Biodiversity by Design

A guide for sustainable communities

A TCPA 'By Design' Guide

TCPA TOWN AND COUNTRY PLANNING ASSOCIATION
HOMES AND COMMUNITIES FOR A SUSTAINABLE FUTURE

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The charitable purpose of the Town and Country Planning Association is to improve the art and science of town and country planning. It is the only independent organisation for planning and housing covering the UK and the longest established planning body in the world. Its key objectives are to:

1. Secure a decent home for everyone, in a good human-scale environment combining the best features of town and country;
2. Empower people and communities to influence decisions that affect them;
3. Improve the planning system in accordance with the principles of sustainable development.

The TCPA occupies a unique position, overlapping with those involved in the development industry, the environmental movement and those concerned with social justice. The Association prides itself on creative thinking and developing practical environmental solutions through its extensive networks. It brings together senior politicians and policy makers and practitioners from a wide range of backgrounds working within the public, private and voluntary sectors.

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This Guide has been prepared by URBED (the Urban and Economic Development Group), the TCPA and ALGE for the TCPA. Case study material from Berlin was written and illustrated by Neil Corteen. Additional comments and input were provided by Mike Oxford from Association of Local Government Ecologists, English Nature and by Caroline Green of the TCPA.

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Foreword and policy context

In mid 2001 the TCPA published "A Programme for Sustainable Communities" calling for the positive planning and delivery of a greater number of homes to higher standards in sustainable social cities – or 'sustainable communities'. This demanded enhanced levels of "biodiversity, renewable energy and energy efficiency", it set out a vision, which "Above all, sees our communities as integrated with the natural environment rather than set against it."

The following year Government launched its groundbreaking "*Sustainable Communities: Building for the Future Action Programme*" more commonly known as the *Communities Plan*[1]. In one element of this programme, "*Creating Sustainable Communities: Greening the Gateway*"[2], the Government sets out its vision of integrating economic growth with environmental enhancement in the Thames Gateway in order to "*create a positive sense of place, provide environmental protection for local communities and enhance the quality of life for those who live and work there*."

But how sustainable will the new developments be? Supporting a richness of biodiversity is one route to building more sustainable neighbourhoods. The TCPA, in this the first of its 'By Design' Guides, therefore, sets out practical, design led solutions which can be implemented now. No focus can be found here on the meaning or definition of sustainable development, instead the purpose of this Guide is on the delivery that is urgently needed.

UK case studies have been paired with international examples, which provide us with useful lessons. They demonstrate how we cannot think solely about protection of the environment but must also explore our relationship with nature's biodiversity. It is a truism too often overlooked that our nation's backgardens support a wide variety of wildlife, whilst on many arable fields wildlife is threatened by intensive farming methods. There is, therefore, evidence that development can, if it treads lightly on the land, deliver positive outcomes for wildlife on both brownfield and greenfield sites.

The examples chosen, whilst illustrating ways in which biodiversity can be created, protected and enhanced, are not intended to be prescriptive. Nonetheless they demonstrate that enhanced biodiversity can be achieved in concert with delivering other aspects of sustainable development, a vital task for any emerging 'sustainable community'.

Prepared by URBED, Mike Oxford from the Association of Local Government Ecologists (ALGE), English Nature and Caroline Green from the TCPA, the Guide spans the boundaries between urban design, architecture and planning on the one hand and ecology on the other. It shows how enhancing biodiversity can and should form an integral part of masterplanning ensuring that we are "designing in biodiversity" from the earliest stages. We hope the series will be a reference point for planners and designers involved in the delivery of "Sustainable Communities" (both Housing Market Renewal and Growth Areas).

Now is a time of opportunity to create better development and in the words of the founder of the TCPA to allow "the countryside to invade the town"[4]. In many of the Growth Areas for example, positive and rising land values exist which could be harnessed not only to create more diverse landscapes, but also to establish an endowment for their future stewardship. In Renewal Areas the task is to create places to which jobs, homes and communities will be attracted and investing in natural greenspaces is key to achieving this goal.

I am indebted to the support received from English Nature, Hyde Housing Group and RSPB without whose support this publication would not have been possible.

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UK GOVERNMENT POLICY

UK Biodiversity Policy" Working with the grain of nature: a biodiversity strategy for England", published by Defra in 2002[3] established the Government's vision for conserving and enhancing biodiversity in England. In the forthcoming Planning Policy Statement (PPS) 9: Biodiversity and Geological Conservation, the Government will set out how it expects the planning system to support this vision and help secure the UK Biodiversity Action Plan targets for species and habitat recovery. By so doing, the planning system will have a role in helping meet the Government's commitment made at the 2002 Johannesburg World Summit to significantly reduce the rate of biodiversity loss by 2010.

Source:
DEFRA (2002) *Working with the grain of nature: a biodiversity strategy for England*, http://www.defra.gov.uk/wildlife-countryside/ewd/biostrat/

How the guide works

The aim of the guide is to provide guidance on how to maximise the opportunities for biodiversity in the planning and design of sustainable communities. The guide takes the user through the design process, presenting a toolkit of best practice that can be tailored according to the scale of the development opportunity.

In order to do this it draws upon lessons from over 20 international case studies, including a set of examples from the city of Berlin. These have been selected to demonstrate new approaches with potential for replication in the UK. Recognising the potential for differences in cultural attitudes to nature we have included a short commentary for Germany.

The guide has been tailored to respond to the scale and form of development being brought forward in response to the Government's Sustainable Communities Plan. Below we summarise the different scenarios we have used to inform the guide. Included within the guide are a number of examples of 'in-progress' schemes promoted by the Communities Plan.

▷ Chapter One introduces the core design principles that form the basis for a 'biodiversity by design' approach: understanding ecological function, realising the benefits of biodiversity, and connecting with nature.

▷ Chapter Two explores tools and techniques for analysing a site and its context. In particular we highlight the need to explore relationships with the existing 'green infrastructure': the distinctive and multi-functional network of habitats, greenspaces and linkages.

▷ Chapter Three explores how to masterplan the green infrastructure for a sustainable community. In particular we look at how ecologically functional green infrastructure can be created, and how it can connect with and enhance the existing assets.

▷ Chapter Four focuses on detailed design elements: in particular the opportunities for urban ecology created by 'doorstep' spaces and buildings.

▷ Chapter Five explores how the long-term management and stewardship of green infrastructure can be secured. In particular we look at management plans, and the establishment of ecologically functional greenspaces. We also highlight the importance of resourcing and stewardship.

Indicative Scale of Development Opportunities

Growth Areas Sub-Region	Green infrastructure for growth corridor 100,000-150,000 new homes e.g. Thames Gateway, Milton Keynes
Growth Areas New Communities	Brownfield, New District or Town 5,000-10,000 homes e.g. Stratford City, Eastern Quarry Greenfield, Urban extension 3,000-4,000 homes e.g. Wellingborough, Cambridgeshire
Housing Market Renewal Pathfinder Areas	Brownfield, Demolition/New-build 1,000-2,000 homes e.g. Liverpool, Newcastle, Hull Brownfield, In-fill/Refurbishment 500-1,000 homes e.g. Lancashire, Greater Manchester

Cultural Commentary

Berlin (Germany)

Germany has one of the strongest ecological traditions in Europe. There is a strong appreciation of the benefits of nature in towns and cities, particularly in making cities more liveable. This is particularly important given the preference for higher density housing. Berlin, the capital city, is an exemplar with its pioneering green infrastructure and community forestry projects.

The naturalistic or ecological approach is the norm for most contemporary greenspaces, though there are differences in approach. In Munich, for example, native plant listings must be used to secure planning permission. In Berlin minimal intervention is favoured. Native and exotic plant species are encouraged to colonise greenspaces and brownfield sites, and few plants are considered to be 'weeds'.

Source: *Based on* Kendle,T (1997) *Urban nature conservation: landscape management in the urban countryside*, E&FN Spon

1.1 Design principles
Ecological function

Biodiversity is the variety of life, from genetic variation to communities of organisms. In this section, we provide a brief overview of the basic principles of ecology, and the importance of functioning ecosystems in creating opportunities for biodiversity.

Biodiversity is the heritage of millions of years of evolution. Human society has had a dramatic impact on this ecological heritage. In the last 200 years more species have become extinct than at any time in the last 65 million years[5]. This threatens ecosystems' ability to provide the air, water and soil on which we depend. Recognition of the need to protect biodiversity is enshrined in the UK Biodiversity Action Plan[6].

A basic understanding of ecology is important in order to understand the factors that influence biodiversity. Ecology is the study of ecosystems: communities of species and the physical environments and habitats that they have adapted to survive in[7].

Each type of habitat, such as woodland, wetland or grassland, supports a community of distinct, and well-adapted native vegetation. Exotics, non-natives and hybrid species, are to be found in natural habitats and may be well-adapted to polluted urban environments[8]. However, in general native vegetation will sustain the greatest biodiversity. Emulating the composition and structure of natural ecosystems will therefore tend to create the best opportunities for biodiversity.

The UK Biodiversity Action Plan

The International Convention on Biodiversity was signed at the 1992 Earth Summit. As a signatory, the UK was required to produce a national biodiversity action plan. This was published in 1994, with the overall aim being to: *'Conserve and enhance biological diversity within the UK and to contribute to the conservation of global biodiversity through all appropriate mechanisms.'* The objectives are:

1. To conserve and where practicable to enhance: the population and natural ranges of native species; natural and semi-natural wildlife habitats; ecosystems that are characteristic of local areas.
2. To increase public awareness of, and involvement in, conserving biodiversity.
3. To contribute to the conservation of biodiversity on a European and global scale.

Sources:
1. *Convention on Biological Diversity,* http://www.biodiv.org/default.aspx
2. UK Government (1994), *Biodiversity - The UK action plan,* HMSO

When nature colonises a new habitat it follows a process called succession: the natural order of events as successive species colonise[9]. Hardy 'pioneer' communities change their environment, improving it and creating more stable conditions for self-sustaining and structurally diverse ecosystems, such as oak-ash woodland.

Functioning natural systems are required to sustain biodiversity, and successional processes. Habitats and their characteristic communities of flora and fauna rely on specific physical conditions and ecological processes for their survival. Changes in water flows, water chemistry, air quality, shading, or disturbance may result in a loss of species and a change in the nature of a habitat.

Processes such as succession, water uptake, nutrient recycling, pollination, predator-prey ('food chain') relationships are features of functioning ecological systems which if disrupted can also lead to rapid changes[10]. An understanding of ecological function should therefore inform decisions when planning and designing for biodiversity.

The size and spatial relationships between habitat patches also influences biodiversity. The fragmentation of habitats by agriculture and urbanisation has highlighted the need for habitat networks: continuous, linked areas of habitat. Whilst planning can create opportunities for habitats, urban form will influence their size and extent. Masterplanning of a community's 'green infrastructure' can therefore play an important role in creating ecologically functional habitat networks.

Definition of Green Infrastructure

Green Infrastructure is the sub-regional network of protected sites, nature reserves, greenspaces, and greenway linkages. The linkages include river corridors and flood plains, migration routes and features of the landscape, which are of importance as wildlife corridors.

Green infrastructure should provide for multi-functional uses i.e., wildlife, recreational and cultural experience, as well as delivering ecological services, such as flood protection and microclimate control. It should also operate at all spatial scales from urban centres through to open countryside.

1.2 Design principles

Realising the benefits

There is increasing recognition of the many benefits of allowing nature to colonise the urban environment. In this section we explore how biodiversity can deliver the benefits of ecological services, improved quality of life and added economic value.

The 'green cities' movement has argued that nature should be allowed to permeate the built environment, seeing nature in the city as a necessity rather than just a luxury[11]. This is because biodiversity can deliver important environmental, social and economic benefits, something recognised by the government's promotion of biodiversity in community strategies[12].

