels and other resources, including water, which are set to become ever more scarce and more expensive.

7.2 St Albans District is typical of most lowland Districts in England in that during the twentieth century there were near-catastrophic losses in habitats (and therefore biodiversity), caused by changes in agricultural practices and to some extent, urban development and the expansion of infrastructure. In addition, rivers have been channelised and wetlands drained and disturbed areas colonised by invasive alien species. An example of the decline in biodiversity is the reduction in the area of species-rich grassland in England and Wales, which declined by 97% between the 1930s and 1980s.[1] It is possible to reverse the decline, however, by restoring lost habitats in suitable areas. In addition it is also possible to require that biodiversity is enhanced through all land management including farming and forestry and to ensure that biodiversity is considered when designing and managing multi-functional green infrastructure.

7.3 St Albans District has a single Site of Special Scientific Interest (a site of national importance for nature conservation with statutory designation),

Figure 7.1 St Albans District Nature Conservation Sites



namely Bricket Wood Common, 70 hectares of relict heathland, ancient oak-hornbeam woodland, secondary woodland and scrub.[2]

7.4 St Albans has four Key Biodiversity Areas (KBAs), identified by the Hertfordshire Biodiversity Action Plan. In addition there is a scattering of designated nature conservation sites and areas of local value, designated by statute, by the County or protected by the District council, local councils, private landowners or NGOs.

7.5 Statutory and non-statutory nature conservation sites in the District cover a total of 1681 hectares or 10% of the area. Setting targets for the protection of habitats is not an easy task because not enough is known about the requirements of the full range of habitats and species that make up the ecosystem in a typical ecoregion. Internationally, conservation organisation bodies advise that 10-12% of each ecoregion or ecosystem type needs to be protected to ensure viability.[3] Others argue that this is inadequate, with large scale planning projects for nature conservation in the US recommending that between 15% and 30% of a landscape is protected.[4,5]

7.6 As well as the overall area of land protected and managed for nature conservation, there are also the issues of minimum patch size (minimum viable area of any given site) and connectivity. Some species will not persist if patch sizes are too small and others will not be able to move through the landscape if suitable habitat does not occur between protected areas.

7.7 In common with nature conservation sites across the whole country, these sites are fragmented and there are some barriers to the movement of some wildlife through the landscape, either because of the lack of suitable habitat or occasionally because of a major barrier like a motorway. A major consideration in the new landscape scale approach to nature conservation is to connect existing habitats together to form a network. This may become more important in the future, as some species will move as they adjust to habitat changes brought about by climate change.

7.8 A number of nature conservation initiatives are already underway or planned in the District, as follows:[6]

Figure 7.2 Hertfordshire Species in Biodiversity Action Plan

From top left: Song Thrush, Cornflower, Chalkhill Blue, Stag Beetle, White-clawed Crayfish, Otter

• **Community forestry**: (See WCCF Plan) Including Oaklands Smallford Campus, Ellenbrook Country Park, Moor Mill, Land to the west of Hatfield and Land East of Redbourn.

• **Wetland**: The Colne Valley is identified as an opportunity area by the Hertfordshire BAP

