Cambridgeshire Green infrastructure Strategy Appendix 5
Climate Change

Contents

This section identifies the baseline datasets and relevant policies for the Biodiversity Theme, which is an important component of Green Infrastructure in Cambridgeshire. These are drawn together to identify the general and spatial issues that relate to this Theme. Conclusions are then made about how the issues can be mapped and overlaid to highlight the opportunities that exist for the Biodiversity Green Infrastructure Theme.

This map of Biodiversity opportunities was then combined with the other six Themes, as well as other important issues and assets in Cambridgeshire, to inform and develop the Strategic Network of Green Infrastructure.

Definition
Biodiversity is the term given to the variety of life on Earth, including wildlife and habitats, and the natural patterns formed as a result. The definition of biodiversity used in this strategy is taken from the Convention on Biological Diversity (CBD), signed in 1992:

"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." - CBD Article 2. UNEP 1992

1 Baseline information and datasets, including relevant policies

National Policies and Strategies

The UK Government Sustainable Development Strategy, DEFRA, 2005
This report outlines the principles and priorities for helping to deliver a better quality of life through sustainable development. Although there is no specific reference to Green Infrastructure, central to the Sustainable Development Strategy is the need to respond to the challenges of climate change, protect natural resources and enhance the environment. Furthermore it highlights the importance of green space and biodiversity networks to standard of living and quality of life.

Planning Policy Statements
A number of Planning Policy Statements, including PPS1 and PPS9, make reference to the importance of Green Infrastructure for the protection and enhancement of biodiversity and habitats. Also see Appendix 4 Planning and Growth for other Planning policy statements and guidance relating to Green Infrastructure.

Planning Policy Statement: Climate Change - Supplement to PPS 1 – this supplement to PPS1 sets out how planning should contribute to reducing emissions and stabilising climate change. In particular, it states that when selecting land for development planning authorities should take into account *"the contribution to be made from existing and new opportunities for open space and green infrastructure to urban cooling, sustainable drainage systems, and conserving and enhancing biodiversity".*

Planning Policy Statement (PPS) 9: Biological and Geological Conservation – this highlights the role that functioning ecosystems can have in promoting sustainable development and contributing to rural renewal and urban renaissance.

Natural Environment and Rural Communities (NERC) Act 2006 Section 40
This Act relates to the duty to conserve biodiversity and includes biodiversity enhancement. This duty requires local authorities to have regard to biodiversity across *all* their functions.

Tree Preservation Orders
Town and Country Planning Act 1990 and the subsequent Town and Country Planning (Trees) Regulations 1999 give Local Planning Authorities specific powers to protect certain trees by making tree preservation orders (TPOs). The purpose of a Tree Preservation Order (TPO) is to protect trees which make a significant contribution to their local surroundings. Special provisions also apply to trees within conservation areas designated by local planning authorities.

Hedgerow Regulations 1997
Following the widespread loss of hedgerows in the second half of the twentieth century, the government introduced the Hedgerow Regulations in 1997. These require a person to give the local planning authority six weeks notice of their intention to remove any hedge on or bordering agricultural land, forestry, commons, greens or nature reserves, stating their reasons. Hedges between domestic dwellings are not included.

If a hedge is judged to be 'important' by the necessary historical, landscape or biological criteria, the local authority may serve a *Hedgerow Retention Notice*, thereby protecting the hedge from removal.

Regional and Local Policies and Strategies

Our environment, our future: The Regional Environment Strategy for the East of England, ERRA and EEEF, 2003
This provides a summary of the current state of the environment, a description of the environmental challenges facing the region and a series of aims for responding these challenges. There is no specific reference to Green Infrastructure, however, the delivery and implementation of a Green Infrastructure Strategy will help deliver the following aims:

- Policy SA1: Accommodate population and economic growth whilst protecting and enhancing the environment;
- SA4: Reducing the vulnerability to the region to climate change;
- SA8: Promote the environmental economy;
- SA10: Maintain and enhance landscape and townscape character;
- SA11: Enhance biodiversity;
- SA12: Conserve and enhance the historic environment; and
- SA14: Increase the understanding and ownership of environmental issues.

Woodland for life: The Regional Woodland Strategy for the East of England, EERA and the Forestry Commission, 2003
This provides a vision for the woodland in the East of England and sets out the benefits that trees and woodlands bring to the people who live and work in the region. The benefits of woodlands are discussed under key themes, including quality of life, spatial planning, economic development, renewable energy, education and learning and natural environment.

Cambridgeshire Vision: Countywide Sustainable Community Strategy 2007 – 2021, Cambridgeshire Together, 2007
This sets out the collective vision and priorities of partner organisations to ensure that public services meet the needs of the people of Cambridgeshire. It focuses on 5 key themes; growth, economic prosperity, environmental sustainability, equality and inclusion and safer and stronger communities. Although there is no specific reference to Green Infrastructure, the Cambridgeshire Vision states that new development needs *"to provide infrastructure that encourages physical activity such as walking and cycling and environments that support social networks, which have a positive effect on mental and physical health"'.*

Cambridgeshire Local Area Agreement (LAA) 2008-2011

The LAA is the three year delivery plan for the Cambridgeshire Vision described above. The LAA establishes county-wide priority areas and targets, using indicators from the national indicator set. Those of relevance to Green Infrastructure include:

- NI 5 – Overall/general satisfaction with the local area;
- NI 188 – Adapting to climate change; and
- NI 197 – Improved local biodiversity.

Cambridge Local Plan, Adopted 2006

Under the Planning and Compulsory Purchase Act 2004, Cambridge City Council is required to replace the Cambridge Local Plan 2006 with a Local Development Framework (LDF), and work is progressing in this respect. However, until the documents comprising the LDF are prepared and their policies come into force, the Act makes provision for Councils to retain their Local Plan policies by application to the Secretary of State. Cambridge City Council has made this application and a number of policies remain in force. There are no policies relating directly to Green Infrastructure, however a number relate to the protection and enhancement of open space and nature conservation. These include:

- Policy 4/2 Protection of Open Space
- Policy 4/3 Safeguarding Features of Amenity or Nature Conservation Value
- Policy 4/6 Protection of Sites of Local Nature Conservation Importance

East Cambridgeshire Core Strategy, Adopted 2009

In relation to Green Infrastructure, Policy CS6 seeks to protect and enhance the natural and built environment, and the local distinctiveness of East Cambridgeshire. The policy refers to Strategic Areas of Green Space Enhancement, where it will be particularly important to improve biodiversity and landscape value. These areas reflect the target areas for habitat creation in the Cambridgeshire and Peterborough Structure Plan (2003) and the priority areas for strategic Green Infrastructure creation identified in the First Green Infrastructure Strategy (2006).

Fenland District Core Strategy and Development Policies, Preferred Options 2, 2007

In relation to Green Infrastructure, the Core Strategy states that Fenland district has no strategic areas of public open space, and country parks should be promoted for March, Chatteris and Wisbech. In additional, there are aspirations to enhance and extend the existing network of rights of way, including the consideration of gaps in the network, and protect and enhance landscape character and biodiversity value.

Huntingdonshire Core Strategy, Adopted 2009

The Spatial vision for Huntingdonshire states: *"In 2026 Huntingdonshire will have retained its distinct identity as a predominantly rural area with vibrant villages and market towns. Residents will be happier, healthier and more active and will enjoy an improved quality of life with improved access to a*

wider range of local jobs, housing, high quality services and facilities and green infrastructure". Policy CS9 specifically relates to Green Infrastructure stating that the Council will actively support Green Infrastructure projects which demonstrate increased access for quiet recreation and increased provision for biodiversity. Areas of Strategic Green Space Enhancement are identified as follows:

- The Great Fen area with links to the Peterborough Green Parks, Ramsey and Huntingdon;
- The Grafham Water / Brampton Woodlands area with links to Huntingdon and St Neots; and
- The Great Ouse Valley area with links between St Neots and Earith.

The policy continues to say that *"within these areas and along the corridors coordinated action will be taken via consultation with statutory and other agencies to:*

- *safeguard existing and potential sites of nature conservation value, including ancient woodlands and historic landscape features;*
- *create new wildlife habitats to increase biodiversity;*
- *contribute to diversification of the local economy and tourist development through enhancement of existing and provision of new facilities;*
- *create appropriate access for a wide range of users to enjoy the countryside; and*
- *Contribute where possible to enhanced flood protection.*

It is particularly important that resources are concentrated in these areas in the early part of the plan period in order to create opportunities for additional outdoor recreation facilities for the growth in population expected and the early creation of new green corridors.

In the longer term the enhancement of the following green corridors will provide additional corridors and connections with key areas across Cambridgeshire and Peterborough and enhancement of a coherent network:

- *Grafham Water area with the Great Fen Project area;*
- *The Great Fen project area with the Hanson RSBP Wetland Project and South Peterborough Green Park;*
- *The Great Ouse and the East of St Neots area with the proposed Forest of South Cambridgeshire".* (Now known as the West Cambridgeshire Hundreds)

South Cambridgeshire Core Strategy - Adopted 2007 and Biodiversity Supplementary Planning Document - Adopted 2009

The Core Strategy sets out the vision and over-arching policies for South Cambridgeshire. With regard to the Green Infrastructure Policy ST/1 Green Belt states that regard should be given to the special character of Cambridge and it setting.

The Biodiversity SPD expands on district-wide policies, ensuring that biodiversity is adequately protected and enhanced throughout the development process.

In relation to Green Infrastructure, the SPD identifies the role of Green Infrastructure in contributing to the network of wildlife corridors. The SPD also identifies 'Countryside Enhancement Areas' where significant projects, such as the West Cambridgeshire Hundreds Project, *"will provide significant areas of land for both people and biodiversity, thus meeting the aim of green infrastructure provision".*

Nature Conservation Designations

Many sites of nature conservation value in Cambridgeshire are protected through legislation. Many sites of nature conservation value in Cambridgeshire are protected on a statutory basis. Other sites have local policy protection due their local contribution to the landscape, historical, geological and/or ecological importance of the area. If these are included in a statutory planning policy document they gain protection on the basis of the policy applying to them.