Ecological Services

Vegetation can deliver a range of important ecological services and later in this guide we highlight examples of how this can be achieved:

- Carbon sink – Trees have a significant capacity to absorb carbon dioxide. 1 hectare of woodland can absorb emissions equivalent to 100 family cars[13].
- Pollution control – Vegetation has a significant capacity to attenuate noise and filter air pollution from motor vehicles[14]. Street trees can remove sulphur dioxide and reduce particulates by up to 75%. Noise attenuation can be as much as 30 dB per 100 metres. Wetland ecosystems are also effective in filtering polluted run-off and sewage.
- Air conditioning – In urban areas the heat island effect can increase temperatures relative to open countryside by up to 5°c[15]. Vegetation provides natural air conditioning. A single large tree can be equivalent to five room air conditioners[16] and will supply enough oxygen for ten people[17].
- Microclimate control – Vegetation can improve local microclimate conditions by providing shade in summer. It can also reduce wind effects created by streets and wind loads on buildings, potentially reducing heating requirements by up to 25%[18].
- Flood prevention – Vegetation can reduce excessive run-off and increase rainfall capture. This reduces the risk of flooding in low lying areas and can also recharge soil moisture and groundwater[19].

There is a strong case for biodiversity to be designed into new developments to offset climate change effects, thereby improving their liveability.

Quality of Life

Natural greenspaces can deliver a range of important social benefits, improving the quality of life for urban citizens and making higher density housing more attractive and liveable.

- Health and wellbeing - Since the creation of the first public parks in the 19th century planners have recognised nature's importance in improving peoples quality of life[20]. Accessible green space creates opportunities for recreation and exercise, and studies have shown that it increases children's creative play, social skills and concentration span[21]. Natural greenspaces reduce stress and encourage relaxation, providing a sense of freedom and exhilaration[22].
- Social cohesion - Natural greenspaces can encourage greater social interaction[23]. This more active use of greenspaces, including streets and communal spaces, can contribute to a more lively public realm - a key urban design objective[24]. Participation in the design and stewardship of green space can help strengthen communities[25]. Nature reserves can create a focal point for life-long learning about nature (see Section 1.3).

Economic Value

Natural greenspaces can increase property values, reduce management overheads, and reduce healthcare costs[26].

- Property values – Street trees and views of natural landscapes and waterways can increase property values by between 6% and 18%[27], as well as helping to sustain values over the long-term and improving the image of difficult to develop brownfield sites, as demonstrated by Greenwich Millennium Village's ecology park. Shoppers may also be willing to pay up to 10% more to shop in tree-lined streets[28].
- Management costs – Traditionally our greenspaces have been intensively managed, requiring significant and costly inputs of nutrients, herbicides and pesticides. Experience has shown that ecologically self-sustaining landscapes can significantly reduce the need for these inputs[29].

1.3 Design principles

Connecting with nature

Urban citizens are increasingly disconnected from nature, reflecting the separation between our built environment and the natural environment. In this section, we explore how people can be encouraged to connect with nature.

As we have become a more urbanised society the separation between our built environment and the 'natural' environment has become marked. Many of the examples of best practice in this guide are about achieving a greater degree of connectivity with nature – particularly in urban areas. Nurturing a culture change in attitudes to nature is therefore important. There are broadly three main ways in which this can be encouraged:

- Positive experience of nature – Biologist Edward O.Wilson talks about the importance of 'biophilia': our intrinsic delight and need to spend time in natural surroundings[30]. Research has also shown that childrens' experiences of nature shape their attitudes in later life[31]. The urban environment should therefore be designed to provide people with a positive day to day experience of nature.

  Ecologically functional communal greenspaces, streets and parks can create a continuous experience of living in an 'urban forest', providing people with an experience of nature on their doorstep. Experience from Germany, the Netherlands and Sweden shows that this can make higher residential densities more liveable.

- Learning from nature – A positive experience of nature creates informal learning about nature through recreation, discovery and delight. The next step is to create opportunities for formal learning. This can be achieved through the interpretation of ecologically functional greenspaces and nature reserves. It can also be linked to projects that explore natural processes, such as composting.

  At a very basic level, signage and information resources can be provided. However, greenspaces and nature reserves can be designed as outdoor classrooms. A good example is Benwell Nature Park in Newcastle (see Case Study). As an amenity space and Local Nature Reserve it is used by schools and adult education programmes.

- Community involvement – Participation in community gardens, allotments and city farms creates opportunities for people to learn about nature whilst improving their own environment. Projects at Kentish Town in London, Heeley in Sheffield, Springfields in Bradford and Hulme in Manchester illustrate how this can deliver significant benefits[32].

  As we go on to discuss in Chapter 5, community involvement in the design and management and stewardship of larger public greenspaces can also bring benefits. Mile End Park in London, with its ecology centre and park, is a good example of how stewardship and participatory learning can be combined[33].

As a theme 'connecting with nature' can be integrated into the masterplanning for sustainable communities, as illustrated by the new district of Viikki in Helsinki.

Viikki District, Helsinki

Community scale connections with nature

Viikki's 1,700 home eco-district masterplan has served to enhance residents' connection with nature:

- Nature reserve – Viikki is adjacent to a 250 hectare wetland bird habitat, with controlled public access;
- Enhanced landscapes – The Viikinjoa agricultural area has been enhanced to create a 34 hectare district park;
- Green 'fingers' – Corridors of ecological planting bring nature into the housing areas;
- Ecology park – A special children's ecology park is being constructed following a design competition;
- Environmental education centre – The 'Gardenia' is an environmental education centre managed by residents;
- Garden centre – An advice centre has been established on the edge of neighbouring woodland;
- Allotments – A range of smallholdings including plots and greenhouses are available to residents.

Sources:
1. City of Helsinki (1999) *Viikki – a university district and science park for the 2000's*, City Planning Department
2. Gauzin-Miller, D (2002) *Sustainable architecture and urbanism*, Birkhauser

Benwell Nature Park, Newcastle

Creating a nature reserve on a brownfield site

Developed in 1981, this 2.5 hectare Local Nature Reserve was originally the site of terraced housing until their clearance in 1976. The park's design incorporates habitats representative of regional character – native woodland, meadow and wetland habitats.

The park rangers run environmental education programmes, and the park is particularly popular with local schools. It also provides valuable local recreational space and is a focal point for a range of other activities, including recycling.

A community building located on-site hosts a range of activities, including adult education classes on maintenance and horticulture. The park has also benefited from significant volunteer input from the community, creating opportunities for skills development in an area of high unemployment.

Sources:
1. Dunnett.N, Swanwick.C and Woolley.H. *Improving urban parks, play areas and open spaces*, Urban research report, DTLR, May 2002
2. Newcastle City Council (2004) *Benwell Nature Park - management plan*, Newcastle Parks and Countryside Rangers Service

2.1 Context study
The existing green infrastructure

The protection and enhancement of the existing green infrastructure is important to conserve natural assets, protect local distinctiveness and minimise habitat fragmentation. In this section, we explore the relationship between a site and its existing green infrastructure.

As we highlighted in Section 1.1, the size and spatial relationships of a habitat influences biodiversity. Habitat networks are important in maximising areas of continuous and linked habitat. This requires an understanding of the existing green infrastructure: the network of habitats, greenspaces and 'green grid' linkages; its assets, functional requirements and the benefits it could deliver.

In some parts of the country such as the East Midlands, the green infrastructure may be relatively impoverished, requiring the creation of new green infrastructure. In other areas the infrastructure may be more developed, as demonstrated by the Kent 'Green Grid', with its range of functions.

Valuable features of the urban fringe may include protected nature reserves, forests and 'greenway' links such as hedgerows and waterways. Valuable features within urban areas may include protected nature reserves, links such as old railway lines, existing parks and brownfield sites.

There is an increasing recognition of the potential value of brownfield sites, particularly those previously in industrial use, and research has demonstrated that brownfield sites can support a wide range of habitats and species, some of which may be priorities listed in the UK BAP[1]. In London, for example, brownfield sites such as the Lower Lea are recognised as being some of the city's most ecologically diverse areas[2]. With their often unique mosaic of habitats and site conditions they may represent valuable assets within the green infrastructure: something recognised by Planning Policy Guidance (PPG) 3, Housing, in its definition of previously developed land[3]. A strategic approach to their protection and enhancement was pioneered by Germany's Emscher Park project[4] and in Berlin, the Schoneberger Naturpark demonstrates how their potential can be maximised (Case Study, Section 2.4).

Existing green infrastructure within urban areas can also be enhanced to deliver ecological services[5]. A good example is Berlin's 'biotope' strategy. The strategy has been closely related to work on urban climate zones and ecological services.

Habitat Networks, The Netherlands

Sub-regional scale ecologically functional green infrastructure

The Netherlands has pioneered the planning of habitat networks and this work suggests that there are four key steps[6]:

1. Determine priorities – what are the priority habitats and species?
2. Determine acceptable risk – what are the risks from weaknesses in the network?
3. Determine habitat networks – what are the dispersal ranges for priority species?
4. Determine conservation potential – what is the functional potential of the network?

Dutch networks define corridors for species migration, and buffer areas to protect habitats from disturbance. This work is supported by the use of new GIS models such as LARCH[7].

Sources: 1. Opdam, P *Assessing the conservation potential of habitat networks*, p.381 in Gutzwiller,K.J. (ed) (2002) Applying landscape ecology in biological conservation, Springer
2. Foppen, R.P.B. and J.P. Chardon (1998) *LARCH-EUROPE a model to assess the biodiversity potential in fragmented European ecosystems*, IBN No. 98/4, Wageningen University

Biotope Strategy, Berlin

City-scale green infrastructure to deliver ecological services

Introduced in 1994, the 'Biotope Area Factor' strategy aims to retain densities whilst developing the city's green infrastructure. Plans of existing habitat networks have been prepared covering the whole city, and dividing it into character areas which include[8]:

- Central city (intense use and densely populated) – maintain densities whilst retaining or increasing areas available to nature.
- Transition areas (mixed uses including residential, industry and infrastructure) – provide habitats that can serve a wider area. Linkages are prioritised.
- Landscape elements (periphery of the urban area) – ensure larger habitats with `fingers´ penetrate into the urban area. These are valuable species reservoirs.

Sources:
Berlin Department of Urban Development (1995) *Valuable areas for flora and fauna*, see map pop-up, http://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/ei503.htm

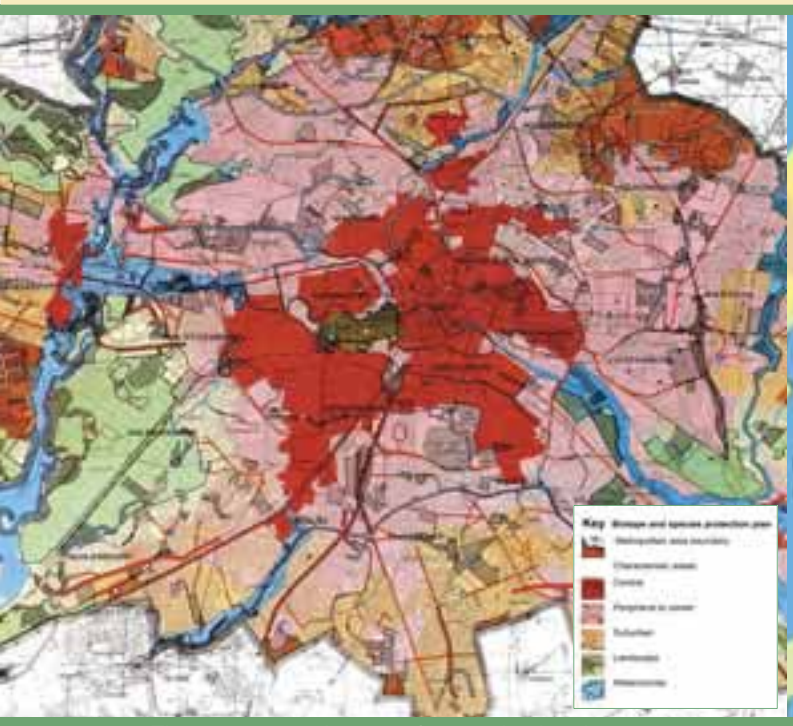
Eastern Quarry, Kent

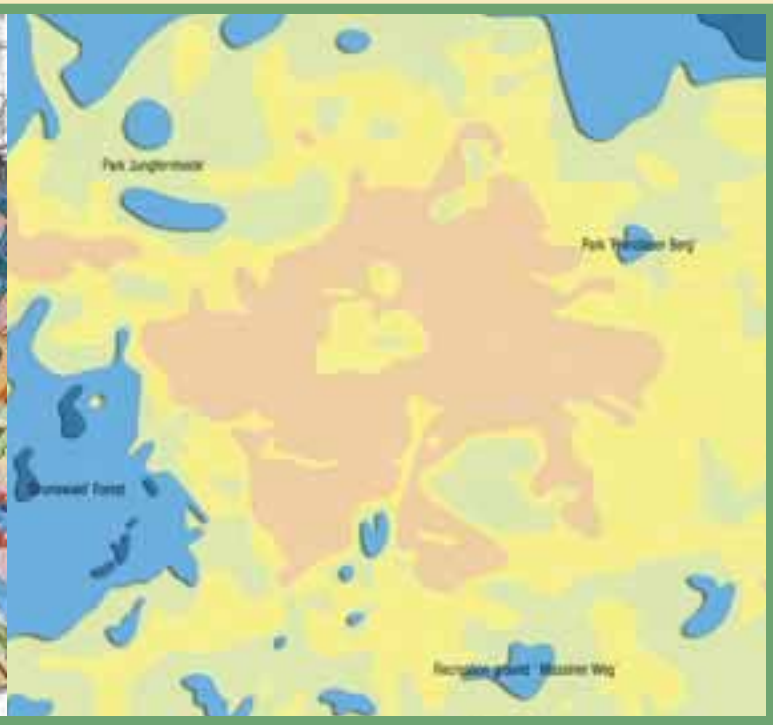
Community-scale connections with the 'Green Grid'