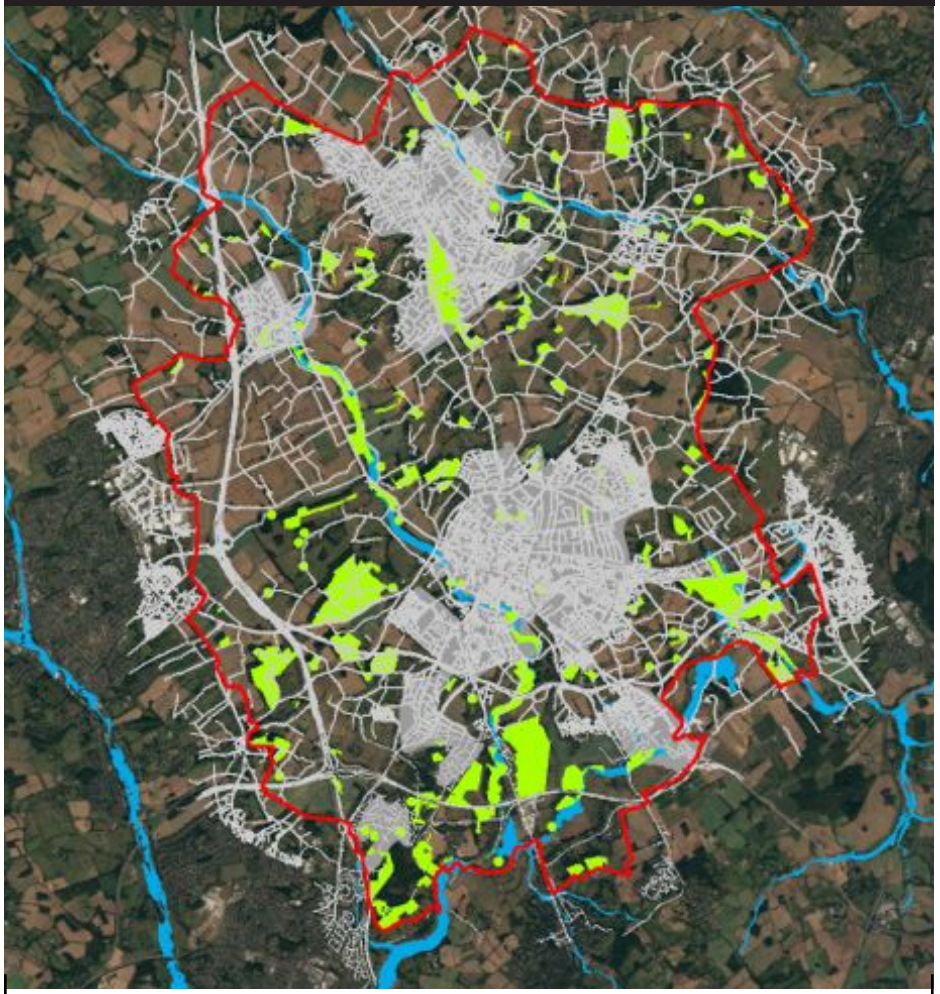
• **Heathland and grasslands**: The Hertfordshire Heathland BAP identifies the Harpenden – Wheathamsptead complex and the Upper Colne Valley (Bricket Wood Common).

7.9 The District's Green Infrastructure Plan (2011) also identifies a need to create links between Key Biodiversity Areas and the major settlements and locally designated wildlife sites, as part of a landscape scale approach which will make the District more permeable to wildlife and people. There is also a need to make connections with sites in adjacent Districts. It may also be advisable to consider all nature conservation initiatives in light of the various ecosystem services discussed in this document.

7.10 There is much that can be done to restore biodiversity. For example, as well as helping to deal with flood management, river restoration schemes are also important nature conservation initiatives. River restoration undoes the work of past channelisation, improves water quality and increases ecological value by reintroducing aquatic vegetation and putting natural features back into the river bank and river bed. In addition, rivers are important ecological corridors which usually form an important component of wider ecological networks.

7.11 Open space has traditionally been managed for recreation and relaxation, with little consideration for wildlife, catchment management or food production. This is changing. Already many parks feature species-rich vegetation to attract pollinators and other wildlife, but there are initiatives that have used municipal parks for river restoration and sustainable drainage schemes, like the improvements to the River Quaggy in Sutcliffe Park, south-east London.[7] Other incidental green space, like the amenity grassland that often surrounds housing estates, and public buildings can be managed for

Figure 7.3 St Albans District - Building a Future Ecological Network - Major Opportunities and Constraints



Building a robust future ecological network will involve expanding core areas and overcoming barriers including major highways and urban areas.

wildlife or re-assigned as allotments for local residents, like the Clapton Park Estate in Hackney, London.[8]

Clapton Park Estate, Hackney

7.12 Although around 10% of the land area of the District is assigned for nature conservation, a figure that meets one of the recommended minima for this purpose, sites are fragmented and patch size is probably inadequate for the long-term viability of many species. Fragmentation and the presence of barriers, also means that many less mobile species will not be able to move through the landscape, an attribute that is likely to become more important with climate change.

7.13 The four Key Biodiversity Areas within the District identified in the Hertfordshire Biodiversity Action Plan will form an important role in a future expanded and integrated ecological and green infrastructure network. Further research is recommended which will help with the development of a more coherent ecological network within and beyond the District.