International / European Sites

The most important sites for wildlife are those identified through international conventions and European Directives. These have statutory protection and many have more than one nature conservation designation. Five international (Ramsar) wildlife sites are found in Cambridgeshire (excluding Peterborough). A small number of European wildlife sites have also been designated within the county, comprising 2 Special Protection Areas and 6 Special Areas of Conservation (see Table 1). Examples include the Ouse and Nene Washes, Wicken Fen and Devil's Dyke.

When comparing Cambridgeshire (excluding Peterborough) to other counties within the East of England, it supports more international / European sites than Hertfordshire, but significantly fewer sites than Norfolk and Suffolk (see Table 1).

International / European sites cover less than 2% of Cambridgeshire, which is much lower than the national average and significantly lower than Norfolk (see Table 2).

Sites of National Importance

Sites of Special Scientific Interest (SSSIs) are a representative suite of sites with statutory protection of national importance for their nature conservation, geological or geomorphologic interest. Some are also designated as sites of international importance. There are 87 SSSIs in Cambridgeshire (excluding Peterborough), which account for 2% of the total number of SSSIs in England. Cambridgeshire supports fewer SSSIs than Suffolk and Norfolk but more SSSIs than Hertfordshire (see Table 1).

SSSIs cover approximately 2.4% of Cambridgeshire (excluding Peterborough). This is significantly lower than the average across England and coverage across Suffolk (approximately 8%) but greater than coverage of SSSIs across Hertfordshire (see Table 2).

Some of these sites are also designated National Nature Reserves (NNRs), to protect biodiversity, geodiversity, and provide opportunities for recreation and education. There are 6 NNRs in Cambridgeshire.

Natural England have a Public Service Agreement (PSA) target for 95% of SSSI land to be in 'favourable' or 'recovering' condition by 2010. Nationally, this target has been met. However, only 62% of SSSI land in Cambridgeshire (including Peterborough) meets the required condition. This is significantly lower than other counties in the East of England, which have over 90% of their SSSI land in favourable / recovering condition (see Table 3).

Sites of Local Importance

The network of sites with local biodiversity interest contributes greatly to the quality of life and the well-being of local communities. Sites of local importance include:

- Local Nature Reserves (LNRs). LNRs are places for people and wildlife that have features of special wildlife interest. They are established by Local Authorities under the provisions of the National Parks and Access to the Countryside Act 1949 on land normally owned by a local authority. There are currently over 20 LNRs in Cambridgeshire, and their number is likely to increase. LNRs may also have more than one designation, for example County Wildlife Site.
- County Wildlife Sites (CWS). CWS are sites of wildlife value in a County context. These non-statutory sites have some protection through development plan policies. Sympathetic management by landowners and managers helps to ensure their wildlife interest is retained. There are 364 CWS in Cambridgeshire (excluding Peterborough) and many contain priority habitats and species. One of the County Wildlife Sites is designated as a Regionally Important Geological and Geomorphological Site (RIGS).
- In addition, City Wildlife Sites are designated by Cambridge City Council to protect sites of local importance. The criteria for their designation are set at a lower level than for CWS. There are 51 City Wildlife Sites in Cambridge.
- Protected Road Verges (PRVs). PRVs are stretches of road verge that have been selected for protection and special management because of their wildlife interest. Many contain the last remnants of important habitats such as neutral or chalk grassland and provide a refuge to some scarce and rare species. There are 68 PRVs in Cambridgeshire, some of which are part of SSSIs or CWS.

Cambridgeshire (excluding Peterborough) supports only 1% of England's local wildlife sites. Cambridgeshire has less than half the number of local wildlife sites than Hertfordshire and less than a quarter of the sites in Suffolk (see Table 1).

Local wildlife sites cover less than 2% of Cambridgeshire (excluding Peterborough), which is less that the national average and other East of England counties (see Table 2).

The condition of Cambridgeshire local wildlife sites has continued to improve over the past few years. The percentage of sites in positive conservation management has increased from 38% in 2008 to 47% by March 2010, with 65% of sites expected to be in positive conservation management by March 2011.

The percentage of Cambridgeshire's local wildlife sites currently in positive conservation management is greater than the national average (41%) and neighbouring counties of Hertfordshire. Although Norfolk and Suffolk have higher percentages of sites in positive conservation management than Cambridgeshire (see Table 4).

Table 1: Number of Designated Sites situated within Cambridgeshire, surrounding counties and across England

	Cambridgeshire (excluding Peterborough)[1]	Hert[2]	Norfolk[3]	Suffolk[4]	England[5]
Ramsar	5	1	8	6	70 +3 proposed
Special Protection Areas	2	1	7	7	83 +2 pSPAs
Special Areas of Conservation	6	2	12	11	240 + 11 cSAC/pSAC
Sites of Special Scientific Interest	87	43	166	149	4118
National Nature Reserve	6	1	20	9	224
Local Nature Reserves	21	33-38	28	36	1400
Local Wildlife Sites	415	1975	1277	924	38000

[1] Annual Monitoring Information for Cambridgeshire County Council - Reporting Year 2009/10 (Cambridgeshire and Peterborough Environmental Records Centre, Nov 2010); LNR – Our Natural Environment Report 2010 (CPBRC & Cambridgeshire & Peterborough Biological Partnership, 2010)
[2] Herfordshire County Council, Dec 2010 (County Wildlife Site information taken from 2009)
[3] Norfolk Biodiversity Information Service, Dec 2010; NNR - Natural England website (accessed 20 Dec 2010); LWS – NI 197 Report 2009/10, Norfolk County Council
[4] Suffolk Biological Records Centre, March/April 2010; LWS – County Wildlife Sites, Suffolk Biological Records Centre, Dec 2010
[5] Ramsar – JNCC, Aug 2007; SPA & SAC – JNCC, Aug 2010; NNR and LNR - Natural England website (accessed 16 Dec 2010); SSSI – Natural England, Dec 2010; LWS (including geological sites) – Natural England, Oct 2010

Table 2: Area (hectares) and % coverage of Designated Sites situated within Cambridgeshire, surrounding counties and across England

	Cambs (exc. Peterborough)[6]		Hertfordshire[7]		Norfolk[8]		Suffolk[9]		England[10]	
	Area (ha)	% land	Area (ha)	% land	Area (ha)	% land	Area (ha)	% land	Area (ha)	% land
Ramsar	3668	1.2%	189	0.1%	79420	14.4%	8368	2.2%	392696	3.0%
Special Protection Areas	3093	1.0%	189	0.1%	105152	19.1%	27404	7.1%	745542	5.6%
Special Areas of Conservation	1093	0.4%	988	0.6%	124654	22.7%	6385	1.7%	1013012	7.6%
Sites of Special Scientific Interest	7259	2.4%	2211	1.3%			31326	8.1%	1081777	8.1%
National Nature Reserve	1004	0.3%	237	0.1%			2589	0.7%	96663	0.7%
Local Nature Reserves	167	0.1%	1029 (based on 33 LNRs)	0.6%			463	0.1%	37768	0.3%
Local Wildlife Sites	5896 +268 km linear sites	1.9%[+] (exc. linear sites)	13815	8.4%	14143	2.6%	19688	5.1%	500000[+]	3.8%[+]
Region[11]	305401	-	164306	-	549834	-	385359	-	13293767	-

[6] Annual Monitoring Information for Cambridgeshire County Council - Reporting Year 2009/10 (Cambridgeshire and Peterborough Environmental Records Centre, Nov 2010); LNR – Our Natural Environment Report 2010 (CPBRC & Cambridgeshire & Peterborough Biological Partnership, 2010)

[7] Herfordshire County Council, Dec 2010 (County Wildlife Site information taken from 2009)

[8] Norfolk County Council, Dec 2010; LWS – NI 197 Report 2009/10, Norfolk County Council

[9] Suffolk Biological Records Centre, March/April 2010; LWS – County Wildlife Sites, Suffolk Biological Records Centre, Dec 2010

10 LWS (including geological sites) – Natural England, Oct 2010; Other sites – Natural England datasets for England (Version 1/11/10); % coverage – Natural England website (accessed 16 Dec 2010)

[11] Area measurement (realm boundary) for electoral and administrative areas have been created by the Office for National Statistics using Ordnance Survey [and Land & Property Services] material. © Crown Copyright. All rights reserved [Dec 2009]

Table 3: Percentage of SSSI land (SSSI units) in Cambridgeshire, surrounding counties and across England by November 201012

	Cambridgeshire (including Peterborough)	Herts	Norfolk	Suffolk	England
Area favourable / unfavorable recovering (meeting PSA target)	62.2%	93.4%	93.2%	90.8%	95.0%
Area unfavourable no change / unfavourable declining	37.7%	6.6%	6.8%	9.1%	5.0%
Area destroyed / part destroyed	0.1%	0.0%	0.0%	0.1%	0.0%

Table 4: Number of Local Wildlife Sites, including number in Positive Conservation Management (PCM), reported for National Indicator 197 within Cambridgeshire, surrounding counties and across England

	Cambridgeshire (excluding Peterborough)[13]	Herts[14]	Norfolk[15]	Suffolk[16]	England[17]
Number of Local Wildlife Sites	414	1760	1273	922	38000
Number of Sites in PCM	195	347	707	455	-
% PCM	47% (March 2010)	20% (2010)	56% (2009/10)	49% (Nov 2010)	41% (June 2010)

Natural Areas (as defined by Natural England)

Natural Areas are sub-divisions of England, each with a characteristic association of wildlife and natural features. Each Natural Area has a unique identity resulting from the interaction of wildlife, landform, geology, land use and human impact.

Natural Areas have been formally defined as:

"…biogeographic zones which reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England, and provide a framework for setting objectives for nature conservation"[18].

