

Part N: Biodiversity and Green Infrastructure

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This part of the Development Requirements SPD provides further detailed guidance on the interpretation of the following Core Strategy policies, as appropriate:

- CS.2 Climate Change and Sustainable development
- CS.4 Water Environment and Flood Risk
- CS.5 Landscape
- CS.6 Natural Environment
- CS.7 Green Infrastructure
- CS.9 Design and Distinctiveness
- CS.25 Healthy Communities (open space)

It will provide guidance and advice on how applicants can achieve a good standard of landscape design, biodiversity and green infrastructure in new development. It should be read in conjunction with other relevant parts of the SPD, in particular Part C & D Design Principles.

This SPD will be used by Stratford-on-Avon District Council to help reach decisions on whether to approve or refuse planning applications. Making sure that applications comply with the guidance contained within SPD will make it easier for the Council to grant planning permission. The Council's Planning Policies are set out in the Core Strategy available at www.stratford.gov.uk/corestrategy.

Key words or terms which appear throughout the document are included in the Glossary.

N1. Definitions

Development proposals should seek to protect existing ecological assets and create new habitats to encourage additional species within a network of green infrastructure.

Biodiversity describes the variety of life on earth, encompassing the whole of the natural world and all living things with which we share the planet.

Biodiversity Offsetting is a method of compensating for biodiversity loss either through on site mitigation or off-site measures.

Green Infrastructure is a network of multifunctional greenspace, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities.

N2. Biodiversity

Biodiversity includes populations of living organisms, different species and varied types of habitat. The design, layout and landscape design of new development offers enormous opportunities to conserve, protect, restore and enhance biodiversity.

Measures to encourage biodiversity can provide a wide range of benefits including:

- providing an attractive residential setting or work environment;
- improving climatic effects (such as providing shade and shelter);
- reducing the impacts of noise and air pollution;
- reducing flood risk;
- providing informal recreation with physical and mental health benefits;
- improving the prospects for flora and fauna; and
- opportunities for appreciating and learning from nature.

It is also important to build-in biodiversity within individual buildings and their immediate surroundings. Buildings and private space create the potential for creating a network of habitats. This can include the following measures which may be appropriate for different types and densities of development:

- Provision of private and communal gardens (as appropriate) with the potential to develop wildlife areas;
- The inclusion of composting areas/facilities;
- The use of green walls (walls which are free-standing or part of a building partially or completely covered with vegetation or soil) within developments;
- The use of green roofs;
- The integration of bird and bat nesting sites within the design of buildings;
- Retaining existing trees and hedges into developments and planting new areas;
- The provision of rain gardens;
- The provision of hedgehog friendly fencing to allow access to garden habitats;
- Features to protect amphibians such as amphibian kerbs and gully pot ladders.

For further information on these features, see Table 1. Opportunities to include biodiversity in and around developments.

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Key considerations include:

- All applicants from Householder to Major developments are advised to consult with Warwickshire County Council Ecology Services planningecology@warwickshire.gov.uk before submitting an application. They provide a detailed record and analysis of the biodiversity dimension of the landscape and its ecological patterns and habitat distributions. For Major developments it is also advisable to consult with Natural England. The early identification and understanding of this information may assist the passage of your application, for example by identifying locations where protected species may be present. Some charges apply for this service;
- Avoid damage or destruction to sensitive sites as well as protected species and exploit opportunities to adapt derelict or underused areas for nature conservation;
- Retain landscape features and provide appropriate buffers to link habitats and contribute to networks of green infrastructure;
- Timing of works to avoid disturbing or damaging the habitats of nesting birds;
- Consider the potential effect of lighting on foraging and commuting bats and other nocturnal wildlife;
- Educational opportunities provided by wildlife areas, both formally and informally;
- Potential to implement to new management regimes or habitat creation projects with consideration for the Warwickshire, Coventry and Solihull [Biodiversity Action Plan priority habitats](#).

N3. Ecological/Geological Assessments

The SDC Planning Application [Local List](#) has details of local requirements for planning applications including the circumstances where Ecological or Geological Assessment might be needed. An Ecological or Geological Assessment is required:

Where there is a potential impact on protected areas, habitat, geology, or protected species (for example, to demonstrate the presence or absence of protected species such as bats, badgers and great crested newts).

Protected areas can be identified via an information request to the Warwickshire Biological Records Centre. Protected species could potentially occur within any vegetated area, particularly where there are mature trees, ponds or watercourses on or nearby the site. Bats also often use buildings to roost in and so further advice on the likelihood of bats being present in any building to be demolished or impacted should be sought. Surveys for protected species often need to be conducted during particular months of the year and so should be planned at the earliest opportunity to avoid delays.

The presence of legally protected species can have a significant impact on your proposals. You are recommended to contact Warwickshire County Council Ecology Services before submitting an application to establish the extent and nature of any survey work. Charges may apply.

N4. Biodiversity Offsetting

Stratford-on-Avon District has some great wildlife areas, but these are often quite fragmented. Biodiversity offsetting provides a great opportunity to explore opportunities for joining up these areas and enhancing the overall biodiversity of the natural environment.

The Mitigation Hierarchy

The NPPF clearly states that: *'If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused.'* Through the NPPF the Government is committed *'to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.'*

The Council's Core Strategy, Policy CS.6 Natural Environment, adds: *'Where a development will have a negative impact on a biodiversity asset, mitigation will be sought in line with the mitigation hierarchy.'* Developers required to provide compensation for biodiversity loss under Policy CS.6 can choose to do so through biodiversity offsetting, once the mitigation hierarchy has been applied and compensation is seen as the only option available:

The mitigation hierarchy can be summarised as follows:

- A. Impacts are avoided;
- B. If impacts are unavoidable, impacts are mitigated against; and
- C. If mitigation is not possible, impacts are compensated for as a last resort (e.g. through biodiversity offsetting).