7.14 This work will involve the detailed mapping of patch size and distribution of sites of different habitats types, understanding the pattern of geographical separation of sites and how feasible it might be to expand habitats. (Potential for expansion can be limited by hostile ground conditions or the presence of roads or other barriers). In addition it will be useful for selected species and the importance of connectivity for those species to be considered. The future ecological network can be significantly enhanced through the inclusion of farm conservation projects and integration with

Nomansland Common – This site could become a core area in an expanded ecological network

green infrastructure interventions, with the ecological network helping to improve access to the countryside for people. Figure 7.3 gives an indication of the major opportunities and constraints associated with a possible future ecological network that would increase connectivity between key nature conservation sites.

HEALTH, SOCIAL & ECONOMIC BENEFITS 8

8 Health, Social & Economic Benefits


Credit: Katy Walters

Green infrastructure reduces air pollution - a cause of asthma and heart disease

Health

8.1 The World Health Organisation defines health as being a state of complete physical, mental and social well-being. A healthy environment which is conducive to physical and mental health is not only a need, it is also a right enshrined in the Universal Declaration of Human Rights.[1] There is now considerable evidence to show that green space makes a positive contribution to physical, mental and social well-being and that a deficiency can lead to deterioration in the health of affected populations.

8.2 The best understood link between green space and health is that associated with exercise. Regular exercise (including walking) reduces the risk of obesity, Type 2 diabetes, coronary heart disease and respiratory illnesses. It has been estimated that a 10% increase in physical activity in adults would benefit England by £500 million per annum through reduced health care costs.[2] Living closer to green spaces is associated with increased physical activity[3] and communities with more parks have higher levels of walking and cycling.[4] There are also strong links between health and proximity to green space for the least well off in England, with people living in the greenest areas enjoying better health than those with similar incomes living in areas without access to greenspace. This also applied to mortality from circulatory diseases, but no effect was found for causes of death unlikely to be affected by green space, such as lung cancer and intentional self-harm.[5]

8.3 Green spaces help to alleviate stress and anxiety. The evidence on the restorative of views and contact with nature, is even more convincing than the evidence of benefits for physical health.[6] Green spaces can also help improve mental well-being by encouraging social activity and interaction. There is also evidence that natural settings improve attention and lower blood pressure.[7] A survey of nine Swedish towns and cities, has suggested that the more often a person visits urban green spaces, the less often he or she will experience stress-related illnesses.[8] Direct evidence has been found of the healing effects of green space on mental health: A study of 96 children suffering from attention deficit disorder and found that they experienced fewer problems if they had access to green space for play and the 'greener' the setting, the less severe the symptoms.[9]

Social

8.4 Green Belt and green infrastructure supports people at the neighbourhood, village of town level, but is also visited by people living in larger conurbations, within the District, in the large towns in adjacent districts and also occasionally by people travelling from London itself. There are also a range of landscapes of different scale and character, attracting people of varying age and background who may be looking for different experiences. There is now

evidence to show that the most successful elements of green infrastructure are those where communities are engaged with those responsible for planning and maintenance and that green space through such engagement can enhance social cohesion, bringing together neighbours and encouraging different social groups to mix as they work together for the common good.[10]

8.5 Green space increases social activity, improves community cohesion and lowers crime levels, particularly in deprived communities.[11,12] The existence and availability of natural green space has been shown to encourage use and to promote positive social interactions.[13,14] People with disabilities, ethnic minorities, children, the elderly and the poor have been shown to benefit most and it has been shown that domestic violence and crime is reduced on housing estates with more natural spaces.[15] It is also important that people have access to a full range of green space, not just formal parks but also local unofficial or informal sites, which are often the most valued places.[16]