[12] Natural England SSSI conditions report, compiled 1st November 2010
[13] Annual Monitoring Information for Cambridgeshire County Council - Reporting Year 2009/10 (Cambridgeshire and Peterborough Environmental Records Centre, Nov 2010)
[14] Significance of and support for Local Wildlife Sites in the East of England (East of England Wildlife Trusts, Aug 2010)
[15] LWS – NI 197 Report 2009/10, Norfolk County Council
[16] Suffolk County Council, Nov 2010
[17] No. sites – Defra, Oct 2010; %PCM – Defra, June 2010
[18] Biodiversity: The UK Steering Group Report, HMSO, 1995

Cambridgeshire contains six Natural Areas. The two most extensive are the Fens and the West Anglian Plain which occupy much of the west and north of the county. The East Anglian Plain and East Anglian Chalk extend across the more elevated landscapes in the south of Cambridgeshire. Areas of the Breckland and Bedfordshire Greensand Ridge are also evident, albeit limited to small areas on the fringes of the county.

A summary of the key features for Natural Areas described in the East of England Natural Area Profile[19] is presented below. However, it should be noted that these descriptions are not a reflection of quality nor do they account for the influence of settlements and infrastructure.

The Fens

Earth Heritage	**Freshwater**	**Bog, Fen and Swamp**	**Lowland Grassland and Heath**
• Upper Jurassic clays and associated deposits with important fossil faunas. • Upper Jurassic fossil-rich limestones including coral reefs and associated deposits at Upware. • Complex sequences of Holocene deposits representing varied environments and recording recent sea level and climatic changes.	• Large, slow-flowing rivers and drains. • Ditches and drains with wet grasslands, some botanical significance, e.g. Ouse Washes. • Ponds and borrow pits (some mesotrophic standing waters). • Many flooded gravel pits (some mesotrophic standing waters).	• Small, scattered areas of relict fen. • Purple moor-grass and rush pastures. • Small areas of marsh, fen-sedge swamp and reedbed habitats.	• Wet neutral grassland including washlands and floodplain grazing marsh. • Ditches and drains within wet grassland, some of botanical significance, e.g. Ouse Washes. • Some improved neutral grassland.

[19] English Nature, Natural Areas in the East of England Region, 1999

West Anglian Plain

Earth Heritage	Woodland
• Formerly economically important ironstone deposits. • Middle Jurassic limestones and clays showing a great variety of environments. • Oxford Clay exposures in brickpits of importance for palaeontology and stratigraphy at the junction of the Oxford and Ampthill clays with rich faunas. • Fossil-rich limestones and clays at the junction of the Oxford and Ampthill clays with rich faunas. • Exposures of well known fossiliferous Cambridge Greensand (Cretaceous) with diverse faunas including reptile bones. • Quaternary glacial deposits. • Quaternary river terrace gravels with important fossil faunas.	• Lowland oak and mixed deciduous woods. • Numerous ancient coppice woods.

East Anglian Plain

Earth Heritage	Freshwater	Bog, Fen and Swamp	Woodland
• Late Cretaceous fossiliferous chalk. • Quaternary stratigraphy - includes glacial and interglacial deposits. • Quaternary river gravel deposits, including cold-climate mammal remains.	• Long stretches of slow-flowing rivers and drains. • Series of flooded gravel pits and reservoirs. • Small ponds and shallow lakes; many of which are eutrophic standing waters.	• Series of spring-fed valley fens in headwater rivers. • Some areas of purple moor grass and rush pastures.	• Numerous ancient lowland oak and mixed deciduous woods. • Hornbeam woods at northern edge of their range. • Ancient lowland wood pasture and parkland with veteran trees.

East Anglian Chalk

Freshwater	Lowland Grassland and Heath
• Chalk spring, ditch, stream and river habitats are significant for invertebrates and particular plant species. • Watercourses home to number of animals including otter, water vole and white-clawed crayfish. • Old pollarded crack and white willows significant feature of almost all riversides.	• Remnants of once extensive chalk grassland, notably on road-side verges and ancient linear earthworks. • Downland turf characterised by varied, low growing, fine leaved grasses and wild flowers. • Mosaic pattern of calcareous and acidic grasslands towards the Breckland Natural Area. • Mesotrophic grassland on unimproved soils along the fen edge and roadside verges. • Marshy grassland meadows on scatter of sites along the chalk spring line.

Breckland

Freshwater	Bog, Fen and Swamp	Lowland Grassland and Heath
• Network of chalk streams. • Unique series of aquifer-fed naturally fluctuating water bodies. • Some large gravel pits. • Extensive series of pingos[20].	• Spring-fed valleys fens in headwaters and tributaries of rivers. • Some reedbeds along riversides and on margin of lakes.	• Extensive areas of dry lowland heathland. • Significant areas of lowland calcareous grassland and lowland dry acid grassland. • Inland sand dunes with grassland vegetation.

20 A dome-shaped mound consisting of a layer of soil over a large core of ice, occurring in permafrost areas. Oxford English Dictionary 2010 Oxford University Press

Broad Habitat Types

At the county scale, five broad habitat types have been identified by the Cambridgeshire and Peterborough Biodiversity Partnership and are the target for protection and enhancement[21] (outlined further in more detailed Biodiversity Action Plans).

Farmland
The farmed environment is the dominant land use in Cambridgeshire and as a result the futures of many species of plant and animal are inextricably linked to the way that farmland is managed.

Grasslands
Species-rich meadows and pastures are now very rare in the county due to more intensified agriculture and the loss of the land to development. Dry meadows and pastures are found on limestone and chalk outcrops, the Brecks and on neutral soils in the county. Many of the remaining grasslands of wildlife interest are now found on road verges and disused railways.

Wetlands
Rivers and wetlands have always been an important feature of Cambridgeshire. However, over the last fifty years, factors such as changing agricultural practices, water pollution, engineered flood defences and navigation structures and management have led to loss or decline of wetland species and habitats. For example the total area of wet grazing marsh has been drastically reduced by improved drainage, while water vole populations have suffered dramatic decreases with the introduction of mink and removal of suitable habitat areas. Cambridgeshire's washlands, originally created for flood defence, are now of international importance for birds, as well as for harbouring rare wetland plants.

Woodland
Cambridgeshire is one of the least wooded areas in the UK. As such wooded habitats play a vital role in the county as important wildlife habitats and landscape features. The priority task is to conserve the surviving sites and ensure that they are appropriately managed. It is also important to increase the area of woodland cover in the county. There is an increasing awareness about the importance of very old trees and the role they play in wooded habitats, especially parklands. For example, the elm droves of East Cambridgeshire and Huntingdonshire are the only UK habitats for the White Spotted Pinion (a species of moth). Such habitats are now increasingly rare and efforts must be made to conserve such features.

Cities, Towns and Villages

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[21] http://www.cambridgeshire.gov.uk/environment/natureconservation/action/partnership/baps/

Urban and peri-urban landscapes are also important for wildlife, providing a refuge for some of the species and habitats that are under pressure in rural areas. Urban and rural environments also host of buildings and other structures which can be of importance to wildlife, such as churchyards for lichens. Habitat creation on existing open space and also through development could increase the number of areas of wildlife friendly habitat.

Biodiversity Partnership 50 Year Vision Map[22]

The Biodiversity Partnership for Cambridgeshire has produced a 50 year wildlife vision to show how they hope the county will look in 2050. This groundbreaking and bold vision was the first of its kind in Britain.

The 50 Year Vision Map aims to show what members of the biodiversity partnership in the county are working towards and has had input from organisations such as Natural England. The map seeks to identify where habitat fragmentation can be reversed and where opportunities to link habitats exist to allow species to move in response to climate change at a broad scale. The Vision identifies the following four targets for habitat creation:

- Chalk and Limestone Grassland.
- Wetland habitats including Meadows.
- Acid Grassland and Heath.
- Woodlands and Hedgerows.

The Wildlife Trust's Living Landscapes

In response to the threat that climate change represents to plants and animals, in 2009 The Wildlife Trust published 'A *living landscape: A call to restore the UK's battered ecosystems, for wildlife and people'.* [23] This report captures a new and ambitious approach to landscape scale conservation and enhancement.

The Wildlife Trust is identifying key areas to protect for wildlife by enlarging, improving and joining them up. There are currently over 100 Living Landscapes schemes around the U.K. Five major schemes have been identified within Cambridgeshire. Living Landscapes projects in and around Cambridgeshire are illustrated on figure 13. A brief description of the Cambridgeshire schemes follows:

The West Cambridgeshire Hundreds Living Landscape Scheme

This aims to enhance biodiversity through the better management, expansion and linkage of habitats, concentrating on the ancient woodlands and hedgerow

[22] http://www.cambridgeshire.gov.uk/environment/natureconservation/action/partnership/publications/vision_map.htm

[23] http://www.wildlifetrusts.org/index.php?section=environment:livinglandscapes

network across the area. It aims to do this by working in partnership with local landowners to identify opportunities for environmental enhancements and co-ordinating action across property boundaries to increase landscape connectivity over a large area and to accomplish greater success than could be realised by landowners working independently. It is a joint project between local landowners, the Wildlife Trust, Woodland Trust, National Trust, Forestry Commission, Natural England and the Farming and Wildlife Advisory Group (FWAG).

The Gog Magogs Living Landscape Scheme

This aims to create an inter-connected network of species-rich chalk grassland and other habitats south of Cambridge and to create a large and accessible GI resource for the expanding population of Cambridge. It will work through a mixture of land acquisition to expand existing nature reserves and working with farmers to identify opportunities for habitat linkages and promoting agri-environment schemes to secure these enhancements. This is being promoted by a partnership between the Wildlife Trust, Cambridge Past, Present and Future, and Magog Trust though it is hoped to widen the partnership to include statutory organisations.

The Ouse Valley Living Landscape Scheme

This aims to create a network of species-rich flood meadows, floodplain grazing marsh and wet woodland along the Ouse Valley from St Neots to the Ouse Washes. The main approaches are through the expansion and management of existing nature reserves; through targeted advice to owners of County Wildlife Sites; through seed harvesting of species-rich meadows to aid the restoration of improved meadows and through the creation of wet grassland for breeding and wintering water birds. This is a partnership project between the Wildlife Trust, Huntingdonshire District Council, FWAG, Forestry Commission and the Environment Agency.