Eastern Quarry is a key development in the Thames Gateway[9]. Over the next 20 years 7,250 new homes are planned, grouped into five urban villages. The boundaries of the site and the proposed greenspaces have the potential to link in to an emerging green infrastructure network: the Kent Thameside Green Grid[10]. Potential connections include:

- The southern and western boundaries – cliff faces and mature woodland, providing habitats for birds listed under Schedule 1 of the Wildlife and Countryside Act;
- The northern boundary – Craylands Gorge, is a designated Site of Nature Conservation Importance (SNCI) with open grassland, scrub and secondary woodland habitats;
- 'Green zones' – a green space network will separate the villages, potentially linking habitats across the site. New areas of water will have wetland habitat potential.

Sources:
1. Land Securities (2003) *Eastern Quarry environmental statement – non-technical summary*
2. Kent Thameside Green Grid (2002) *Green Grid – creating a greener place*





The structure and extent of vegetation in urban areas can have a major impact on temperature, humidity and run-off. The 'biotope' strategy therefore seeks to develop a green infrastructure that delivers air conditioning, microclimate control and flood attenuation.

The different climate zones within the city have been mapped, illustrating variations in air temperature, humidity and soil moisture. The city has been colour coded into five broad zones, clearly identifies the moderating effects of greenspaces.

The strategy enables a citywide perspective to be taken, enabling identification of important linkages, mosaic patterns and species reservoirs. From a users perspective, this enables them to see how their involvement fits into the wider habitat network.

SUMMARY

- Green infrastructure is an areas multi-functional network of habitats, greenspaces and linkages
- Understanding the assets, functional requirements and potential benefits of the existing green infrastructure is fundamental to a context study
- The ecological function of existing green infrastructure as habitat networks can be protected and enhanced through careful planning
- Enhancing the existing green infrastructure can help to deliver important ecological services

2.2 Context study
Landscape character

Landscapes create a range of distinct environmental conditions influenced by factors such as climate and geology, as well human activities such as agriculture and industry. In this section, we explore how to characterise the landscape context for the existing green infrastructure.

The British landscape is the product of a range of natural and human influences. The countryside as we know it is largely the end-result of evolving agricultural practices. Urbanisation has created a patchwork of different land-uses, which have both contributed to and scarred the landscape as we recognise it. Characterising the landscape is therefore an important first step in understanding the context, as well as defining the environmental conditions which create opportunities for functional habitats.

Understanding the landscape character requires a number of layers of information. These include physical factors such as geology and hydrology, as well as historical and cultural influences such as industry and agriculture. Each may play, or may in the past have played, a functional role within the landscape: such as water resource management or rail transport. Each will need taking into account during planning and design, highlighting relationships with stakeholders and statutory consultees.

The process can be illustrated by the proposed urban extension at Wellingborough in Northamptonshire (see case study), where landscape character informs the development framework. The potential value can be seen at Beauregard ZAC in Rennes (see case study), where distinctive elements of the rural landscape have been incorporated as 'greenways' into an urban extension. The masterplan for Brighton's New England Quarter incorporates distinctive elements of the urban landscape, in the form of a former railway line 'greenway' which extends out from the site (see Section 3.5).

The Countryside Agency has developed a useful on-line resource, 'Countryside Character', which provides a good starting point[11]. It consists of profiles describing the physical and historical influences for sub-regional character areas as the following example Wellingborough East illustrates, which is covered within the character area of 'Northamptonshire and Leicestershire Vales'[12].

Beauregard ZAC, Rennes (France)

Urban extension incorporating rural greenway links

Beauregard is one of 22 planned development zones or 'ZAC's' (Zone d'Amenagement Concerte)[13]. It is located to the north of the city and is an urban extension onto agricultural land. The plan explores the potential for improvement of blue (water) and green (flora) corridors[14]. It is notable for incorporating elements of the rural landscape.

The site was surveyed prior to development. Existing hedgerows and tree-lined country lanes were identified for retention within the overall masterplan. They now form pedestrian routes integrated with and enhanced by the landscaping and the new urban blocks. The old farmhouse has been restored and forms the entrance to the new municipal Parc de Beauregard, which is divided up by fragments of old hedgerows and retained chestnut trees[15].

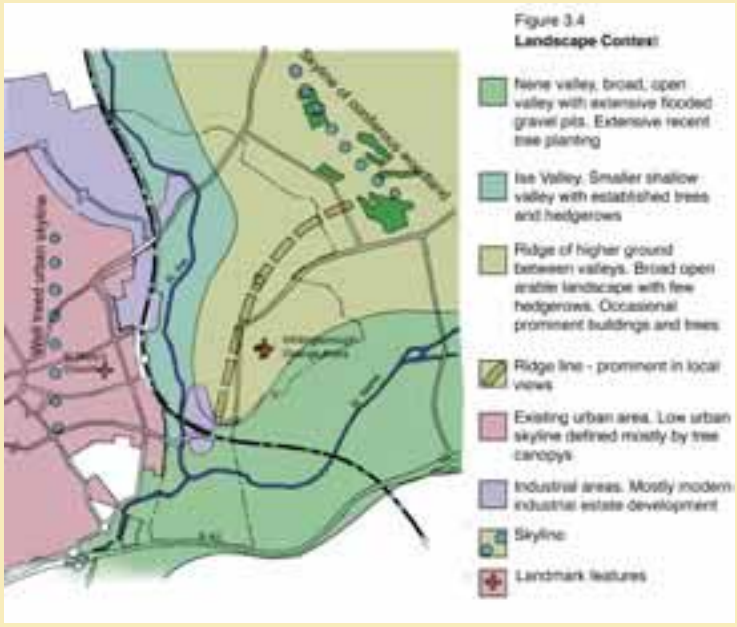
Sources:
1. Gauzin-Miller, D (2002) *Sustainable architecture and urbanism*, Birkhauser
2. ICLEI (1999) Rennes, *France – the control of urban space*, http://www3.iclei.org/egpis/egpc-136.html
3. Ville de Rennes (1997) *Project urbain de Beauregard*, http://www.ville-rennes.fr/index.php?rub=224

Wellingborough East, Northamptonshire

Development brief for an urban extension based on landscape character

Wellingborough East is a 361 hectare 'sustainable urban extension' planned for a greenfield site east of the mainline railway[16]. Over the next decade the site is expected to deliver 3,000 new homes and 110 hectares of employment land. A development framework based on landscape character has been worked up, which was adopted as Supplementary Planning Guidance in November 2004.

The development framework is built up from a series of layers of context including landscape, ecology and wildlife, microclimate and drainage[17]. It identifies features for incorporation including areas of mature planting and conservation value, as well as existing hedgerows and drainage ditches. It also seeks to avoid development in the River Ise floodplain and to explore connections with the proposed Nene Valley regional park, located to the south east of the site.

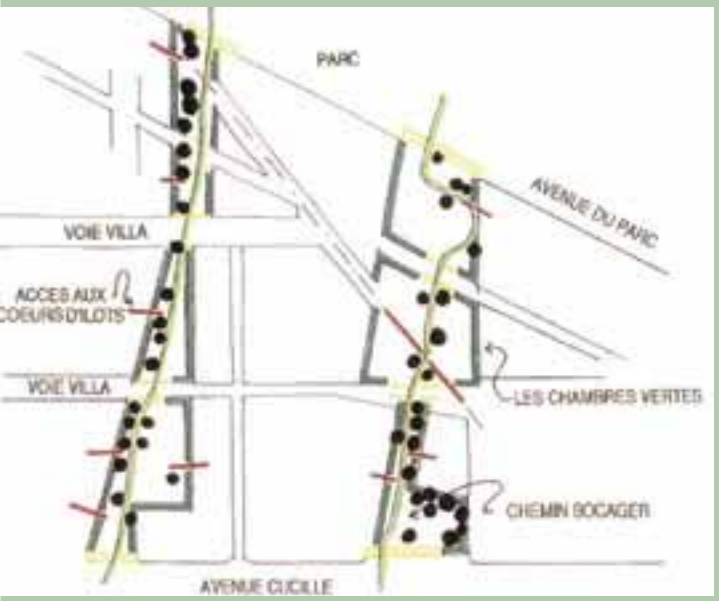


Wellingborough East

Landscape Character - Northamptonshire Vale

The area comprises low-lying vales and river valleys extending between wood landscapes and other areas of higher ground. Gravel, alluvial and head deposits have accumulated in the Ise and Nene river valleys, influencing settlement patterns and later industry. Floodplain land is in both arable and pasture use, with a strong pattern of Tudor and parliamentary enclosure, often with low, but well-maintained, hedges and variable densities of hedgerow trees. Wellingborough was founded on the iron industry and as a result there has been local extraction of ironstone in the 18th and 19th Century. Floodplain areas are also dominated by sand and gravel workings.

Sources:
1. Wellingborough Borough Council (2004) *Wellingborough East* http://www.wellingborough.gov.uk/business/weast.asp
2. Matrix Partnership (2003) *Wellingborough East: Development framework*, Supplementary Planning Guidance



SUMMARY

- An area's distinctive landscape is the product of a range of natural and human influences
- Tools such as 'Countryside Character' can be used to carry out landscape character assessment
- Understanding landscape character helps identify locally distinct features and understand conditions for habitat creation
- Features may each have functional roles with associated stakeholders and statutory consultees
- Distinctive features should be retained within the development framework for a new community

2.3 Context study
Local distinctiveness

Each area of the country has its own distinctive communities of flora and fauna which have adapted to local conditions over time. In this section, we explore how to characterise an areas distinctive ecology, using the results to create a pattern book for landscape design.

Maximising the opportunities for biodiversity requires an understanding of an area's distinct habitats and species. As we highlighted in Section 1.1, native flora tend to sustain the greatest biodiversity. It is therefore important as a first step to characterise the distinct ecology, or 'biogeography', of the area[18].

However, it is also important to recognise that urban areas create their own environmental conditions and so some exotic species may be appropriate. This information can then be used as a reference point for landscape architects.

Characterising an area requires reference to Natural Area Profiles developed by English Nature[19] and the local Biodiversity Action Plan (BAP)[20], both of which are available as web resources. Natural Area Profiles describe the distinct habitats of sub-regional character areas. As is shown in the example for Wellingborough East (Case Study, Section 2.2), which falls within the West Anglian Plain Area Profile. Equivalent tools for UK regions are Landmap, developed by the Countryside Council for Wales[21] and Natural heritage zones, developed by Scottish Natural Heritage[22].

Local BAPs provide definitive information for an area enabling distinct natural habitats and species to be identified - including those at risk. Additional sources include the UK's broad habitat classification[23], the national vegetation classification[24] and organisations such as Flora Locale[25]. Guides are also available, which cover species that are well adapted to urban habitats[26].

This information can then be used to develop a pattern book of plant communities. The design value of this approach can be illustrated by the new community of WaterColor in Florida (see case study) and Amsterdam's Heem Parks (Case Study, Section 2.3).

Local Biodiversity Action Plans

Local Biodiversity Action Plans (BAPs) are the mechanism for local delivery of the targets set out in the national plan. Each local BAP identifies local priorities for the protection of distinct habitats and species. Local BAPs are developed by Local Authorities in partnership with stakeholders such as the Environment Agency, landowners and conservation groups. Each BAP reflects the priorities of the national plan, covering priority habitats and species which are at risk, as well as more common 'broad' habitats and local species.