Economy

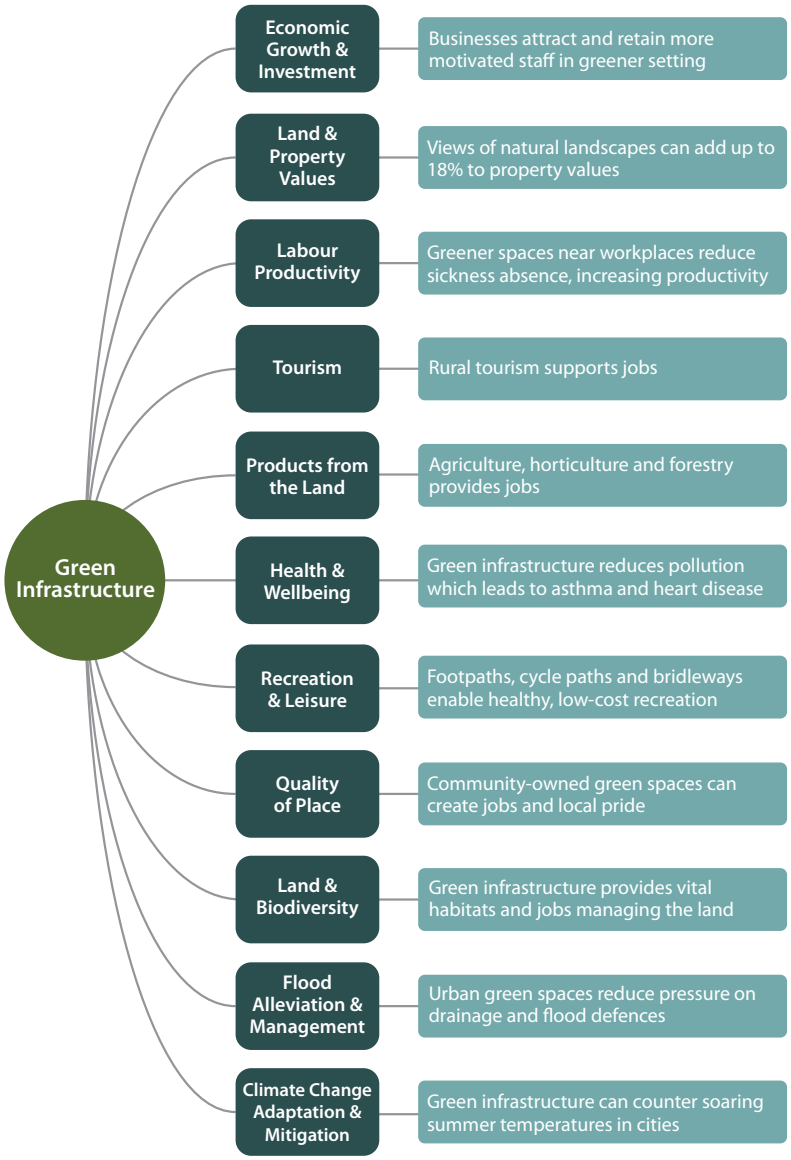
8.6 The District's non-urban areas have a valuable role to play as a learning resource. Learning from the natural environment is an ideal way for young people to integrate classroom curricula, stimulate academic interests and promote social skills.[17] It can also help people of all ages to achieve a sense of place and the practical and soft skills learnt can also improve employment opportunities.

8.7 Green Belt and green infrastructure has a positive impact to the local economy through:

- Attracting inward investment that creates jobs
- Increasing land and property values
- Helping to create local businesses involved with land management, recreation and tourism

8.8 High quality green space and countryside improve the image of a district, helping to attract and retain high value industries, businesses, entrepre-

Figure 8.1 Economic Benefits of Green Infrastructure



Graphic follows Ecotec 2008: http://www.nwda.co.uk/PDF/EconomicValueofGreenInfrastructure.pdf

Green infrastructure can create jobs in rural tourism and provide fresh produce

neurs and workers. This then increases the likelihood of private sector investment, further reducing unemployment.[18] For example, landscape improvements at Riverside Park, Clydebank and Winsford yielded over 16% and 13% respectively of net growth in employment and levered over £1 million of private investment.[19] Another example, is the creation of the National Forest, in the Midlands, which increased the number of local jobs by 4.1% and local regeneration using green infrastructure attracted £96 million of investment.[20]

8.9 Improving green space in key locations has a significant beneficial effect on property and land values. For example trees can add 15% to 25% to the total value of properties, depending on size, condition, location and species. CABE has found that for properties adjacent to a local park attract a premium of 11% and close 7%, similar to the findings of an earlier study in the Netherlands.[21] According to the North West Development Agency a view of a natural landscape can add up to 18% to property and residents in peri-urban settings are willing to pay £7,680 per household for views of broadleaved woods, equivalent to £4.2 billion across the UK.[22] Proximity to or a view of broadleaved woodland has been found to increase the value of an average house by 7.1%.[23]