The Great Fen Living Landscapes Scheme

This will restore 3700 ha of fenland habitat between Huntingdon and Peterborough, by connecting two vitally important existing National Nature Reserves, Holme Fen and Woodwalton Fen. This will provide a haven for wildlife and create a massive green space for people, opening new opportunities for business, education and recreation. The project is a partnership between the Environment Agency, Huntingdonshire District Council, Middle Level Commissioners[24], Natural England and the Wildlife Trust.

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[24] The Middle Level Commissioners are a statutory corporation created under the Middle Level Acts 1810-74 and operating also under the Land Drainage Act 1991, the Flood and Water Management Act 2010 and the Nene Navigation Act 1753. The Commissioners' primary functions comprise the provision of flood defence and water level management to the Middle Level area, and as navigation authority for the navigable waters of the Middle Level system. The Commissioners have also certain conservation duties to fulfill when undertaking their functions. The Middle Level Commissioners consist of representatives from both the agricultural and non-agricultural sectors. Occupiers of agricultural property receive a rate demand direct from the Commissioners.

Nene Valley Living landscapes Scheme
In the next 20 years, The Wildlife Trust's plan for the Nene Valley is, initially, to buffer and extend existing reserves and, eventually, to link them together through habitat restoration and creation. In this process, facilities for visitors will be improved and environmental education and outdoor learning will support the growth of healthy, environmentally aware communities. In addition to acquiring land, the Wildlife Trust will work with farmers and landowners to support more wildlife friendly land use and with local authorities, development agencies and developers to achieve a valley with naturally functioning interlinked wetlands, rich in wildlife for the enjoyment of everyone. The Wildlife Trust has started to develop a joint initiative with Northamptonshire and Cambridgeshire in partnership with the Environment Agency and Nene Park Trust.

Other Strategies, Schemes and Action Plans

England's Trees Woods and Forests (ETWF) Delivery Plan 2008-2012
"The Government's Strategy for England Trees, Woods and Forests, launched in 2007, highlights the contribution that trees make to social, environmental and economic objectives today and sets out a vision for their future role.
The goal is that by 2020 more woods will be brought into sustainable woodland management supplying raw materials for use in construction and for woodfuel, and we will have a healthier landscape for wildlife and an increase in people visiting woodlands. For the first time the Strategy covers the full spectrum - from extensive forests to street trees and hedgerows." (Forestry Commission. 2010. http://www.forestry.gov.uk/website/forestry.nsf/byunique/infd-8audpv)

English Woodland Grant Scheme (EWGS)
The English Woodland Grant Scheme (EWGS) provides grant support for landowners wanting to create new woodland and carry out sustainable woodland management, particularly where it protects and enhances the woodland's environmental or social value (http://www.forestry.gov.uk/ewgs). Target areas are identified for the application of the scheme.

Cambridgeshire Biodiversity Action Plans (BAPS), mostly updated in 2009
Cambridgeshire is covered by 42 BAPS, identifying more than 400 individual actions to enhance biodiversity across the County. Key habitats and BAP actions are summarised below, as identified by the Cambridgeshire and Peterborough Biodiversity Partnership:

– *Farmland (6)*

- BAP Actions for Farmland including Arable land, Arable field margins, Hedgerows, Skylark, Grey partridge and Brown hare

– *Grassland (5)*

- BAP Actions for dry grasslands including neutral, acid and chalk grassland, grassland, Stone curlew and Pasque flower

– *Wetlands (15)*

- BAP Actions for Wetland including Reedbeds, Ponds-Lakes and Reservoirs, Fenland Drainage Ditches, Fens, Rivers and Streams and Floodplain Grazing Marsh, Mineral Restoration Sites, Water Vole, Otter, Bittern, White-clawed Crayfish, Ribbon-leaved Water Plantain, Desmoulin's Whorl Snail, Glutinous Snail, Shining Ram's Horn Snail

– *Woodland (6)*

- BAP Actions for Woodland including Wet woodland, Woodland, Veteran trees and parkland, Traditional orchards, Black hairstreak butterfly, Dormouse

– *Cities, Towns and Villages (10)*

- BAP Actions for Urban Areas including Urban Umbrella BAP, Allotments, Burial Grounds, Domestic Gardens, Managed Greenspaces, Brownfield sites and built environment, Urban Forest, Great crested newt, Pipistrelle bat and Song thrush

Cambridgeshire's natural habitats and species

No audit of the habitats present within Cambridgeshire has been completed. However, an estimation of the extent of local Biodiversity Action Plan (BAP) grassland and woodland habitats across the county was produced as part of the Biodiversity Action Plan review in 2008/9. BAP grassland and woodland covers approximately 0.33% and 1.25% of Cambridgeshire (excluding Peterborough), respectively (see Table 6 below).

Table 6: Estimates of Grassland and Woodland Biodiversity Action Plan Habitats in Cambridgeshire (excluding Peterborough)[25]

BAP habitat	**Cambridgeshire (exc. Peterborough)**	
	Area (hectares)	% of total area
Chalk/Limestone grassland	640	0.21
Neutral Grassland	310	0.10
Acid Grassland	40	0.01
Grassland total	**990**	**0.33**
Woodland	2550	0.84
Wet Woodland	80	0.03
Veteran trees and Parkland	1180	0.39
Woodland total	**3810**	**1.25**

[25] Cambridgeshire and Peterborough Biological Records Centre and Cambridgeshire and Peterborough Biodiversity Partnership (2010) *Our Natural Environment 2010*

Many species have already been lost from Cambridgeshire and some of those that remain are declining, such as farmland birds. The county is also a national strong-hold for some rare species, such as White-spotted Pinion moth, which underwent rapid decline as a result of Dutch elm disease during the 1970s. However, there are some success stories where species decline has been halted, for example Otter.

Farmland Birds

Changes in the agricultural landscape have resulted in a significant decline in farmland bird populations across the UK. This decline is similarly reflected across Cambridgeshire due to intensification of agricultural practices and the growth of development and associated infrastructure.

A number of farmland birds, including Skylark and Yellow Wagtail, have been listed as UK priority species for conservation (UK Biodiversity Action Plan) and included within the red list of the Birds of Conservation Concern in UK[26] due to the severity of their population declines.

For example, the Skylark, a resident of the farmed landscape, has seen its population decrease nationally by 17% and regionally by 26%. The population of Yellow Wagtail, a summer migrant to the UK, has decreased by 41% regionally and 48% nationally.[27]

Otter

The Otter is listed as a UK priority species for conservation (UK Biodiversity Action Plan) and local Biodiversity Action Plan species. The Otter was formerly widespread throughout the UK but underwent rapid decline in numbers in the 1950s to 1970s. However, there are clear signs that the Otter is recovering within Cambridgeshire.

Surveys of bridge sites in Cambridgeshire have found an expansion in the Otter population since 1992. Sites showing evidence of usage by Otters have increased from 1.1% in 1992 to 26.3% in 2007. The Cam and Great Ouse appear to have the best Otter populations in the local area.[28] The increase in Otter populations is reflected both within the Anglian region and nationally (see Table 5).

The recovery of the Otter population is attributed to the ban of pesticides linked to Otter extinctions (1960s-70s), legal protection for Otter (1978) and significant

[26] Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man.* British Birds 102, pp296–341.

[27] Cambridgeshire and Peterborough Biological Records Centre and Cambridgeshire and Peterborough Biodiversity Partnership (2010) *Our Natural Environment 2010*

[28] Cambridgeshire and Peterborough Biological Records Centre and Cambridgeshire and Peterborough Biodiversity Partnership (2010) *Our Natural Environment 2010*

improvements in water quality since the 1970s. In addition, Otter re-introductions are likely to have accelerated localised recovery within East Anglia.[29]

Table 5: Percentage of sites showing evidence of Otters during the Environment Agency's 5 monitoring surveys for Anglian region and across England[30]

Survey date	1977-79	1984-86	1991-94	2002-02	2009-10
Anglian region	3%	1%	8%	27%	56%
England	6%	10%	23%	36%	59%

White-spotted Pinion Moth

The White-spotted Pinion moth is a UK priority species for conservation (UK Biodiversity Action Plan). Nationally, the moth has seen a 90% decline in its UK population and contraction of its range to Cambridgeshire, Bedfordshire and Essex.[31] However, Cambridgeshire is the national stronghold for the White-spotted Pinion moth, with the population considered to be stable.[32]

The national decline of the White-spotted Pinion moth is most likely due to the large-scale loss of elms (larval food plant) as a result of Dutch Elm disease. Small areas of mature elm trees have survived within Cambridgeshire, which has contributed to the survival of this species within the county. The long-term survival of this species will depend on the retention of, and planting of, elms resilient to Dutch Elm Disease.

[29] Environment Agency (2010). *Fifth Otter Survey of England 2009-10 – Summary Report*. Environment Agency, Bristol

[30] Environment Agency (2010). *Fifth Otter Survey of England 2009-10 – Full Technical Report*. Environment Agency, Bristol

[31] Cambridgeshire and Peterborough Biodiversity Partnership (2010) *Update 2010* newsletter

[32] Personal communication with Sharon Hearle, Butterfly Conservation (Dec, 2010)

2 Spatial analysis

The Biodiversity Theme map was developed by taking into account the decline in biodiversity and pressures on habitats and species in Cambridgeshire, and the following baseline maps and other baseline information.

Principle Habitat Types: These maps illustrate the distribution of Cambridgeshire's principal habitat types, which are based on existing designated sites being attributed with their principle habitat type. This work was undertaken in conjunction with The Wildlife Trust for Bedfordshire, Cambridgeshire, Northamptonshire and Peterborough. The habitat types are:

- Open Water
- Woodland
- Wet Woodland
- Farmland
- Fenland
- Calcareous Grassland
- Parkland/Neutral Grassland
- Floodplain Grassland

Figure 5.1 and 5.2 identify the distribution of habitats across Cambridgeshire and clusters or groups of similar habitats. This information can then be used to highlight where there is existing provision that can be protected and expanded, in part by creating new habitats in the gaps between these habitat clusters.