Urban Ecology

London Biodiversity Action Plan

We need to balance the undoubted problems that some exotic species can create against the rich diversity, historical and cultural interest and the considerable local distinctiveness that the vast majority bring to the Capital. Most introductions are benign, and in urban areas the natural colonisation of wasteland by native and exotic species has formed communities that are distinctive and unique to cities.

Source: English Nature, www.english-nature.org.uk

Wellingborough East

BAP habitats - West Anglian Plain

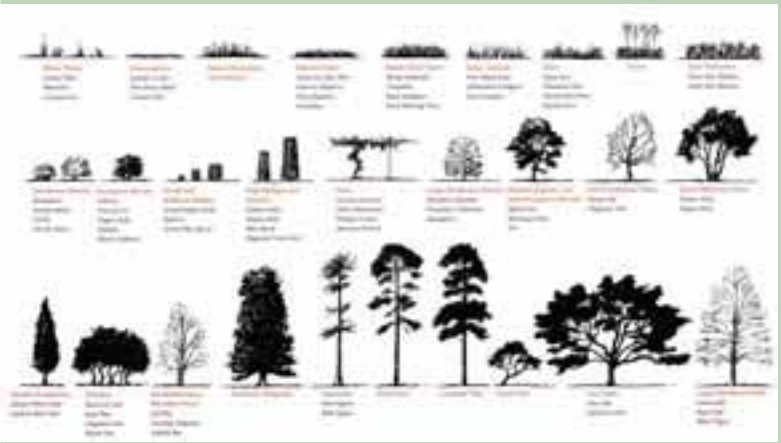
National significance

- Lowland meadows – unimproved neutral grassland occurs on the seasonally flooded (winter and spring) alluvium of the Ise Valley;
- Coastal and floodplain grazing marsh – periodically inundated meadows containing brackish or fresh water are rich in plants and invertebrates.

Local significance

- Rivers and streams – from bank top to bank top, including the open water area, fringing vegetation and exposed sediments;
- Reedbeds – wetlands dominated by common reed, where the water table is at, or above, ground level;
- Purple moor-grass and rush pastures – occur on poorly drained, acidic soils, in lowland areas of high rainfall;
- Lowland mixed deciduous woodland – where a significant proportion of the cover is broadleaved and/or yew trees.

Sources:
1. Wellingborough Borough Council (2004) *Wellingborough East* http://www.wellingborough.gov.uk/business/weast.asp
2. Matrix Partnership (2003) *Wellingborough East: Development framework*, Supplementary Planning Guidance



Source:
1. Mays,V, *Walk on the wild side, Landscape Architecture*, December 2003
2. Urban Design Associates (2003) *Patterns for place-making*, http://www.arvida.com/watercolor/

WaterColor, Florida (USA)

Greenfield community with native vegetation pattern book

WaterColor is a community in Florida designed to 'new urbanist' principles. The masterplan for the 490 acre site is based on the interweaving of natural and built elements. The site consists of three overlapping ecosystems characteristic of the region: freshwater marshes, coastal dune scrub, oak and pine woodlands. The masterplan is based on a recognition of these ecological 'zones' and their native biodiversity[27].

To inform the design of new landscape elements an urban design pattern book has been developed[28]. This establishes a vocabulary of landscape elements for both public and private space which draws upon native vegetation. It establishes a native plant 'palette' with detailed listings based on characteristics and visual appearance. This has been used by the landscape architects to design the network of public spaces, and has also informed the design of stormwater systems.

SUMMARY

- Maximising opportunities for biodiversity requires an understanding of an area's distinctive ecology
- Tools such as 'Natural Area Profiles' can be used to establish a basic profile of sub-regional character areas
- Local Biodiversity Action Plans (BAPs) will provide definitive information on habitats and species
- The characteristics and visual appearance of native vegetation can form the basis for a pattern book to be used by public realm designers

2.4 Context study
Protected habitats and species

Protected sites are an integral part of an area's green infrastructure and because they are afforded protection need to be considered in more detail. In this section, we explore the different levels of protection, and the practical implications for adjacent development.

The process of characterising an area's green infrastructure may have revealed the presence of habitats and species that are protected by law or by local and regional planning policies. This may be because they are important remnants of our natural biodiversity heritage, of local, national or international significance protected by either planning or statutory designations (see designation framework). They may also be regenerating greenfield or brownfield sites. In each case they will represent valuable conservation and educational assets.

In order to develop land adjacent to protected habitats, early consultation with responsible bodies is important. This will help establish criteria required to protect functioning ecosystems and to ensure development proposals are appropriate. This will require reference to survey information, management plans and advice available from the Local Authority, English Nature and Non-Governmental Organisations (NGOs) such as Wildlife Trusts and the RSPB[29]. For habitats and species of national significance there is a requirement to consult English Nature and DEFRA on development proposals[30].

Development of a site will invariably have some impact on the local environment. It is therefore the responsibility of a developer and their professional team to avoid damage to functioning ecosystems and their associated habitats and species. Where impacts are unavoidable, measures must be proposed to mitigate and compensate for these impacts. Site-specific factors may also need to be taken into account in order to meet statutory requirements, such as the vulnerability of resting and breeding sites, extensive foraging areas and features that enable species movement and migration.

Examples of a comprehensive approach to protection, and the mitigation and compensation of impacts include Orton Brick Pits near Peterborough, a brownfield SSSI - and Portishead Ashlands near Bristol, a wetland foreshore SSSI. Developers at Portishead are supporting the creation of an adjacent wildlife reserve, extending the internationally significant wetland foreshore habitat[31]. Ashlands' management plan also demonstrates how to maximise a nature reserve's educational value.

Protecting our Biodiversity Heritage
Designation Framework

- European – The EU Habitats Directive and Birds Directive form the basis for the pan-European Natura 2000 network of conservation sites. In the UK these sites are designated as Special Protection Areas (SPA) and Special Areas of Conservation (SAC) and are afforded statutory protection under the Conservation of Natural Habitats Regulations 1994. Certain species of plants and animals are protected by the Habitats Directive, for example all species of bats.
- National – Sites of Special Scientific Interest (SSSIs) are the country's very best wildlife sites and are afforded statutory protection under the Wildlife and Countryside Act, 1981. It is an offence for anyone to knowingly damage a SSSI. Public bodies must take reasonable steps to further their conservation and enhancement. SSSIs which have special qualities are designated National Nature Reserves (NNRs). Certain species of plants and animals are protected by the Wildlife and Countryside Act, such as water voles.
- Local – Sites of Importance for Nature Conservation (SINCs) or Wildlife Sites are identified in local development plans, and are protected through the planning system. Local Nature Reserves are statutory sites declared by Local Authorities especially to promote education, awareness raising and accessibility to nature. Their significance may be set out in planning policies, so for example, in London there are sites of metropolitan, borough and local importance. Other statutory designations include Local Nature Reserves, which are sites of nature conservation value managed by Local Authorities especially to promote education, awareness raising and accessibility to nature.

Sources:
1. UK Government (1994) *Biodiversity – the UK action plan*, HMSO
2. English Nature (2004) http://www.english-nature.org.uk/
3. Joint Nature Conservancy Council (2004) *Protected Sites*, http://www.jncc.gov.uk/ProtectedSites/
4. Oxford, M (2000) *Developing naturally*, ALGE

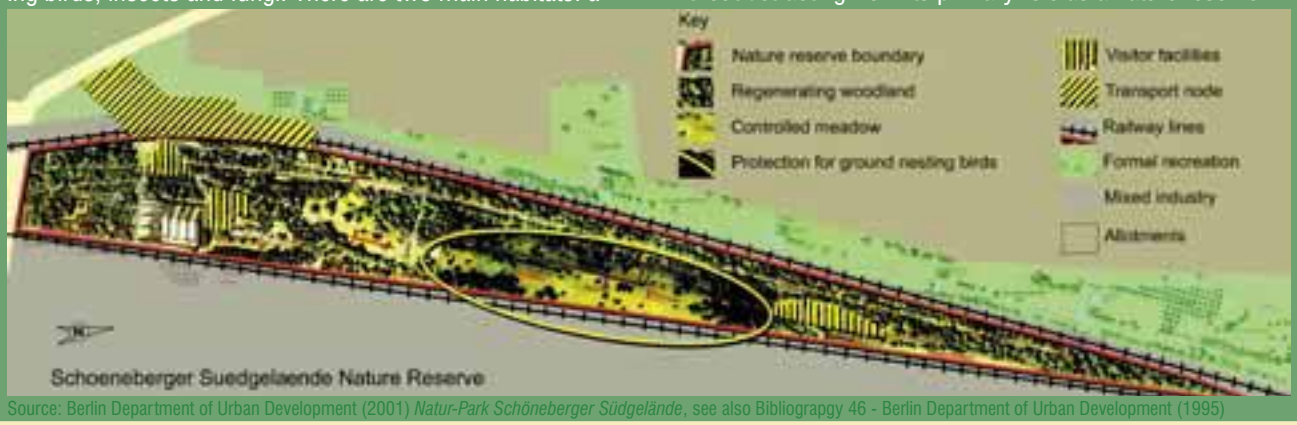
Schoneberger Naturpark, Berlin

Naturally regenerating brownfield nature reserve

Schoneberger Naturpark is an 18 hectare brownfield nature reserve. It is located between two heavily used railway lines and was identified as a possible location for a new railway yard, however, following a habitat survey, it was awarded statutory protection in 1999 as a 'Nature Protected Area'. The Naturpark is afforded protection equivalent to UK SINC status, with the restricted areas equivalent to UK SSSI status.

The site had lain disused for almost 50 years, during which time a process of self-regeneration had occurred. The site has been extensively surveyed, identifying ground nesting birds, insects and fungi. There are two main habitats: a light canopy woodland covering two thirds of the site and dry grass meadow with many rare insect species.

The reserve has successfully combined the needs of nature and the public. It has become popular as a quiet retreat. Access and movement are controlled in the most sensitive areas. Industrial features have been retained to highlight the sites history. The use of art also enhances the experience without detracting from its primary role as a nature reserve.



Source: Berlin Department of Urban Development (2001) *Natur-Park Schöneberger Südgelände*, see also Bibliograpgy 46 - Berlin Department of Urban Development (1995)

Orton Brick Pits, Peterborough

A SSSI brownfield habitat

This 160 hectare brownfield site on the edge of Peterborough was first designated as SSSI in 1995[32]. It consists of an unusual landscape of ponds and furrows resulting from former brick clay extraction. This has encouraged the development of a mosaic of habitats, including aquatic vegetation and open water pools.

It is of special interest for its population of great crested newts, the largest in the United Kingdom, as well as standing water habitats which support nationally rare stoneworts. The newt population was discovered in the early 1990s, by which time half of the land had been granted outline planning permission for the 5,000 home community of Hampton[33].

A major programme of newt translocation was agreed with the developer, along with habitat enhancement measures. An extensive network of access trails, and a water-level management system has been constructed. The resulting site is managed as a nature reserve by the developer, the O + H Group, with professional support, and provides an educational resource for the community.

Sources:

1. English Nature (2004) *Orton SSSI - Notification under section 28C of the Wildlife and Countryside Act 1981*, http://www.english-nature.org.uk
2. Hampton, http://www.cygnetpark.co.uk/

SUMMARY

- The existing green infrastructure may include habitats and species which are protected by statutory designations and planning policies
- Protected sites are valuable assets, with an important educational and conservation role
- Developing land adjacent to sites with protected habitats or species requires an understanding of their functional requirements
- Survey information, management plans and advice should be obtained from consultees and managing NGOs
- Impacts on protected sites should be minimised, and where unavoidable mitigated and compensated for
- Adjacent sites can be used to increase the area of valuable habitat available

3.1 Masterplanning
Creating new green infrastructure

The establishment of a masterplan enables new green infrastructure to be designed to realise the social, economic and environmental benefits of biodiversity. In this section, we explore how to plan new green infrastructure which complements and enhances the function of existing green infrastructure.