8.10 Local authorities and businesses are involved in the creation and management of green space and Green Belt land. Of course there will always be a certain number of jobs for farming, forestry and land management, but the increase in interest in the sustainable management of land and farm diversification will encourage future growth of local jobs, which can be high quality, landscape sensitive, environmentally friendly and skilled. Such employment is often particularly satisfying, especially if it is associated with bringing about environmental improvements and opportunities for recreation, leisure and tourism. Nationwide, countryside recreation and sport is already of great economic importance and interest is likely to grow in local facilities and attractions, which do not require long distance travel. St Albans District is well placed to benefit from this trend, being within a few miles of 4 million people living on Green Belt land on the northern side of London. The estimated annual turnover of countryside recreation and sports organisations in the UK is a minimum of £850 million, with additional economic impacts accrued through the expenditure of participants. Studies show that countryside recreational walkers on trips in England alone spent £6 billion each year supporting up to 245,000 full-time jobs.[24]

CONCLUSIONS & RECOMMENDATIONS 9

9 Conclusions & Recommendations

Conclusions

9.1 The intention of this report is to improve our understanding of the carrying capacity of the non-urban areas of the District in order to justify decisions on the scale of further development and to ascertain whether or not such development is sustainable and in the best long-term interests of people in the local area as well as the wider region, particularly the London metropolis. The report has analysed a wide range of well-established evidence which has shown:

- The ecological footprint reveals an unsustainable pattern of consumption: An area of biologically productive land fifty times the size of the District is required to sustain its population (approximately equivalent to Hertfordshire, Bedfordshire, Buckinghamshire and Essex combined).
- An area of land eleven times the size of the District is required to sustain the District's current food consumption.
- To produce sufficient energy domestic energy to support the local population would require an area of short-rotation coppice 1.7 times the areas of the District
- Ecosystem services, including supporting services, provisioning services, cultural services, regulating services and biodiversity provided by the natural environment within the District are vitally important.
- The District's non-urban areas will become even more important in terms of the District's ability to respond to energy and resource scarcity and climate change.
- The retention and enhancement of the District's non-urban area should be a key part of the local economic development strategy, due to its array of economic benefits.
- Water resources are under immense pressure and over abstraction has resulted in biodiversity damage, including to local chalk streams.

With the compact cities model, urban sprawl is avoided and the countryside remains within easy reach of walkable neighbourhoods

9.2 We are living through a period of great change, with global populations predicted to climb from its current level of 7 billion to peak at 9 billion around 2050. This, along with improvements in living standards in developing countries, will drive up demand for energy and natural resources. At a time when oil production is reaching is geological peak, these factors will combine to cause energy costs to continue to rise, with concomitant effects on the costs of transportation, food and raw materials. The people of the St Albans City & District, like most communities throughout the UK, are particularly vulnerable to these changes, because they rely on overseas imports for much of their energy and food.

9.3 Scientists are warning of dire consequences if civilisation continues to ignore the limits of planetary systems, which may not continue to operate in a relatively stable way when breached. Most people will be aware of con-

cerns over levels of greenhouse gases in the atmosphere, which are causing climate change, but there are also major concerns over the rapid loss of biodiversity and profound effects that human activity is having on the nitrogen cycle. Other parameters like the availability of freshwater, are yet to become a global problem, but there are areas already under stress, including the South-east of England.

9.4 Although still not recognised or appreciated by all, the ecosystem approach is being advocated by international bodies, the UK government, independent experts and others. It brings a new opportunity for spatial planners to recognise the full range of ecosystem services provided by the natural world and 'work with the grain of nature'. It will also help to improve integration and coordination of the many existing items of legislation, policies and plans relating to sustainable development, which are being promulgated and promoted by the various agencies and which are too often considered in isolation. The ecosystem approach helps people to envision and, it is hoped, implement genuine multi-functional planning, design and management of both the rural and urban environments.

9.5 St Albans City & District is, in general, a pleasant place to live and its people enjoy, for the most part, a higher than average standard of living, both in UK and world terms. However, ecological footprint analysis shows that the lifestyle enjoyed by most local people, in common with the UK as a whole, is unsustainable in the long term. The District relies to a large extent on imported food, water, energy and other resources. Whilst this has always been the case with cities, it becomes a concern when even predominantly rural districts are also in ecological deficit, for traditionally, towns and cities have been supported by their rural hinterland.

9.6 The Green Belt has worked successfully for more than 70 years in controlling the growth of Greater London. This has proven to be valuable for all Londoners in the sense that they all continue to live within a relatively short distance of the countryside. In St Albans City & District that Green Belt has also served local people well, ensuring that nearly everyone lives or works within a few minutes walk of attractive scenery.