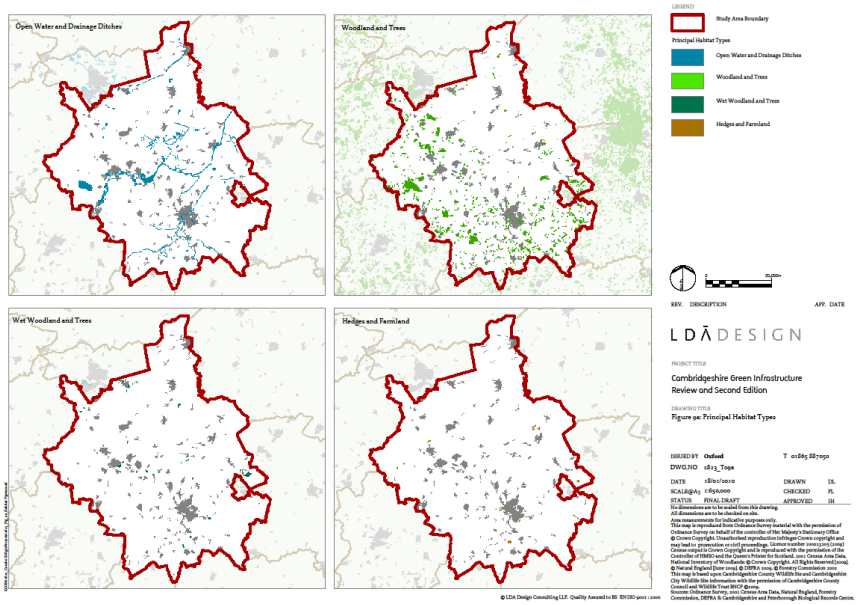

Figure 5.1 Principle habitat types

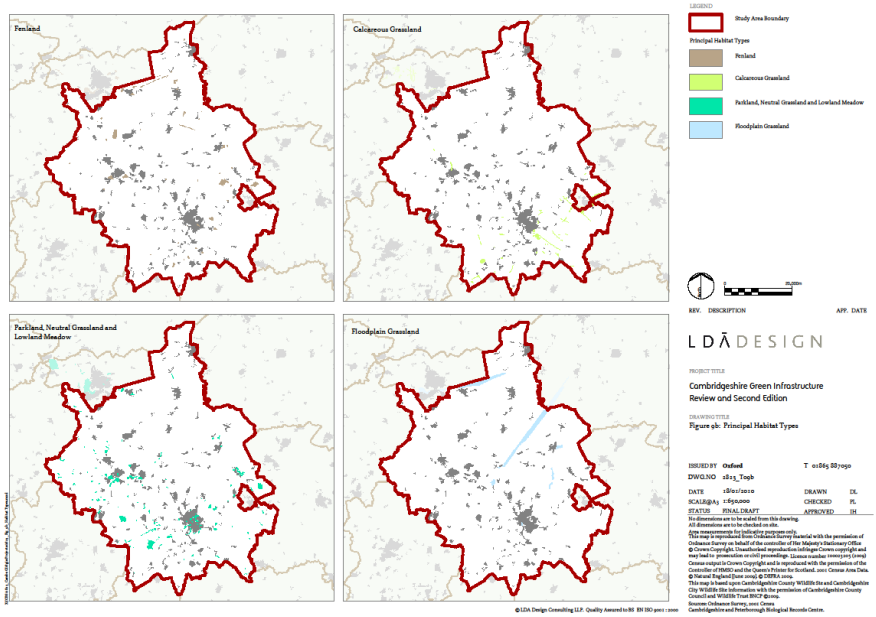

Figure 5.2 Principle habitat types

Woodland/Ancient Woodland and English Woodland Grant Scheme[33] (EWGS) Target Areas/Priority Areas: The below map shows existing areas of woodland and ancient woodland; and target areas for woodland creation through the EWGS. Ancient woodlands are extremely important for nature conservation because the well developed plant and animal populations they support cannot be re-created in new woodlands. They provide rich habitat and support species such as Oxlip, Bluebell, Wood Anemone, Yellow Archangel, Herb Paris and Early Purple Orchid. Rides and transition habitat on the edges of woodlands are also important, when appropriately managed.

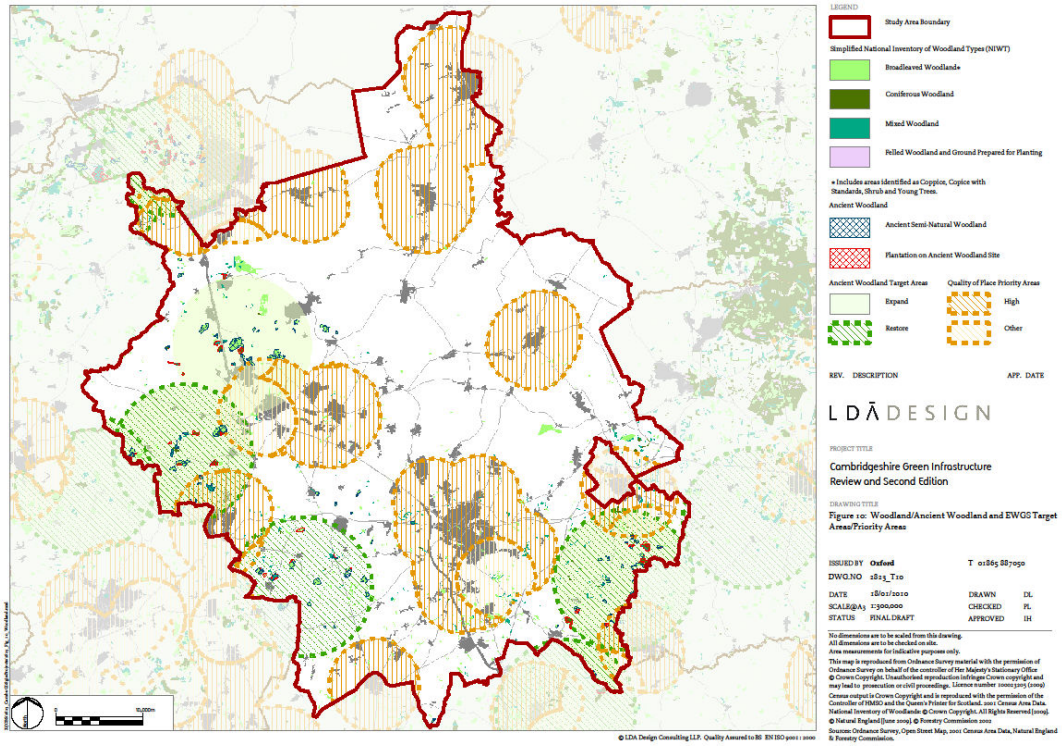

Figure 5.3 Woodland/Ancient Woodland and EWOST Target Areas/Priority Areas

[33] The English Woodland Grant Scheme (EWGS) provides grant support for landowners wanting to create new woodland and carry out sustainable woodland management, particularly where it protects and enhances the woodland's environmental or social value. http://www.forestry.gov.uk/ewgs

Natural Areas: This map illustrates the extent of different Natural Areas in the County. Natural Areas influence the different habitats that exist within them and so they provide a broader context for the range and distribution of habitats across Cambridgeshire.

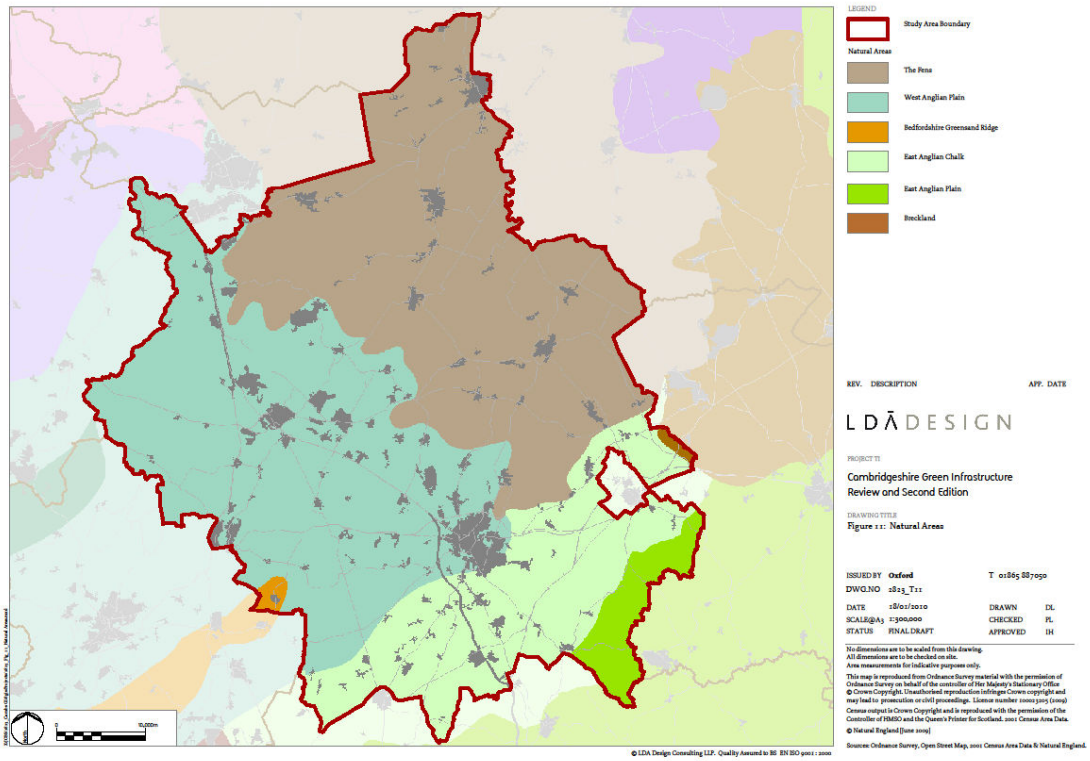

Figure 5.4 Natural Areas

Nature Conservation Designations: This map illustrates statutory and non-statutory (such as County Wildlife Sites) designated sites. These sites are internationally, nationally and locally important for their habitats and species. Designated sites are protected under law and are often publicly accessible and have wider educational benefits. As such, they form a key component of Green Infrastructure in Cambridgeshire.