At masterplanning scale the aim should be to establish a 'green infrastructure network'. A 'Joint Statement on Green Infrastructure' by English Nature and partners suggests that its design should 'link or extend the network of existing sites, providing green corridors...from urban through suburban to rural'[1]. The network defines a communities green infrastructure, integrating key functional requirements:

- Urban design principles – a hierarchy of permeable streets defined by housing of sufficient density and mix of uses to animate the public realm. Communities require accessible green space as set out in PPG 3 and PPG17;
- Functional habitat networks – a mosaic of smaller greenspaces set within a continuous, linked hierarchy of larger greenspaces in order to minimise edge effects and to maximise the extent and variety of habitats available;
- Valuable ecological services – the design of habitat networks in order to deliver services such air conditioning, pollution control and flood prevention (see Chapter 1.2);
- Connections with nature – planned connections with nature intended to provide opportunities for experience, learning and involvement (see Chapter 1.3).

The network provision for larger greenspaces is based on recognised Accessible Natural Greenspace[2] and Publicly Accessible Open Space[3] standards. The network provision of mosaics and linkages reflects best practice from EU cities.

Natural Greenspace – Urban Design Principles

- Interface – the interface between dwellings and ecologically functional landscapes should form a clear transition, with residents having a choice as to which landscape they want to use, and when;
- Legibility – the extent and purpose of ecologically functional landscapes should be readily apparent and users should be given a variety of routes through an area with all routes terminating in other routes.

Source: adapted from Overvecht (2003) *Green structure plan*, http://www.making-places.info/overvecht/potential/

The plan will also need to integrate and establish links with valuable features of the existing green infrastructure, as identified by the context study. These features can make a valuable contribution to the network's provision of parks, greenways and nature reserves.

Overvecht in the Netherlands demonstrates the basic principles of a network. In particular it considers the importance of urban design principles in planning for safe routes, as highlighted by the Safe Cities Movement[4]. The potential for UK application of green infrastructure networks can be demonstrated by Stratford City's proposed open space strategy.

The Green Infrastructure Network

Typology	Provision	Description
Regional parks and community forests	500 hectares, 10km	Large, linked urban fringe habitats with sustainable forestry potential
Park greenspaces 1. Neighbourhood 2. District 3. Metropolitan	 2 hectares, 300km 20 hectares, 1.2km 60 hectares, 3.2km	 Natural green space park hierarchy incorporating increasing areas of habitat
Ecology parks Nature Reserves	At least 1 hectare per 1,000 population	Designed ecology parks and/or Local Nature Reserve provision embedded within green space hierarchy
Greenway linkages	Site specific	Linear habitats incorporating routes and waterways
Street tree canopy	80 trees/km road	Continuous canopy linking doorstep spaces to parks
Communal 'doorstep' spaces	At least 1 hectare per 1,000 population	Habitat mosaics within courtyards and pocket parks
Green buildings and private spaces	Site specific	Buildings and private spaces as habitats

Sources: Adapted from
1. English Nature (2003) *Accessible natural greenspace – Standards in towns and cities*, Report No. 526
2. Llewelyn-Davies (2000) *Urban design compendium*, English Partnerships and the Housing Corporation
3. Overvecht (2003) *Green structure plan*, http://www.making-places.info/overvecht/potential/

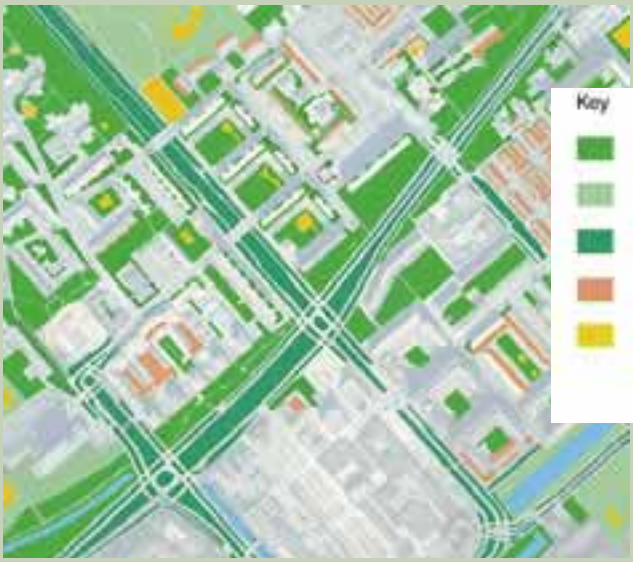
Overvecht, The Netherlands

An existing communities 'Green Structure' plan

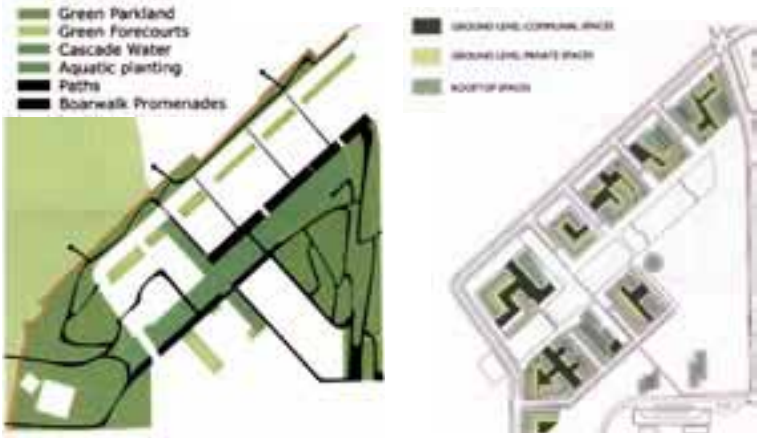
Overvecht in Utrecht has established a 'green structure' plan[5] which takes into account natural and built environment factors, such as building form, habitats and microclimate, as well as social factors, such as safety, 'ownership' and amenity uses. The aim is to create a sense of place through the definition of landscape character zone defined as[6]:

- Public and commercial building greenspaces
- District parks and river banks
- Parkways (road system)
- Greenways (footpaths and cycle routes)
- Doorstep communal greenspaces adjacent to dwellings
- Private gardens

Each has to function as a place resolving amenity use, landscape character objectives and biodiversity objectives.



Sources:
1. Overvecht (2001) *Overvecht district atlas*, http://www.making-places.info/overvecht/atlas/
2. Overvecht (2003) *Green structure plan*, http://www.making-places.info/overvecht/potential/



Stratford City, London

A new brownfield district's open space strategy

Stratford City is a proposed new metropolitan centre for East London on 60 hectares of brownfield land in the Lower Lea Valley[7]. It is anticipated that 4,500 new homes could be built by 2015. The aim is to deliver a 'place of many places' with five main objectives[8]:

- To integrate with the Lee Valley Regional Park in order to extend habitats and fulfil metropolitan park functions;
- To provide a network of continuous open spaces linked to pedestrian and cycle networks and the wider public realm;
- To provide play facilities and recreational provision, which will serve areas of high density housing;
- To preserve, manage and enhance principal ecological areas to provide rich and diverse ecological habitats.

The open space strategy establishes a hierarchy of open spaces, and also establishes a complementary role for private and communal spaces, exploring space typologies and how they relate to different residential densities.

Sources:
1. Chelsfield (2004) *Stratford City – political briefing*, http://www.chelsfield.co.uk/home.htm
2. Chelsfield Stanhope LCR (2004) *Stratford City - open space strategy*, final draft

SUMMARY

- A green infrastructure network can be used to define the hierarchy and form of the habitats and natural greenspaces within a community
- The opportunities will be defined by the scale and form of development and its associated infrastructure
- The network will need to integrate and establish links with valuable elements of the existing green infrastructure
- The network will need to adhere to principles of good urban design
- The network will need to resolve the functional requirements of urban form, greenspace provision, habitat networks and ecological services (such as drainage)

3.2 Masterplanning

Regional parks, green grids and community forests

Regional parks, green grids and community forests enable large areas of habitat on the urban fringe to be linked together, creating a source of biodiversity for our towns and cities. In this section, we explore how they can be managed to sustain biodiversity and function as community assets.

The largest opportunities for continuous natural or semi-natural habitat are likely to be located on the urban fringe. By bringing together new and existing land areas, a mosaic of native forest, wetland and grassland habitats can be established.

These habitats are the building blocks for a green infrastructure connecting towns and cities. The planning of urban extensions should therefore take into account and explore the relationships with these areas of opportunity.

Urban fringe habitats have a key role to play as a source of biodiversity for smaller areas of habitat within towns and cities, providing there are linkages extending into the urban area. They are important greenspaces for the urban population, and areas of forestry can also be managed to produce a sustainable supply of timber.

The experience of European cities, such as Berlin, is that these areas of habitat can be managed as community assets in order to benefit a city-region. The Grunewald in Berlin demonstrates how such an asset, in this case a community forest, can be managed on a financially self-sustaining basis. It requires a long-term vision, as well as management and planning in order to resolve potential conflicts between nature conservation, recreational use and forestry. The Grunewald's Forestry Stewardship Council (FSC) accreditation is important in demonstrating that ecological objectives can complement commercial forestry (see Case Study).

Though a relatively new concept for the UK an ambitious Community Forest Programme was established in 1989[9]. The aim has been to regenerate and revitalise 1,750 square miles of countryside around twelve major towns and cities, transforming the landscape closest to where people live and work. The programme is sponsored by the Countryside Agency and the Forestry Commission.

A good example of a project supported by the programme is the Forest of Marston Vale in Bedfordshire[10]. The forest is managed by a trust based on a 25 year financial plan with the aim being to benefit from economies of scale.

Grunewald Forest, Berlin

Long-term stewardship of a city asset

The Berlin forest covers 17,500 hectares, 6,000 of which are within the current city boundaries (making up almost 20% of the total city area)[11]. The city bought the forest area in 1915, aiming to prevent speculative development, provide green space for the city and ensure a local supply of timber. The result is that Berliners now have access to extensive areas of publicly accessible green space at little or no cost.

Commercial forestry within the area is managed according to sustainable principles, which has the benefit of producing higher value timber whilst increasing biodiversity[12]. In practice this requires:

- Maintenance of the forest's structure through avoidance of clear felling;
- Forest renewal by natural regeneration, with retention of old-growth;
- Harvesting through the scheduled selection of individual trees;
- Protection of native habitats with particular attention to endangered species.

Currently 247 hectares of the forest are under protection, with visitor access limited in these areas. The success of this management approach was acknowledged with Forest Stewardship Council accreditation in 2002.

Access by residents and visitors is a central consideration in forest management, requiring additional measures such as pathways and the fencing of areas to allow natural re-growth. Signage and interpretation are used to raise public awareness of how the forest is managed. Management costs are greater in areas which attract significant numbers, and the provision of facilities and commercial activity in these areas generates an income stream. There is also a focus on public transport locations, which ensure a broader spectrum of the public can benefit.