9.7 The importance of the countryside around our cities for growing food and providing habitat for wildlife is well known, but we are still only just beginning to understand how access to the countryside, parks and open spaces is important for the maintenance of good mental and physical health. We are also now beginning to plan better connected green infrastructure, in order to make our landscape more permeable to both wildlife and people, but also to help us adapt to some of the unavoidable consequences of climate change, including flood and drought.

Recommendations

9.8 In view of all these alarming factors and trends, the observations made regarding the various global and local ecosystems and the services they provide and the fact that we are already exceeding the capacity of the environment to support us, it is concluded that it would be unwise to permit further urban development in the District on undeveloped land. Any further loss of soil and vegetation will lead to loss of ecosystem services and will undermine our ability to build resilience to climate change as we seek to restore the landscape and build green infrastructure networks.

9.9 There will be some land use changes which should be encouraged. Farming practices will be adjusted to cope with rising energy costs and new demands for locally grown food. Food will continue to be a priority for land managers of course, but the goals of producing energy through biomass, reducing flood risk, conserving soil, groundwater and watercourses and increasing biodiversity and ecological connectivity will also need to be fully addressed through the planning system.

9.10 Where development is permitted, for example in urban renewal schemes, it should be restorative and regenerative. All new development should be designed to increase ecosystem services, provide adaptation to climate change and build green infrastructure networks. The Council is committed to the Compact City approach first recommended by the European Commission in its Green Paper on the urban environment in 1991 (and the Urban Task Force's Towards an Urban Renaissance in the same year) whereby urban development involves mixed-use settlements within urban areas, which

make effective use of public transport and encourage walking and cycling. The application of this approach and associated policies has been successfully demonstrated in cities like Copenhagen, Amsterdam, Hamburg and Freiburg. In following this approach (with for example projects like its review of garage courts which might be suitable for residential schemes), St Albans City & District will continue to protect its valuable non-urban areas.

This report and the Council's new Local Plan

9.11 The approach taken in this document by the Council to justify the numbers/ approach to setting its local housing target is new and innovative but strongly supported by evidence.

9.12 It is recommended that a paper is prepared to support the Strategic Local Plan housing target. Although many of the environmental, social and economic issues are inter-related and have been considered in this report, the paper should take the profound environmental basis set out here and build upon this strong platform with more detail in the context of local economic and social aspirations and trends.

9.13 The Strategic Local Plan is a long-term planning document covering the next 15 to 20 years. It is therefore vitally importantly that appropriate consideration is given to the needs of future generations in defining a truly sustainable housing target. It's also important to note that this is informed by a recognition that failure to address environmental capacity and limits will eventually lead to catastrophic changes.

This report and the NPPF

9.14 This report has been produced with full consideration given to the NPPF and is considered to be consistent with its objectives and policies. The NPPF suggests that there should be a presumption in favour of sustainable development, and sets out principles, but does not concisely define what sustainable development might mean in practice (instead covering 201 paragraphs of the NPPF). The interpretation of what sustainable development should mean locally, it seems, will be left to communities to consider as they devise local plans and determine planning applications. There are already commitments to sustainable development, through long-standing international agreements, European, national and local policy and regulation, but still no consensus over what the details of sustainable development might be.

9.15 No doubt we are about to see further debate over these issues and what they could mean in terms of land use planning. St Albans City & District Council will be at the forefront of these debates, recognising that the recent financial crisis is probably more than a temporary interruption in economic progress and more likely to be part of a seismic shift. When combined with environmental capacity, climate change and the need to plan sustainably for the needs of future generations, most people understand that a return to 'business as usual' is not an option.

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Appendix

Commentary by Pooran Desai, MA (Oxon), OBE, HonFRIBA

Pooran Desai MA (Oxon) OBE HonFRIBA

Co-founder, BioRegional and International Director of One Planet Communities programme

Pooran studied at Oxford and Cambridge Universities before co-founding BioRegional, an international environmental network operating in Europe, North America, Central America, Africa and China.

He has worked in sustainable farming, forestry, recycling & eco-housing, drawing together the partnership to construct Beddington Zero (fossil) Energy Development (BedZED), the UK's foremost eco-village development where he lives and works. He is also co-founder of UK zero carbon property development company, BioRegional Quintain Ltd. Pooran coined the term 'One Planet Living' and heads up BioRegional's One Planet Communities programme working with developers to create the earth's greenest neighbourhoods using the One Planet framework. Developers using the framework include Codding Enterprises, Lend Lease, China Merchants Property Developers and Masdar City. He has led teams which have written sustainability plans for a total of $30 billion of planned development.