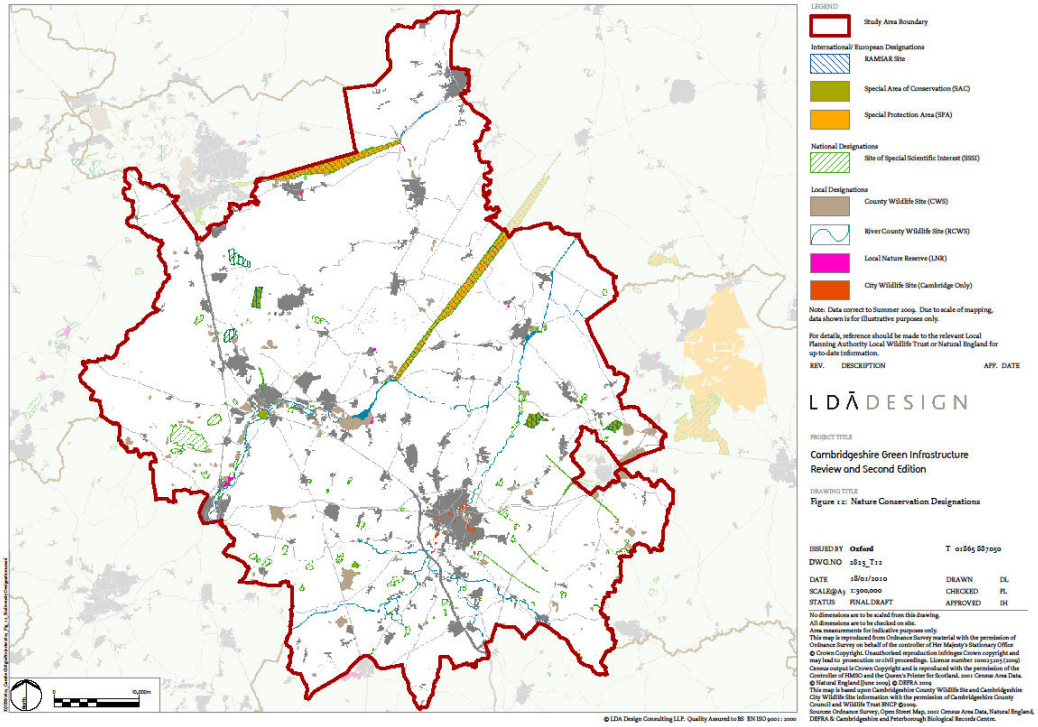

Figure 5.5 Nature conservation designations

Wildlife Trust's Living Landscapes Projects and Cambridgeshire and Peterborough Biodiversity Partnership's 50 Year Vision Areas: The Cambridgeshire and Peterborough Biodiversity Partnership has identified areas of large-scale habitat creation to support Biodiversity Action Plan (BAP) habitats and species – reflecting in part the location of existing habitats. The Wildlife Trust has identified similar areas called 'living landscapes'. These show where large-scale habitat creation would be best located, based on the existing habitats in Cambridgeshire. This map illustrates extracts from the Wildlife Trust's Living Landscapes Projects and Biodiversity Partnership's 50 Year Vision plan.

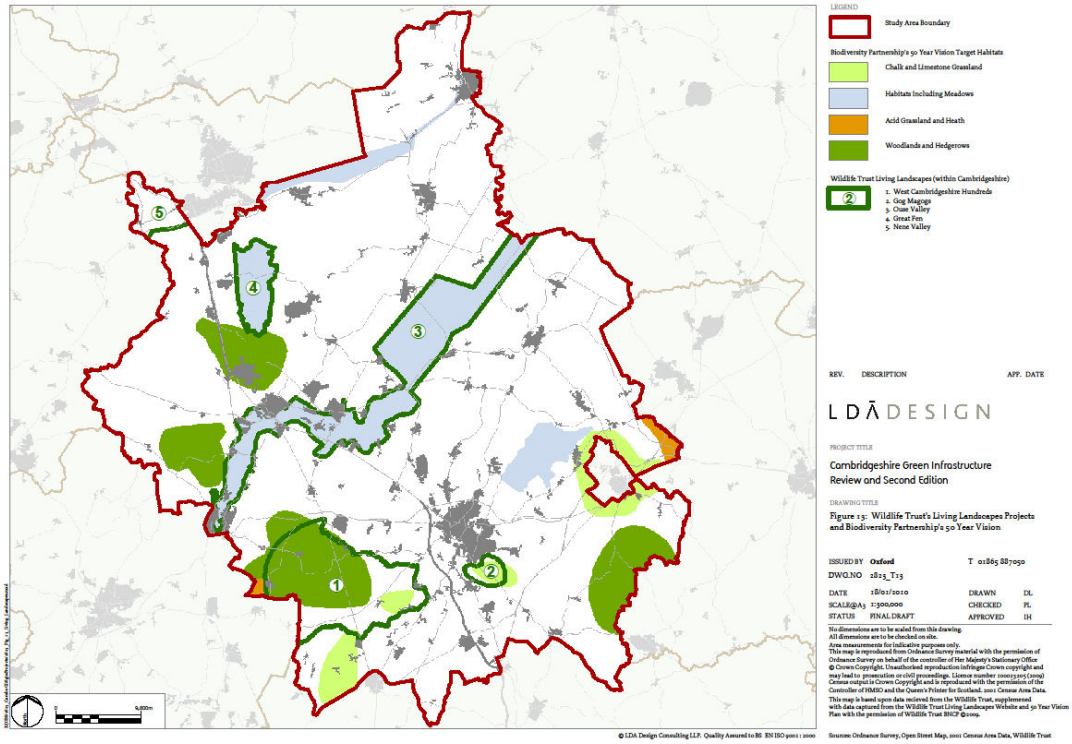

Figure 5.6 Wildlife Trust's Living Landscapes projects and Biodiversity Partnership's 50 Year Vision

In the absence of a single comprehensive habitat dataset for Cambridgeshire, the biodiversity theme was developed by analysing these key baseline datasets and in particular individual designated sites in the county to identify the distribution of key habitat types in Cambridgeshire.

The key habitat types identified across the county were as follows:

- Open Water and Drainage Ditches
- Woodland and Trees
- Wet Woodland and Trees
- Hedges and Farmland
- Fenland
- Calcareous Grassland
- Parkland, Neutral Grassland and Lowland Meadow
- Floodplain Grassland