Sources: 1. Berlin Digital environmental atlas (1995) *Age structure and investory of the forests*, Department of Urban Development, http://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/ei504.htm
2. Senatsverwaltung für Stadtentwicklung und Umweltschutz (1994) *Ein neuer Umgang mit dem Wald (A new way of managing forests)*

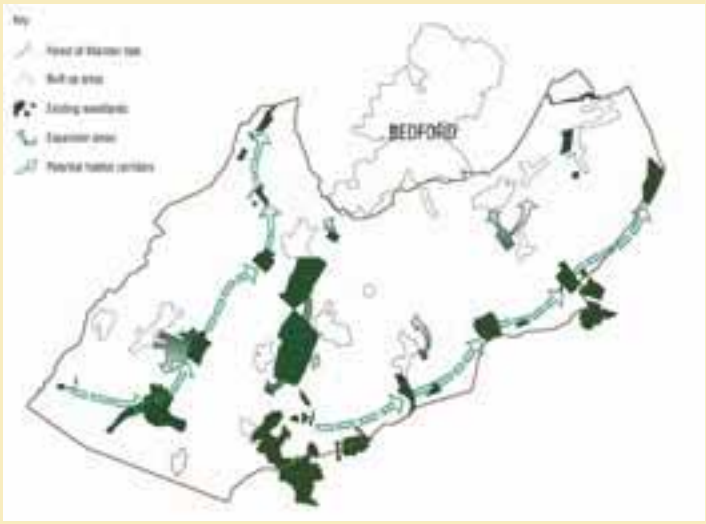
The Forest of Marston Vale, Bedfordshire

Multi-purpose green space on the urban fringe

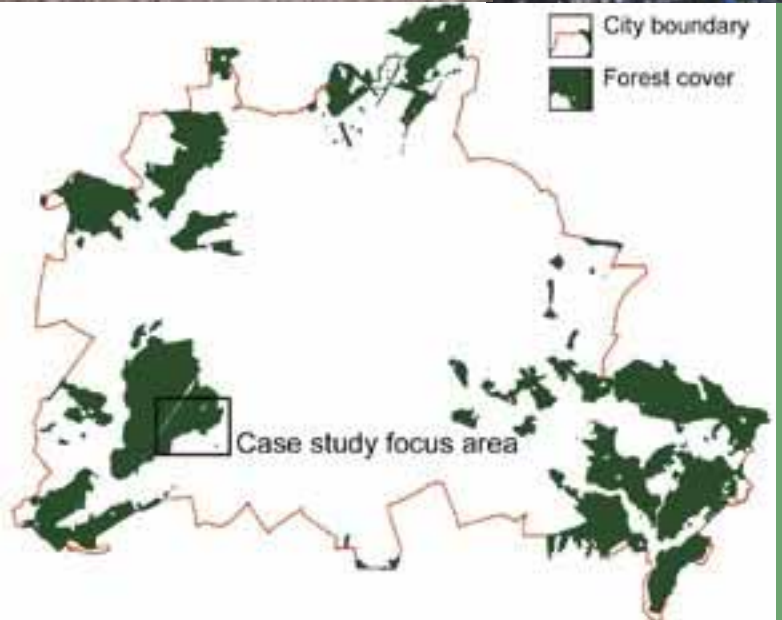
Marston Vale is a community forest covering 61 square miles between Bedford and Milton Keynes. It is a major growth area and the forest is strategically important in preventing the coalescence of the two settlements and in providing public green space for a growing population. Management is guided by the forest plan, which was extensively consulted on with the local community and is endorsed by the Local Authorities[13].

Careful consideration of drainage systems has supported the creation of wet woodland – a national priority habitat within the UK Biodiversity Action Plan. Habitats have been created that support both resident and migratory bird populations, as well as creating a range of attractive amenity spaces. This has been made possible by working closely with Local Authorities, the Environment Agency, the Bedford Group of Drainage Boards and the private sector[14].

A charitable trust has been established to manage the forest. The long-term aims of the trust are supported by a 25-year financial model. Financial support has been secured through the planning process and partnerships with Local Authorities, local business and central government[15]. The extent of the forest is being increased, achieved through an ongoing programme of land acquisition. Active and ongoing local participation in design, planting and management ensures that local needs are met. A Sustrans cycle route linking together forest areas is also being developed by the trust.



Sources:
1. The Forest of Marston Vale (2000) *Forest Plan*
2. Marston Vale Surface Waters Group, *The Surface Waters Plan*, June 2002
3. The Forest of Marston Vale (2002) *Investing in the success of the forest of Marston Vale*



SUMMARY

- Regional Parks and Community Forests enable large areas of habitat on the urban fringe to be linked together·
- Plans for urban extensions should take into account and explore relationships with these areas of opportunity·
- Forestry can be managed as a community asset, with the potential to cover management costs through sustainable forestry and visitor facilities
- Community forests require a long-term vision, with careful management to resolve the potential conflicts between conservation, recreation and forestry

3.3 Masterplanning
Parks and natural green spaces

Parks provide urban residents with access to recreational green space and an experience of nature within the urban area. In this section we explore how parks can be designed and managed to increase biodiversity, and how they can also function as nature reserves.

In Section 3.1, we set out a hierarchy of parks based on recognised standards for the provision of natural green space at a neighbourhood, district and metropolitan level. There are three main opportunities for biodiversity in the parks hierarchy:

- Existing parks – changing management plans to enhance ecological function;
- Designed ecology parks – provision of new ecologically functional greenspaces;
- Local Nature Reserves – heritage, semi-natural and brownfield reserves as outdoor classrooms.

As well as providing recreational open space, parks can also provide significant areas of natural green space, thereby maximising the extent of habitat available.

Existing Parks

Traditionally the design and management of British parks has favoured an ornamental and manicured appearance[16]. This limits the potential of existing parks as ecologically functional greenspaces. In order to enhance the opportunities for biodiversity, park management plans can be revised with the aim of encouraging more species-rich and structurally diverse vegetation. Common examples include reduced mowing to encourage wildflowers and the establishment of field and shrub layers under trees. This approach is low input but can yield cost benefits, as demonstrated by Iris Brickfields in Newcastle[17].

Designed Ecology Parks

In large masterplans there are likely to be opportunities to create new parks, including designed ecology parks. As we discussed in Section 2.3, the distinct flora of an area can be used as a pattern book to inform the design of ecologically functional park landscapes. Dutch Heem Parks, native herbaceous gardens, provide an example of this approach[18]. Their design draws upon an understanding of native plant communities, and their response to landscape conditions. Greenwich Millennium Village's ecology park demonstrates an application of this approach, and the park has helped to attract people to live in the area.

Local Nature Reserves

There is an increasing recognition of the educational value of creating Local Nature Reserves (LNRs). LNRs are 'places with wildlife or geological features that are of special interest locally, which give people special opportunities to study and learn about nature'[19]. LNRs are a statutory designation made by Local Authorities and they can include natural habitats, enhanced man-made greenspaces, designed ecology parks and regenerated brownfield sites.

Benwell Nature Park in Newcastle is a good example of the potential value of LNRs to local communities (case study, Section 1.3). The recent declaration of Kersal LNR in Salford has the potential to deliver similar benefits in the neighbouring Housing Market Renewal area.

Iris Brickfields, Newcastle

Enhancing the ecological function of an inner city park

Iris Brickfields is natural green space in the Heaton area of inner city Newcastle. The park was redeveloped in 1997 with the active input of the 'Friends of the Park' group. Ecological management techniques were successfully introduced in order to reduce overheads and make the area more attractive. Prior to this it was managed as amenity grassland.

There is active community involvement in the management plan for the park, including the local children's nature club. Mowing has been reduced to allow wildflower meadows to grow and the result has received a good level of local acceptance. The habitat potential of the pond and wetland has also been enhanced. Professional support is provided by the ward rangers who are part funded through the leasing of meeting rooms and a cafe.

Source: Dunnett.N, Swanwick.C and Woolley.H. *Improving urban parks, play areas and open spaces*, Urban research report, DTLR, May 2002

Higher Broughton HMR area, Salford

Kersal Local Nature Reserve

In 2003 Salford City Council adopted a masterplan for the re-development of a 16 hectare area of Higher Broughton[20]. The plan includes provision for new housing, a school, a community centre and retail units. The site is adjacent to Kersal Dale 'one of Salford's most important wildlife habitats'[21].

Kersal Dale is a 23 hectare Site of Biological Importance recently declared as a Local Nature Reserve[22]. Though it is cut off by a main road with an inconspicuous entrance and no signage to highlight its significance, the area is well used for informal recreation and school nature walks. Habitats include semi-natural woodland and wetland alongside the River Irwell.

Sources: 1. Salford City Council, *Higher Broughton Regeneration Area*, SPG, Sept 2003
2. Wildlife Trusts, *Salford Phase I Habitat Survey*, 2000-2001
3. Greater Manchester Ecology Unit (2001) *Kersal Dale, Record of Sites of Biological Importance*

Heem Parks, Amstelveen (The Netherlands)

Designed Ecologically Function

The first Heem Parks of De Braak and Jac.P.Thijssepark were designed for the Amstelveen urban extension. Heem Parks draw their inspiration from the study of native plant communities. Lawns and ornamental trees do not belong in Heem Parks, instead mixed woodlands were established with herbaceous underplanting and adjacent wild flower meadows.

Completed in 1939, the planting plan for De Braak Park was based on the natural conditions of the soil. Native plants were used exclusively. An old mere was central to the layout, creating peaty conditions for planting based on the natural communities of low lying fens.

The 24 hectare Jac.P.Thijssepark is regarded as the archetypal Heem Park. It forms a green corridor along the edge of Amstelveen. The layout is based on a combination of meandering stretches of water with open and closed planting. The footpaths progress through a series of distinct habitats, allowing it to be read like a book of nature.

Source: Bekkers,G (2003) *Jac.P.Thijsse Park – designed Dutch landscape*, Architectura and Natura

SUMMARY

- Provision should be made within the greenspace hierarchy for ecologically functional natural greenspaces and associated habitats
- Ecologically functional habitats can be incorporated into existing parks through new planting or by changing management techniques
- Ecology parks can be designed based on the selection of appropriate plant communities and an understanding of their response to landscape conditions
- Local Nature Reserves have an important role to play as outdoor classrooms for local communities

3.4 Masterplanning
Greenway linkages

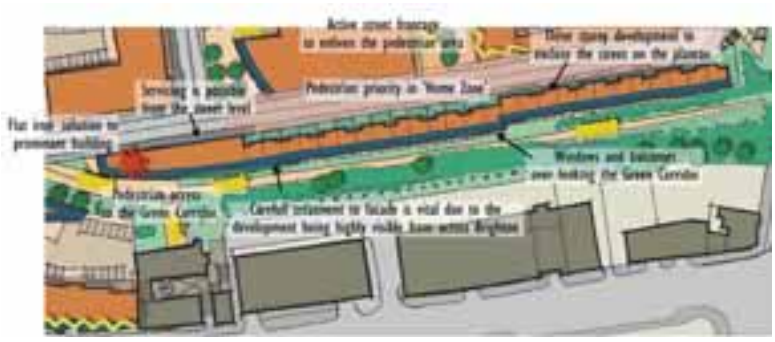
Greenways are linear wildlife corridors that provide linkages between habitats, and can form habitats in their own right. In this section, we explore how to maximise the ecological function of woodland and wetland greenways.

Greenways are linear wildlife corridors that may already exist in the form of woodland belts, overgrown railway lines and waterways, opportunities identified in the context study, or can be designed as new functional landscape elements[23]. Greenways can be used to link together habitats and form routes from residential areas to larger greenspaces. Waterways can also provide ecological services such as drainage to attenuate flooding. As highlighted in Section 3.1, 'greenways' design must adhere to basic principles of urban design.

Woodland Greenways

In order to reduce car dependency urban housing is increasingly likely to incorporate clearly defined pedestrian routes, cycle routes and public transport corridors. This creates the opportunity to integrate these areas within a network of woodland greenways. Warrington New Town was a pioneer of this approach, with the successful establishment of ecologically functional woodland greenways based on experience from the Netherlands and Sweden[24].

However, an important point to learn from this case study is that if the aim is to maximise their function as linear habitats then pedestrian and cycle routes must be excluded or be well-designed. Recreational routes can be incorporated as long as they are punctuated by links to surrounding areas where housing provides informal surveillance. A good example is the proposed New England Quarter in Brighton (see illustration below). An old railway line is to be improved as a recreational route whilst also enhancing its value as a Site of Importance for Nature Conservation[25].



Wetland Greenways

Greenways can also take the form of waterways with associated wetland and woodland habitats. Germany's Emscher Park project in the Ruhr valley pioneered the de-culverting of engineered waterways, with the re-introduction of wetlands and buffer strips of ecologically functional meadow and woodland habitats[26]. A similar approach has been taken in the UK by the Environment Agency.

Sealed surfaces can reduce soil moisture and, as is increasingly the case in the UK, leave low lying areas susceptible to flooding from excessive run-off. There may therefore be the opportunity to create Sustainable Urban Drainage Systems (SUDS), which can function as wetland habitats. The Environment Agency and CIRIA (the Construction Industry Research & Information Association) have been actively promoting the use of SUDS[27].

A good example can be found at Kirchsteigfeld in Berlin. SUDS are common in new German housing schemes for flood alleviation, but they also create buffer strips for habitat creation. Whilst the width of the buffer may be constrained by land use pressure, integration with linear greenspaces of the kind seen at Kirchsteigfeld, and as proposed for New Hall near Harlow in Essex[28] can allow for wider corridors.

Management is required to maximise habitat potential[29]. Intermittant tributaries can be linked up using swales. Contaminants, for example from surface car parking, may need pre-treatment by reedbeds. Tree planting may be required for bank protection and sediment may require periodic removal.