In 2004, Pooran was awarded an OBE for services to sustainable development and in 2007 was made an Honorary Fellow of the Royal Institute of British Architects. In 2009 he was named in the top 5 most influential people of the decade in the construction industry by Building Magazine.

He has authored or co-authored 3 books, his last being 'One Planet Communities – a real life guide to sustainable living' which was published by John Wiley in November 2009.

BioRegional is an independent environmental network headquartered at the BedZED eco-village in South London, with offices and sister organisations in 6 countries. We take a scientific approach to sustainable development and have supported organisations such as the Global Footprint Network in California, led by Professor Mathis Wackernagel, on the development of ecological footprint methodology with one of our staff members sitting on its international Standards Committee.

This report by Gary Grant, assisted by Lani Leuthvilay, is an important and groundbreaking piece of work for the UK. The concept of ecological footprint has been gaining credence and our own organisation has worked with a number of local authorities in the UK on application of this methodology to municipal sustainability strategies – including with London Borough of Sutton, Middlesbrough Borough Council and Brighton and Hove City Council. However, this report is unusual in covering not only ecological footprint, but also ecosystem services, and relating this directly to spatial planning and design. The Spatial Planning and Design Team of St Albans City and District Council need to be commended on commissioning this report.

The figures on biocapacity outlined in the report are in line with our understanding on the situation – the consumption of the average citizen in the UK is some 3 times the global per capita availability of naturally renewing resources. The average citizen in St Albans has an ecological footprint somewhat greater than the UK average due to lifestyle factors such as private car mileage. The analysis of ecosystem services likewise demonstrates the various values we can and should place on the unbuilt areas in the district, over and above the still important concept of 'Green Belt – a concept now over 60

years old. Ecosystem services is an analysis now being adopted by national government and provides a scientific framework to consider a wide range of benefits and services which open space provides. Ecological footprint and ecosystem services, as well as the emerging concept of Planetary Boundaries, must now be taken as a material consideration in planning decisions.

Globally, the exponential growth in demand for natural resources is putting increasing pressure on the biological capacity of our planet and its ecosystems. A challenge in this century is how we take this emerging understanding of the global context and apply it at the local and regional level. In Europe and other historically wealthy countries, we have depleted many of our natural resources and have continued to maintain high material standards of living by exploiting natural resources and biological capacities around the world – whether this be in fish stocks or carbon emissions. The growth in consumption in emerging countries like China, India and Brasil, combined with reaching the limits at a global level of naturally renewing resources, presents us with a massive challenge. We can no longer hide from the consequences. How we respond at a local and regional level will determine global collective outcomes. Indeed, as resources become more constrained into the future, securing and nurturing more local renewable sources of food, materials and energy will be in our own self-interest.

With this perspective, open space in the Home Counties – the farmland and woodland – should not simply be viewed as Green Belt for London. It needs to be considered in future as a productive hinterland whose biocapacity needs to be increased (through soil building for example) rather than decreased, in order to provide increasing amounts of food, energy and recycling (e.g. of green and sewage waste) for St Albans, London and the South East. This will be essential for the South East to become more resilient as pressure on resources increase.

More topical at the moment with the South East in drought, is the issue of water stress. There are 2 aspects. The first is any increase in population in the South East adding to water demand. The second is impact of built development and land management on water retention in soils, replenishment of aquifers and supply to streams and rivers. Land-use in the Home Counties is now critical to water catchment and seasonal availability of water in London and the South London. Impact on water will need to be considered carefully in land-use planning to avoid for example increasing dependence on desalination – with the first desalination plant commissioned in London.

Considerations of ecological footprint, ecosystems services, water availability and planetary boundaries, will all now need to inform decisions on land-use policy and spatial planning. It will require a revolution in approach. These concepts must provide a new scientific basis to determine the type and scale of new development, promote a mix of land-use which will increase biocapacity, and spatial planning which will support sustainable lifestyles in St Albans, determining such aspects as the degree of dependence on car use going forward. It will require consideration of local, regional, national and global factors. It will challenge the way we have been doing things for the past century.

This report lays a sound foundation for St Albans City & District and for considering the issues which we must now address.

Pooran Desai