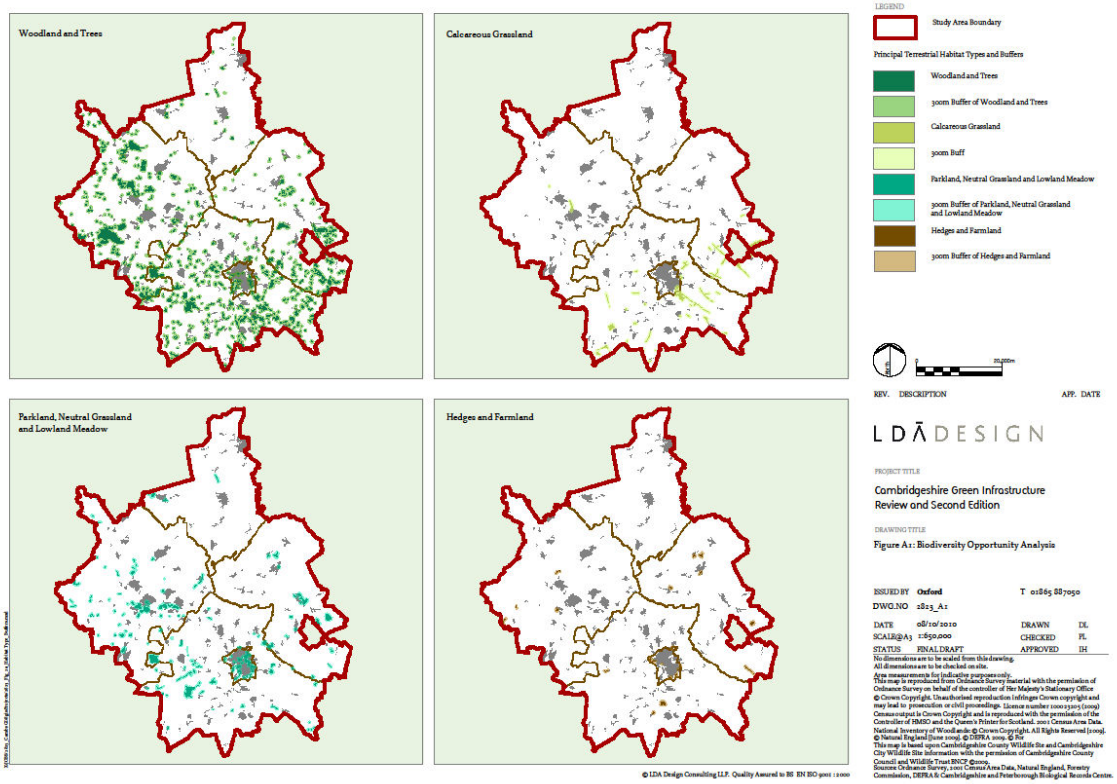

Figure 5.7 Biodiversity Opportunity analysis

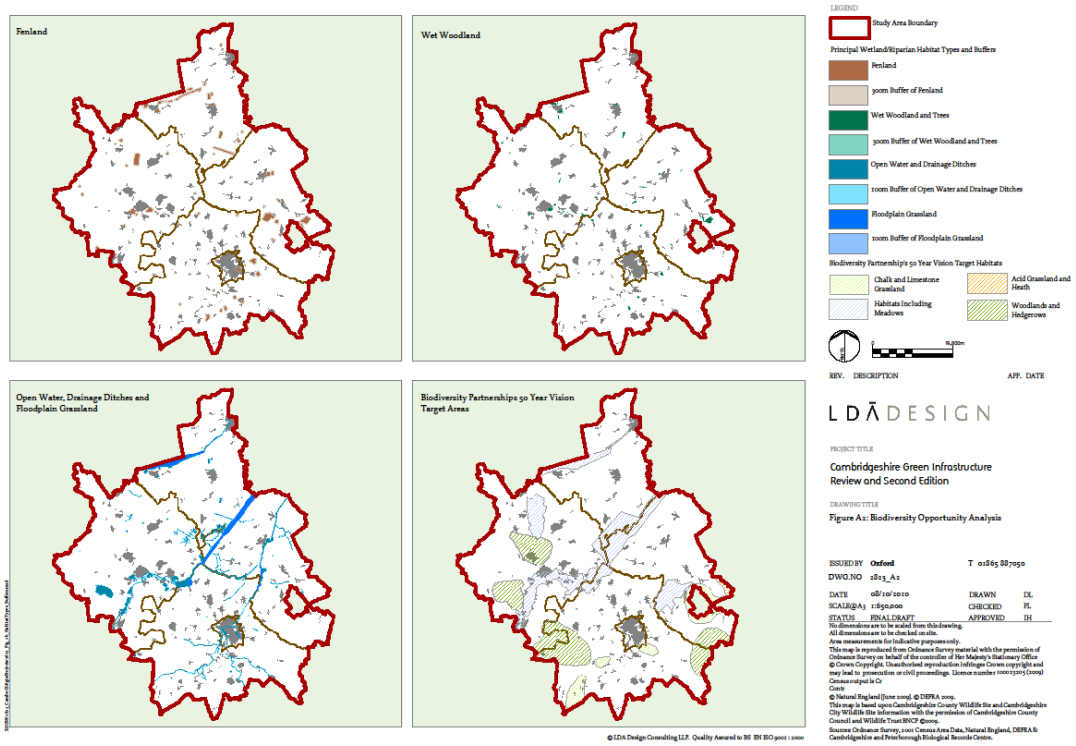

Figure 5.8 Biodiversity Opportunity analysis

Clusters of these different habitats were then identified (Figure 5.8) these habitat clusters were where large areas of particular habitats exist or where smaller areas of habitats are found in close proximity to each other. These clusters form 'reservoirs' for strategic investment in habitat protection, enhancement and creation. When compared to the Biodiversity Partnership's 50 Year Vision Target Areas for biodiversity enhancement, there is a strong overlap between the areas identified.

The biodiversity reservoirs identified by this process are:

- Woodland, Farmland and Hedgerows Habitat Reservoirs
- Parkland, Neutral Grassland and Lowland Meadow Habitat Reservoirs
- Calcareous Grassland Habitat Reservoirs
- Floodplain Grassland, Open Water and Wet Woodland Habitat Reservoirs
- Fen

In bringing these together on a single map the network of habitat reservoirs can be identified – highlighting the opportunities for strategic biodiversity enhancement.

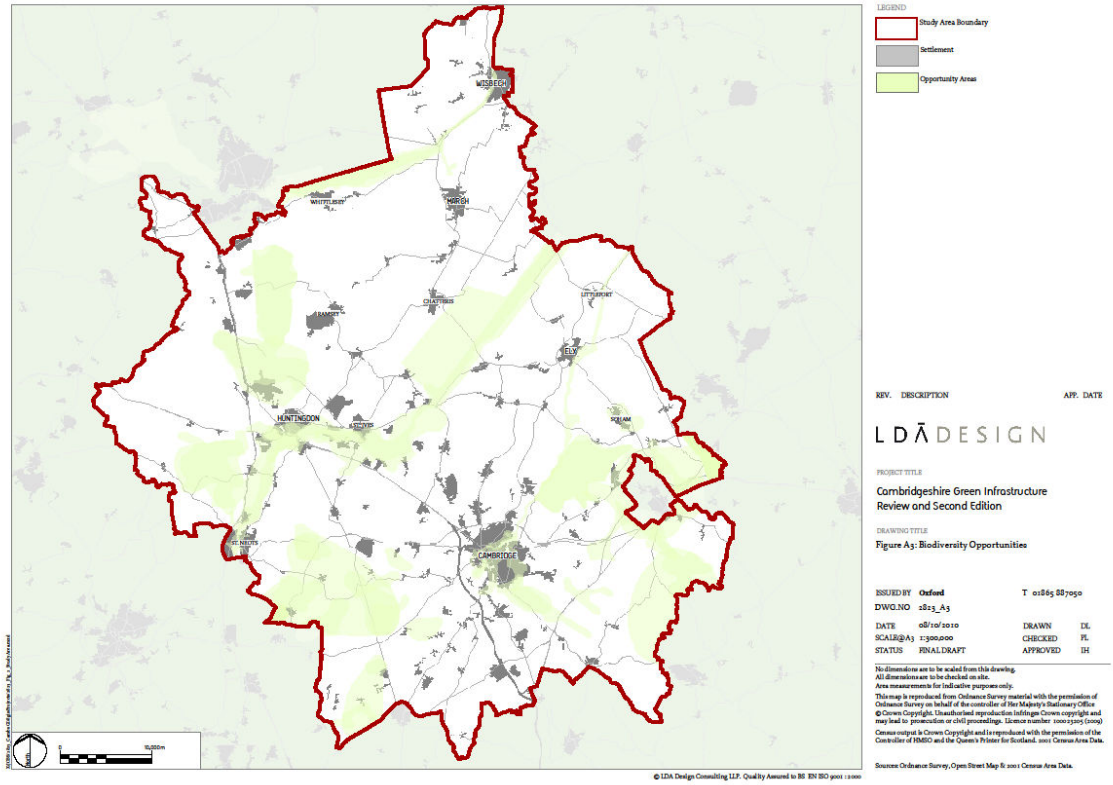

Figure 5.9 Biodiversity Opportunities

3 Issues and Opportunities

Changing land uses and new development in both rural and urban contexts can threaten and erode biodiversity character (as expressed by Natural Area Profiles). However, settlement growth can, through delivery of carefully considered Green Infrastructure plans at the local scale, strengthen biodiversity character, and create new biodiversity assets. As such Green Infrastructure projects can demonstrate a sound understanding of underlying physical influences and ensure that key biodiversity character is protected and enhanced. Consideration will need to be given to the strategic context and to local issues when judging what changes are appropriate in regard to biodiversity.

The combined effects of habitat fragmentation and climate change could have negative impacts on biodiversity. Fragmentation reduces the size and viability of species populations and their ability to move within the landscape. Climate change compounds these effects by increasing pressure on populations as well as their need to move. The effects may be offset by taking action at a landscape scale so that ecological connectivity is improved[34].

Habitat areas identified in the Green Infrastructure Strategy support the highest levels of biodiversity offering the best chance of achieving a high standard of habitat restoration, expansion and linkage. At a more local scale, where core areas of habitat are located in close proximity to each other, priority can be given to habitat linkage initiatives with the aim of reversing fragmentation and isolation. Linear features such as watercourses and hedgerows also make an important contribution to habitat connectivity.

Several Living Landscapes projects have been identified by the Wildlife Trust in Cambridgeshire. The Green Infrastructure Strategy presents an opportunity to support the objectives of existing Living Landscapes projects, and add new projects in the future. It may also be possible to extend the scope of existing Living Landscapes projects to help address a greater number of Green Infrastructure objectives.

The health, wellbeing and educational benefits of robust and functioning habitats cannot be overstated and these functions can be exploited through provision of improved access and interpretation, where possible and appropriate to protect the intrinsic character and quality of individual wildlife sites.

[34] J Latham and J Gillespie, Applying Connectivity to Spatial Planning in Wales, 2009

Woodland, Farmland and Hedgerows Habitat Reservoirs

Eight Woodland, Farmland and Hedgerows Habitat Reservoirs have been identified in Cambridgeshire. These largely occupy the southern and western portion of the county, where woodlands are a characteristic feature of the landscape, and where the majority of the county's Ancient Woodland sites are located.

A particularly noticeable cluster of Woodland, Farmland and Hedgerows Habitat Reservoirs have been identified across the West Anglian Plain centered on the clay hills and ridges between Cambridge and St Neots. Here the most ecologically important woodlands are largely ancient in origin. Indeed, several are nationally renowned, such as Hayley Wood which has been the subject of extensive study[35].

Whilst many of the woodlands in the Habitat Reservoirs are influenced by the underlying boulder clay geology, the influence of acidic soils is also evident, albeit very locally. For example to the west of Gamlingay, acidic soils influence the tree species and ground flora present.

Whilst much of the nature conservation interest across the Woodland, Farmland and Hedgerows Habitat Reservoirs is the ancient woodland component, areas of secondary woodland and new plantations are also significant. These range in species composition and nature conservation interest. However they perform an important function, notably in creating 'stepping stones' of woodland and shelter between fragments of ancient woodland.

Similarly, hedgerows, unimproved grasslands and field margins are an important component of Terrestrial Habitat Reservoirs. Hedgerows form boundaries to many arable and pastoral fields, and whilst they are in no way as frequent as they once were due to agricultural intensification and field amalgamation, they are once again increasing in number and becoming more sympathetically managed. Hedgerows provide food and shelter for invertebrates, birds and mammals and are also known to operate as foraging routes for animals such as bats and as dispersal routes between woodlands for certain species.

Field margin buffer strips bordering hedgerows are also valuable, both as mechanisms for reducing the adverse effects of pesticide drift from neighbouring fields and creating a range of habitats and vegetation profiles, further enhancing the foraging and shelter capacity of the hedgerows.