Sources:
1. Scott, D, *The greening of Warrington*, Landscape Design
2. Tregay,R & Gustavsson,R (1983) *Oakwood's new landscape – designing for nature in the residential environment*
3. CPRE, *Memorandum to the Parliamentary Select Committee on Transport*

Kirchsteigfeld, Berlin

A Sustainable Urban Drainage System

Kichsteigfeld is a 60-hectare urban extension of Potsdam 25 km south west of Berlin. Over 2,600 high-density new homes have been constructed, following a masterplan that adheres to recognised European urban design principles[30]. The involvement of over 25 architects and use of chromatic colour scheme gives the new town its own distinct identity. In-line with current best practice surface water is channelled into a SUDS. The system starts with water draining from courtyards into swales where it either soaks away, evaporates or is retained within the system. It then flows along verges into minor streets. It is then collected into a stream that forms part of a formal linear park from where it flows into a retention basin before flowing into the drainage network in surrounding rural area. Each element of the system creates the potential for wetland ecosystems, with planting selected to reflect the pattern of water retention.

Source: Ruano, M (1999) *Eco-urbanism*, Gustavo Gili

Oakwood, Warrington New Town

Establishing ecologically functional greenways

Oakwood is one of three residential areas within the Birchwood district of Warrington New Town. It was developed in the early 1980s and occupies the former site of an Ordnance Factory. An entirely new landscape was designed consisting of linked woodland belts and parks[31]. These form a 'web' of greenways enclosing the new housing. Footpaths and cycleways lead from the housing to recreational green space and out to the rural landscape.

The design and planting of these woodland belts aimed to create structural diversity, with complex patterns used to emulate natural mosaics of trees, shrubs and meadow[32]. Vegetation was planted out six years ahead of housing development delivering a number of benefits:

- Less mature trees could be used, minimising costs
- Growth was unhindered during the most vulnerable period
- Residents moved into a mature and sheltered landscape, raising land values
- Vandalism normally associated with new planting was minimised

Whilst the establishment of designed ecosystems has been successful, the greenways' function as pedestrian routes has been less so[33]. The layout resulted in small estates becoming isolated, and the greenways were not way marked or lit. Some routes have been closed because of vandalism or safety issues. In some cases local roads are used by pedestrians because they are the safest and most direct routes.

SUMMARY

- Greenways are linear wildlife corridors which can provide linkages between greenspaces and larger areas of habitat
- They can be either woodland or wetland, based on existing landscape features or designed as new functional elements
- Woodland greenways can incorporate pedestrian and cycle routes but must adhere to urban design principles in order to address safety issues
- Wetland greenways can be designed as SUDS in order to provide ecological services
- Buffer strips associated with SUDS can be integrated with linear greenspaces in order to maximise their habitat potential
- SUDS require management in order to maximise their habitat potential

3.5 Masterplanning
Street trees

Street trees can be used to create a continuous canopy, creating an experience of living in an urban forest. In this section, we explore how street trees can be used to define streets, improve the urban environment and provide linkages in habitat networks.

Street trees can form an attractive and functional element of urban streets, helping to define the character of streets, from boulevards to home zones. Street trees make cities more liveable, particularly important given an increasing preference for flats and higher density housing, and as we discussed in Section 1.2, can add value to property.

Experience from cities such as Berlin, which favour continuous street tree canopies shows that streets with mature tree cover are generally the most popular amongst residents. They also provide important ecological services such as pollution control, air conditioning and noise attenuation.

Planting native species as a continuous canopy will maximise their habitat potential, particularly for birds and insects. However, some exotic species are better adapted to conditions in the urban environment. Resilience to air pollution is a major factor, as is access to an adequate water supply, suitability of root structure for planting close to buildings, and the density and maintenance requirements associated with foliage. Some key questions to answer when planning for street trees are therefore[34]:

- Is there enough space for the tree to grow?
- How will the tree affect the building at maturity?
- How will the tree affect streets and utilities at maturity?
- Will foliage cast shadows or brush window panes?
- Will associated drains and soak aways create maintenance problems?

These factors can limit the choice of native species. Guidance is available on the selection of appropriate species from knowledgeable organisations and urban ecology texts.

In urban areas there is also pressure to plant older and larger trees to realise design objectives and property values. Smaller and younger specimens are preferable as they have a greater opportunity to grow into their surroundings, however, resilience to vandalism during initial years can be a deciding factor. In small open spaces a variety of sizes and ages of trees, planted together with elements of an understorey can provide visual interest and structural diversity, as demonstrated at Warrington New Town (Case Study, Section 3.4).

There may also be opportunities to retain existing mature trees. These must, however, be adequately safeguarded during development in order to avoid direct damage from equipment or indirect damage to roots or through soil compaction. Disturbance to the local water table may occur as soil moisture is depleted, and new forms of drainage may be needed.

Street trees, Berlin
The Urban Woodland

Most residential and major streets in Berlin are lined with trees. In the summer these dominate the character of the city, providing shade and increasing humidity. The city is now estimated to have 416,000 street trees, or 79 street trees per kilometre of road[35]. They form linear routes, creating invaluable habitat networks for many insects and birds.

When new trees are planted, the species by determined on whether there is already a dominant species prevalent, in which case the same species is used to fill gaps. New streets are usually planted with one of the five most common species, which are Lime, Maple, Oak, Plane and Horse Chestnut. These can survive the conditions within the city without excessive maintenance. All new street trees are planted as semi mature standards at around 10 years old, as at this age they are less easily vandalised.

Source: Runze und Casper with the Senatsverwaltung für Bau und Wohnungswesen, (1990) *Ökologisches Planen und Bauen* (Ecological planning and building)

Home Zone Street Trees

Helping to define liveable streets in Germany and Holland

SUMMARY

- Street trees can be used to create a continuous habitats, whilst making urban neighbourhoods more attractive and providing ecological services
- Tree species must be selected that can survive urban conditions and avoid excessive maintenance requirements
- Selecting native species will maximise their habitat potential, however, urban conditions favour some exotics
- Planning for street trees requires consideration of water requirements and the impact on buildings and streets at maturity
- Vandalism can be reduced by planting as semi-mature standards, however, where possible it is better to plant younger trees

4.1 Detailed design

Communal 'doorstep' spaces

Communal 'doorstep' spaces such as communal courtyards and pocket greenspaces create the potential for a fine grain of habitat mosaics. In this section, we explore how functional habitat mosaics can be created, which are responsive to a range of microclimate conditions and provide an experience of nature on people's doorstep.

Whilst the Communities Plan has established a minimum density of 30 dwellings per hectare, to be sustainable the Urban White Paper suggested raising housing densities to at least 75 dwellings per hectare[1]. This is achievable with terraces and perimeter blocks of town houses and flats. Reduced car parking and higher plot ratios result in more communal 'doorstep' spaces, such as courtyards and pocket greenspaces. This creates the potential for continuous mosaics of habitats, defining spaces and making higher density living more attractive.

The proximity of buildings to each space will create unique microclimate conditions, with varying daylight, wind, temperature and moisture levels. This will need to inform the selection of plant communities. So, for example, narrow, dark courtyards may resemble conditions on a forest floor. Designing-in the basic requirements to attract fauna will also maximise the opportunities for biodiversity. Rainwater systems can be designed to sustain wetland habitats and attenuate run-off.

Within a masterplan, plots are likely to be built out by a range of property developers. A mechanism is therefore required to encourage habitat creation. Recent experience in the new district of Bo01 in Malmo, Sweden provides a novel mechanism for encouraging this (Case Study, Section 4.2). Post-occupancy, landlords and residents groups can also be encouraged as part of a programme of local support and funding. This can be demonstrated by the successful courtyard greening initiatives in Berlin designed to reduce sealed surfaces (see case study). The configuration of communal spaces can vary considerably, influencing the potential to link habitats. At Schoneberg in Berlin networks of open courts created by urban blocks allow for continuous areas of habitat. The traditional terraced housing that is typical of industrial cities such as Manchester limits the opportunities for continuous areas of habitat. The proposed remodelling of the traditional terraced streets of Salford will see the creation of communal courtyards from private space, as well as home zone streets, creating the potential for larger areas of continuous habitat. Limiting factors may include disturbance by residents and preferences for ornamental exotics.

Wildlife Basics

Food	Sources of nectar, edible nuts, seeds and berries
Water	Introduce artificial ponds, swales and rainfall catchments
Cover	Areas of dense tree, shrub and tall grass cover, leaves, logs and stones can also provide cover
Breeding	Vegetation that protects from elements and freedom from disturbance; introduce artificial sites where necessary

Source: Johnston, J and Newton, J (1993) *Building green*, London Ecology Unit

Courtyard Greening, Berlin

In Berlin, a Biotope Area Factor (BAF) is calculated based on how much land surface with habitat potential is being lost through urban land-use. Compensation is made by considering all suitable wall and roof surfaces as well as better use of the ground level spaces. A tax on drainage from impermeable surfaces encourages the minimisation of sealed surfaces that contribute to runoff. There is advice available on the choice of species to be planted, but this is not specified, and funding is available from the Local Authority.

At a local level implementation has various forms[2]. Most areas are 'greened' either as they are built or as they are renovated. This allows measures such as the replacement of unnecessarily sealed surfaces. The design is always dependent on the prevalent conditions. However, constant features include: functional space (bike storage, general and recyclables bins); trees and nature-like planting or in smaller areas, climbers trained up wires which are then kept away from eaves; green roofs; paving only on main routes; and use of permeable surfaces.

Sources:
1. Berlin Department of Urban Development (2004) Biotope Area Factor, http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/en/ziele.shtml
2. Senatsverwaltung für Stadtentwicklung und Umweltschutz (1997) Courage to plant green walls
3. Runze und Casper with the Senatsverwaltung für Bau und Wohnungswesen, (1990) Ecological planning and building

Langworthy HMR, Salford

Communal remodelling of Victorian terraces

Innovative developer Urban Splash have recently averted the demolition of over 300 Victorian terraced properties in Salford following the collapse of the housing market in the Langworthy area. Funded by the Government's Housing Market Renewal programme the proposal is to remodel a complete block of traditional 'Coronation Street' style terraces. 'Outrigger' kitchen and bathroom extensions into yards are to be removed along with the back alleys to create continuous strips of communal garden. 'Privacy buffer zones' will be planted to delineate each property's private terrace. The roofs will also be completely replaced.

Notably the streets are adjacent to Langworthy Park, better known locally as Chimney Pot Park, a small but popular recreational park built on the in-fill site of a former reservoir. Its planting is typical of Victorian parks in the city, with ornamental and exotic shrubs and trees laid out within a manicured landscape. There have been recent experiments with reduced mowing of amenity grassland to allow wildflowers to grow.

Sources: 1. Birch, A. Salford Sommersault, Building Design, 28th November 2003
2. Wildlife Trusts, Salford Phase I Habitat Survey, 2000-2001

SUMMARY

- Communal 'doorstep' spaces create the potential for a mosaic of habitats which respond to varying microclimate conditions
- Plants must be selected to survive in the unique microclimate conditions of each communal space
- An understanding of the basic requirements for attracting a variety of fauna will enable biodiversity to be maximised· Networks of spaces create opportunities for more continuous areas of habitat
- Traditional forms of housing can be remodelled to create large, communal spaces with habitat potential
- Developers, residents and landlords can all play a role in the establishment of habitats

4.2 Detailed design

Green buildings and private spaces

Buildings and private spaces also create the potential for a fine grain of habitat mosaics, selected to respond to the distinctive range of microclimate conditions. In this section, we explore how nature can be encouraged to colonise buildings and private spaces.

Higher density urban forms can be exploited to create habitats on walls, balconies, roof terraces and decks. As we highlighted in Section 4.1, distinct microclimates can be found in and around buildings, with varying daylight, wind, temperature and moisture levels. This requires the selection of native plants to be adapted to each distinctive microclimate condition, but may also require reference to better adapted exotic species.

From the outset property developers building out plots can be encouraged, or even required, to creatively incorporate habitat mosaics into buildings and communal spaces. Recent experience in the new district of Bo01 in Malmo, Sweden demonstrates how a scoring system, the 'Greenspace Factor', can successfully encourage creative solutions[3]. The result is a diverse range of habitat mosaics, which enhance the courtyards and buildings.

Private gardens, balconies and roof terraces can also be a haven for wildlife, as demonstrated by recent surveys in London[4]. With the growing popularity of 'natural gardening' there is the potential to support households with guidance on native flora. At WaterColor in Florida (Case Study, Section 2.3), residents are provided with a pattern book of native species and support is available from an on-site ecologist. At Hulme in Manchester, a community garden centre provides local advice and support[5].