Within the Woodland, Farmland and Hedgerows Habitat Reservoirs, opportunities for woodland and hedgerow creation will be a key objective, with the intention of increasing the overall area of woodland and shrubby habitat. In addition habitat creation and enhancement should focus on buffering existing

[35]Oliver Rackham, Hayley Wood its History and Ecology, Cambridgeshire Wildlife Trust, 1990

woodlands, particularly those which are currently designated for their nature conservation value, and on creating habitat links and stepping stones between woodland blocks.

Careful consideration should be given to visual and landscape character when planning new woodlands. Key views and panoramas should not be obstructed and the balance between woodland and open areas maintained.

Woodland creation could be achieved through natural regeneration, particularly when planning new woodland adjacent to existing stands. All new planting should comprise native broadleaf species; with consideration given to ensuring species selection is appropriate for site and prevailing conditions.

In addition to creating new woodlands and hedgerows and habitat connectivity more generally, the quality of existing woodlands should be maintained and enhanced through appropriate management. Priority should be given to ancient woodland sites and ensuring that these are maintained in a favourable condition.

It will be necessary to address all woodland habitat expansion and enhancement proposals on a case by case basis, since land ownership, historic land use and soil conditions may be important factors determining the most appropriate approach to habitat creation, restoration and enhancement.

Target Species
Farmland and woodland birds, including Spotted Flycatcher, Bullfinch and Turtle Dove
Barbastelle bat
Hazel Dormouse
Black Hairstreak
Invertebrates such as longhorn beetles or click beetles.

The eight Woodland, Farmland and Hedgerows Habitat Reservoirs are:

- Alconbury and Sawtry
- Chippenham and Fordham
- Longstowe, Wimpole and Great Eversden
- Hayley and Hatley
- Gamlingay and Gransden
- Croxton and Eltisley
- Stetchworth and Kirtling
- Grafham Water Fringe

Parkland, Neutral Grassland and Lowland Meadow Habitat Reservoirs

Very few fragments of species-rich grassland remain within the county; former sites having been damaged or degraded by decades of improvement through the application of pesticides and fertilisers, or through reversion to arable production.

However, areas of parkland and remnant species rich neutral grassland associated with verges and dismantled rail lines are notable nature conservation features across the claylands of the West Anglian Plain. Indeed, public rights of way often preserve strips of species-rich grassland. Further grasslands are located on the commons fringing Soham in the east of the county. This broad habitat type also forms an important component of many ancient woodland rides.

Several sites are currently designated, largely on account of the neutral grassland indicator species present such as Cowslip, Green-winged Orchid, Pepper Saxifrage or Yellow Rattle, or in the floodplain meadows Great Burnet, Marsh Marigold or Ragged Robin. The Parkland, Neutral Grassland and Lowland Meadow Habitat Reservoirs are also important because of the various other habitat features they support including veteran trees, ditches and wetland areas. Veteran trees are particularly valued features for their micro habitats and the invertebrates they support.

The extent and continuity of grassland habitat is less strongly developed than, for example, woodlands. As such remnant grasslands form 'islands' of habitat rather than large areas of continuous or linked habitat resource. Reducing the effects of habitat fragmentation is therefore the overall objective, perhaps through increasing the size of individual remnant areas of grassland and connecting grassland patches through the creation of linear grassland belts or enhancement of existing landscape features such as field margins, roadside verges and hedges. Priority should be given to the protection and enhancement of existing high quality grasslands as well as their expansion where this is achievable. This will be important in creating buffers between the existing grasslands and adjacent land uses that have the potential to adversely affect habitats and key species.

Target Species
(Meadows) Great Burnet, Saw-wort and Green-winged Orchid
(Parkland) various bat species and wood eating invertebrates such as the hoverfly Callicera spinolae and click-beetle Elater ferrugineus

The eight Parkland, Neutral Grassland and Lowland Meadow Habitat Reservoirs are:

- Ouse Valley, Huntingdon and Brampton
- Ouse Valley - St Ives and Hemingford
- Wimpole Hall Park
- Soham Commons

- Cambridge Commons, Southern Fringe and Cam Meadows
- Croxton Park
- Kingston and Bourn
- Caldecote

Calcareous Grassland Habitat Reservoirs

Up until relatively recently, botanically rich calcareous grasslands would have been a more common feature across the rolling chalk hills in the south of the county which were created and maintained through low intensity sheep farming well into the nineteenth century.

However, intensive agricultural regimes and decades of improvement for arable farming have reduced the remaining resource to a relatively small number of fragmented sites in well protected locations, roadside verges and former quarries.

As for other grassland types in the county, the extent and continuity of chalk grassland habitat is less strongly developed than, for example, woodlands. As such remnant grasslands form 'islands' of habitat rather than large areas of continuous or linked habitat resource, albeit in some cases these are relatively long linear features such as the Devil's Dyke. Reducing the effects of habitat fragmentation is therefore the overall objective, perhaps through increasing the size of individual remnant areas of grassland and connecting grassland patches through the creation of linear grassland belts or enhancement of existing landscape features such as field margins, roadside verges and hedges. Priority should be given to the protection and enhancement of existing high quality grasslands as well as their expansion where this is achievable. This will be important in creating buffers between the existing grassland and adjacent land uses.

Whilst only small fragments remain, six distinct clusters can be identified, some of which currently support scarce plant species such as Kidney Vetch, Horseshoe Vetch and Wild Thyme.

Target Species
Pasqueflower, Lizard Orchid, Moon Carrot, Great Pignut, Perennial Flax, Juniper
Stone Curlew
Invertebrates such as Chalk-hill Blue butterfly, Small Blue butterfly, the red data book robber fly Machimus rusticus, the ground beetle Harpalus punctatulus and the bumblebee Bombus ruderatus
Bryophytes such as Tortula vahliana, Tortella inflexa, Aloina brevirostris and Lophozia perssonii.

The six Calcareous Grassland Habitat Reservoirs are:

- Litlington and Morden
- Gog Magog Hills and Roman Road
- Fleam Dyke and Chilly Hill
- Devil's Ditch and Newmarket Heath

- Limekilns
- Bassingbourn Barracks

Floodplain Grassland, Open Water and Wet Woodland Habitat Reservoirs

Rivers, streams, drainage ditches and open water areas such as Grafham Reservoir and associated wetland habitats such as wet woodland and floodplain grassland are significant and important habitat resources within the county. Of particular significance are the main river channels of the Cam, Nene and Ouse, each flowing in a north easterly direction towards the Wash, where they debouch into the North Sea.

In many respects, these river corridors are the focus of the county's biodiversity interest, with several of Cambridgeshire's most significant nature conservation designations being found along them, including Special Protected Areas (SPAs) and Sites of Special Scientific Interest (SSSIs) and Ramsar sites. Of particular significance are the Ouse and Nene Washes which attract large flocks of over wintering birds. Artificial wetlands and water bodies are also important such as Grafham Water which was created in the mid 1960's and restored sand and gravel pits such as those found along the Ouse.

Emphasis needs to be given to maintaining and improving water quality and creating or enhancing riparian habitats such as marshy grassland, flood meadow and wet woodland and features such as waterside pollarded willows and alders. Given the linear nature of these Habitat Reservoirs, significant opportunities exist to create coherent corridors of wetland habitats landscape through the heart of the county, offering strategic scale habitat reserves and linkage to several other types of Habitat Reservoir.

Target Species
Breeding waders e.g. Snipe, Redshank & Black-tailed Godwit
Other water-birds such as Whooper and Bewick Swans and various duck species
Spined loach
Ribbon-leaved water-plantain, Marsh sow-thistle, the stoneworts *Nitella tenuissima* and *Tolypella prolifera*
Scarce Chaser Dragonfly and various other aquatic invertebrates

Target Species are:

The four Floodplain Grassland, Open Water and Wet Woodland Habitat Reservoirs are:

- Grafham Water
- River Cam
- Nene Washes
- Ouse Valley and Washes

Fen

The Cambridgeshire Fenlands is an extensive landscape covering some 550 square miles that was, just a few centuries ago, and a wild landscape comprising a rich matrix of fen, bog and open water habitats of significant biodiversity interest. However, the rich and intensively farmed agricultural scene evident today has a relatively short history, having been created through extensive drainage of former fens and bogs over the last 350 years. Three principal phases of drainage have been identified, the most dramatic dating to the 17th century which saw deep drainage of the southern peat fens leading to the widespread conversion of pasture to arable farming, which in turn accelerated peat shrinkage resulting in a continued requirement to pump water into the now elevated drainage channels and rivers.

As a result of this widespread drainage and improvement, very few remnant fen habitats remain. The two key sites are Woodwalton Fen and Wicken Fen, both designated as SSSI, although other remnant sites are also evident in proximity, many of which are County Wildlife Sites. Isolated amongst intensively farmed arable fields, these wet fen sites are highly valued habitats and an important reminder of the once more extensive fen landscape.

Of particular significance in the remnant fens is the high occurrence of wetland plant communities including marshy grassland, birch and alder woodland and fen carr.

Target Species
Fen violet, Great Water Parsnip, aquatic plants
Bittern, Reed Bunting
Invertebrates such as Desmoulin's Whorl-snail, the fen diving beetle *Agabus undulatus* and other beetles such as *Oberea oculata*, *Pterostichus aterrimus, Pangaeus crux-major* and *Cryptocephalus exiguus*

Given the small and isolated extents of existing fen habitats, Fen Habitat Reservoirs are those that coincide with large-scale restoration proposals. The two fen Habitat Reservoirs are:

- Great Fen Area
- Wicken Fen Area

Cambridgeshire contains a rich biodiversity resource and potential. However, the county has suffered declines in a number of its species and habitats for many different reasons, most notably increased development pressure and agricultural intensification. Overall, Cambridgeshire has a smaller proportion of natural habitats than most counties in Britain. Many species have already been lost, and some of those that remain are isolated and declining.

The protection of existing resources and the potential for enhancement should be a priority of the Green Infrastructure Strategy. Whilst the mapped areas are strategy priorities, they represent only a part of the rich biodiversity and habitats in Cambridgeshire that require protection.