Climbing plants can be encouraged to colonise walls, creating habitats for birds, insects and small mammals[6]. They can also enhance the visual appearance of buildings, as well as providing cooling, insulation and microclimate moderation.

Establishing climbing plants generally requires the incorporation of fixed frames or cable lattices. Plants can either grow upwards from containers at the foot of a wall, or cascade down from containers on terraces. A trickle watering system may be required, potentially supplied by rainwater.

Modern buildings tend to reduce the amount of potential nesting sites. Artificial sites may therefore need to be provided for bats and birds. There are a range of ways in which these can be incorporated into buildings, or alternatively they can be setup in courtyard habitats. Their location should provide protection from the elements, ideally being placed north of east facing. Species of climbing plants can also provide habitats.

English Nature have highlighted the potential role of distinctive green roof habitats, claiming that 'low maintenance wild plant gardens on roof tops …could make an important contribution to the survival of Britain's native plants, including rare species'[7].

Whilst the relatively harsh conditions created by green roofs tend to require hardy pioneers, they can attract a range of insects and birds. Their main benefit to building occupiers is that they provide natural insulation, rainwater attenuation and cooling.

There are broadly two forms of green roofs, intensive roof gardens and extensive green roofs, with each having advantages and disadvantages (see table). Factors to consider include load-bearing capacity and waterproofing.

'Brown' rubble roofs are gaining popularity as they are cheaper and relatively low maintenance, making use of materials available on the site and encouraging the existing plant communities of brownfield sites to colonise them[8].

Integrating Nesting Sites into Buildings

Nesting sites	Species	Action
Open-fronted box	Flycatchers, robins, wagtails, blackbirds	Replaces bricks
Hole-entrance box	Tits	Needs to be removable
Quarter sphere	House martins	Under eaves and terraces
Small cavities	-	Remove façade brick(s)
Gaps between roof	Swifts, bats	Small gap or special tiles
Purpose made bricks	Bats	Replaces bricks
Ledges	Kestrels	Design-in at high level

Source (adapted from):
Johnston,J and Newton,J (1993) *Building green*, London Ecology Unit

Bo01, Malmo (Sweden)

Creative habitat mosaics

Bo01 is a new district of Malmo constructed on reclaimed land at the city's Western Docks. The housing comprises a mix of houses, flats and terraces, with the green space mainly taking the form of communal courtyards, with smaller private gardens and balconies. A 'Green Space Factor' has required each property developer put in place measures to enhance biodiversity and manage rainwater. Every developer had to choose 10 out of 35 Green Points which included:

- At least 50 species of native herbs in the courtyard
- All walls covered with climbing plants
- All roofs are green roofs
- A bird box for every flat
- Food for birds all year round in the courtyard
- Facades to have swallow nesting facilities
- Bat boxes in the courtyard
- A habitat for specified insects in the courtyard
- Courtyard vegetation selected to be nectar giving
- A $1m^2$ pond for every $5m^2$ of sealed area in the courtyard
- Courtyard amphibian habitats with space for hibernation
- The whole courtyard to consist of semi-natural biotopes
- A section of the courtyard to be left to natural succession

Developers were also required to establish mechanisms for long-term management and maintenance. Overall this has resulted in a mosaic of habitats including green roofs and walls, wetland retention ponds and courtyard gardens.

Sources:
1. Kruuse,A (2004) English extract from Greenspace Factor, City of Malmo ecologist
2. Beer, A (2001) Greenspace management in Denmark and Sweden, http://www.map21ltd.com/scan-green/bo01.htm

Comparison of Roof Gardens and Green Roofs

Intensive Roof Garden 'Traditional'	Extensive Green Roof 'Ecological'
Deep soil, irrigation system, more favourable conditions for plant,	Thin soil, little or no irrigation stressful conditions for plants
Advantages: ▷ Allows greater plant/habitat diversity ▷ Good insulation properties ▷ Simulates wildlife garden ▷ Diverse utilisation of the roof	Advantages: ▷ Lightweight ▷ Suitable for large areas and 0-30^0 slope ▷ Low maintenance and more natural ▷ Often doesn't require irrigation and drainage
Disadvantages: ▷ Greater weight loading ▷ Requires irrigation and drainage ▷ Higher resulting cost	Disadvantages: ▷ Limited choice of plants ▷ Usually no access for recreation

Source:
Johnston, J and Newton, J (1993) *Building green*, London Ecology Unit

Hampstead Garden Suburb

A land trust to preserve character and amenity

Hampstead Garden Suburb was designed as a response to the newly constructed Golders Green underground station. Development of the suburb was initiated in 1906 with the acquisition of 243 acres of land by the Hampstead Garden Suburb Trust. The vision was "so to lay out the ground that every tree may be kept, hedgerows duly considered, and the foreground of the distant view preserved, if not as open fields, yet as a gardened district, the buildings kept in harmony with the surroundings". The plans placed a particular emphasis on natural plot divisions, public gardens and street trees. The need to "preserve the present character and amenities" of the Garden Suburb was recognised early in the process. As a not for profit company, the Hampstead Garden Suburb Trust administers leaseholds and freeholds and acts as an estate manager. A ground rent is charged, which is used to maintain streets and public spaces. The Trust employs a landscape consultant who can also help residents with problems involving gardens, hedges and trees.

Sources:
1. Hampstead Garden Suburb (2003) Home page, http://www.hgs.org.uk
2. Saint, A et al (1999) London suburbs, Merrell Holberton

SUMMARY

- High density urban forms create the potential for habitats on walls, balconies, roofs, terraces and decks
- Private gardens can suport a wide variety of wildlife
- Plants must be selected to survive in the unique microclimate conditions of each location
- Benefits to building occupiers include cooling, insulation, rainwater management and reduced microclimate effects
- Climbing plants, nesting sites and green roofs each require specific design solutions to achieve the best results
- A 'green point' scoring system can be used to encourage creative design solutions across a neighbourhood

5. Management and stewardship

Protecting, enhancing and creating opportunities for biodiversity requires careful planning and resourcing over the short, medium and long-term. In this section, we explore some of the key issues relating to the management and stewardship of greenspaces and nature reserves.

In this guide we have identified the range of opportunities for biodiversity in sustainable communities. Each opportunity requires management and resourcing in order to realise their potential, requiring consideration at a number of key stages:

- Planning and design – Designing ecologically functional greenspaces requires specific knowledge and expertise. This will need to be taken into consideration in the selection of appropriate landscape architects. If specific habitats and species require protection then it may be necessary to minimise intrusion and disturbance by incorporating buffer areas and imposing access restrictions. Proposals are likely to require approval by the Local Authority and statutory consultees. Licenses may be required if species need to be moved (translocated), although this should always be a last resort.

- Construction – If specific habitats and species are legally protected then they will require consideration as part of the construction process. The timing and extent of each development phase may require careful planning, related to seasons and statutory requirements. Site traffic and earthworks create a particular risk of disturbance and specific care may need to taken due, for example, to the extent of foraging areas.

  Ecological features may need to be created at an early stage. For example, at Warrington New Town, woodland areas were planted up to six years in advance (Case Study, Section 3.4). Whilst this incurs upfront costs, it can add value to properties, can help minimise damage to immature vegetation and allows it more time to establish.

  Appointment of an on-site ecologist, or 'ecological clerk of works', can help ensure that due consideration is given during programming, as employed at Cambourne near Cambridge[1] and as proposed for Portishead Ashlands, near Bristol (see Case Study). Advice may also be available from local Wildlife Trusts[2], the RSPB, Biological Records Centres[3] and Community Forest projects.

- Ongoing management – Opportunities to enhance biodiversity can be maximised by creating more ecologically self-sustaining habitats. The techniques required will need to be set out in a management plan[4]. This will also need to cover recreational uses. Nature reserves and community forests are likely to require their own management plan to resolve potentially conflicting uses.

  Establishing ecologically functional landscapes and habitats may initially require more intensive management. However, they have the potential to reduce maintenance costs over the long-term. This approach requires skilled personnel and provision should be made accordingly. Where more extensive areas are covered a dedicated ranger service may be appropriate, also delivering wider community benefits such as educational programmes[5].

- Long-term resourcing – The resourcing of ongoing management requires consideration from the outset. Revenue funding can be secured in a number of different ways relating to specific sites or community-wide greenspaces:

  1. Land trust – Greenspaces across a whole community can be managed by a dedicated charitable trust. This can be endowed with profits or vested with assets. It can also help capture future Section 106 contributions. Successful examples are Hampstead Garden Suburb (see Case Study, Section 4.2) and the Milton Keynes Park Trust[6]. Regional Parks, such as Nene Park in Peterborough, and Community Forests such as Marston Vale (Case Study, Section 3.2) also use this model.
  2. Service charge – Residents can be required to pay a ground rent, essentially a service charge. This approach has been used for more recent attempts to create new communities such as Linden Home's Caterham Barracks scheme, which has also established a Trust[7].
  3. Partnerships – Partnerships can be established with organisations with the knowledge and skills to manage reserves and greenspaces. At Cambourne a wildlife trust will manage the community's eco-park, with residents

Portishead Ashlands, Bristol

Greenfield new community sponsors protection, mitigation and compensation

Ashlands is an 182 hectare brownfield site east of the town of Portishead. It was once an ash tip for the Central Electricity Generating Board (CEGB). Outline planning consent was granted in 1999 for development of the site by a consortium of housebuilders[11]. A planning requirement is the adoption and management of the adjacent 40 hectares of land fronting onto the Severn Estuary as a wildlife reserve.

The Severn estuary's foreshore a protected habitat for migratory and wading birds. It is designated as an SSSI, EU Special Protection Area and as a 'wetland of international importance' under the Ramsar Convention[12]. The foreshore 'nature reserve' area therefore requires specific protection. The boundary of this area has been designed with rhynes to restrict access and create buffer spaces. The need to safeguard this area is to be communicated through interpretation signage. This will be supplemented by way-marks, boardwalks and bird hides in order to create interest.

The aim of the wider reserve is two-fold: 1) to compensate for the loss of habitats as a result of development and, 2) to enhance the quality and range of habitats. The reserve will contain a series of habitats including wetlands, hay meadows and raised pastures. Native species have been selected to create new habitats, which reflect the local character. The site will also form a receptor for protected species translocated from the housing area, including great crested newts.

Sources:
1. BBC Bristol (2003) *Nurturing nature around Portishead*
http://www.bbc.co.uk/bristol/content/green/2003/03/20/portishead_wildlife.shtml
2. Landmark Consultants (2003) *Portishead Quays Wildlife Reserve - Design and Implementation*

and local businesses contributing to overheads[8].

4. Local taxation – A local tax hypothecated to communities that benefit from greenspaces. At Wimbledon Common in London, a 1871 Act of Parliament transferred land to the 'Conservators of Wimbledon Common' who collect a tax from households within three quarters of a mile. The tax is based on proximity and Council Tax band (varying from Band A £13 to Band H £140)[9].

- Community stewardship – Stewardship is an important long-term objective[10]. It can deliver tangible benefits, helping to ensure that amenities respond to local needs, dissuading vandalism and reducing management costs. Nurturing stewardship requires a genuine feeling of local ownership and control. To realise these benefits active community participation must be facilitated at agreed stages, which can include design, ongoing management and maintenance. Trusts are a particularly effective way of involving local communities in decision-making.

  Fostering stewardship amongst the younger generation is particularly important. This can be achieved through the support of projects and clubs associated with greenspaces, as demonstrated by Benwell Nature Park in Newcastle (Case Study, Section 1.3). The participation of residents may also be required to maximise the opportunities for biodiversity in communal 'doorstep' spaces.

SUMMARY

- Designing and managing ecologically functional greenspaces requires specific knowledge and expertise
- Habitats and species protection will require consideration during the construction process and an 'ecological clerk of works to manage the process
- Habitat and species protection may require buffer areas and access restrictions
- Establishing ecologically functional habitats requires more intensive management and investment during the early years
- The techniques required to achieve this need to be set out in a management plan, which will also need to resolve potentially conflicting uses
- An on-site ranger service can deliver wider community benefits, including management of educational programmes
- Long-term resourcing requires consideration from the outset and can be secured in a number of different ways, dependant on the circumstances and type of green space
- Community stewardship can help to ensure amenities respond to local needs, dissuade vandalism, reduce management costs and further educational aims

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