The components of ecological networks

The diagram shows that natural areas can be:

- increased by habitat creation (**more**);
- extended through adding protected buffer zones to existing natural areas (**bigger**);
- enhanced through habitat restoration (**better**) and connected by stepping stone corridors, landscape corridors and linear corridors such as road verges and railway embankments (**joined**).

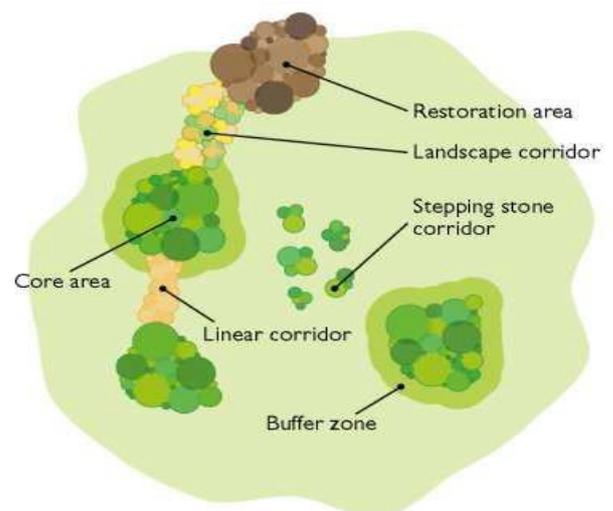


Fig. N1 - The components of ecological networks (from Making Space for Nature, DEFRA).

N5. Biodiversity Impact Assessment Calculator

Warwickshire, Coventry and Solihull were part of a [DEFRA national pilot of Biodiversity Offsetting](#) and its implementation has continued across the sub-region.

Warwickshire County Council Ecological Services recommend a Biodiversity Impact Assessment (BIA) calculation is completed to accompany every planning application for Major and Minor scale of development which involves land take likely to affect biodiversity. It will enable developers to assess their biodiversity impacts and those who are required to provide compensation for biodiversity loss under planning policy can choose to do so through biodiversity offsetting. The Biodiversity Impact Assessment metric is used to calculate the biodiversity of a site before and after development; this then calculates if the development is likely to cause a loss or gain to biodiversity.

Should the Biodiversity Impact Assessment calculate a residual loss to biodiversity, as in most cases, once the mitigation hierarchy has been followed and the development is in accordance with all other local and national planning policy and law, it may be suitable to apply principals of biodiversity offsetting. A Biodiversity Offsetting Scheme will compensate for biodiversity loss from development by habitat creation/restoration projects in strategic areas to be managed in the long term; gain is measured using the same metric ensuring there is no net loss to biodiversity so that the development can proceed more sustainably. Where Biodiversity Offsetting is to be used this will normally be secured via a S106 Agreement with Warwickshire County Council being the lead authority in the matter.

A [Biodiversity Impact Assessment Calculator](#) in excel format has been designed to help measure the habitat value gain or loss of a development, together with a Guidance document on how to complete it. Advice is also available from WCC Ecological Services.

Find out more

[Natural England: Designated Sites](#)

[Sites of Special Scientific Interest](#) (SSSI) Designated sites system – search by site (if known) or County and view details and map. Stratford-on-Avon District has 37 designated SSSIs. [Magic map](#) which shows designations, habitats and species, landscape/geology etc. The planning system deals only with material considerations on planning matters. In wildlife terms this means: Statutory or non-statutory wildlife sites; Species protected by law; and Priority (rare or declining) species and habitats listed in national or local biodiversity plans.

[Warwickshire County Council – Planning and Ecology](#)

Ecological Services maintain the Warwickshire Biological Records Centre (WBRC) and provide [ecological advice relating to the planning process](#). They provide specific advice on bats and bat survey requirements, protected species in Warwickshire and relevant wildlife legislation.

Warwickshire Wildlife Trust

[Warwickshire Wildlife Trust](#) is a local conservation charity which aims to protect and enhance wildlife, natural habitats and geology throughout Warwickshire, Coventry and Solihull, and to encourage a greater awareness, appreciation and participation in all aspects of nature conservation and the environment.

Habitat Biodiversity Audit (HBA) Partnership

[The HBA](#), established in 1996, covers the Warwickshire authorities and Solihull and Coventry unitary authorities. It is managed by Warwickshire Wildlife Trust and based at Warwickshire County Council's Ecological Services. The HBA's remit was to survey every field and boundary in the sub-region to provide up-to-date biodiversity data. The data is held on a [Geographical Information System](#) (GIS), which provides high quality coded maps and linked site notes with a powerful tool for interpretation and statistical analysis.

Local Wildlife Sites (LWS)

Stratford-on-Avon District currently has 118 designated LWS which is 24% of all LWS in the Warwickshire, Coventry and Solihull sub-region. See the HBA web-links above for information on LWS designation.

Warwickshire Biological Records Centre

The centre maintains information on [species distribution and ecological sites](#) in Warwickshire, Coventry and Solihull – for which it is the most comprehensive data bank of species and habitat records in the County. They are organised into two inter-related databases: Records for sites (habitats) and records for species (flora and fauna).

Local Biodiversity Action Partnership (LBAP)

See [Warwickshire Wildlife Trust website](#) for information about the partnership and links to the Species and Habitat Action Plans.

N6. Green Infrastructure

Green Infrastructure (GI) is the network of green and water spaces (sometimes referred to as 'Blue Infrastructure') that are found within and between our towns and villages. Green infrastructure assets include waterways, gardens, allotments, street trees, sustainable urban drainage systems, green walls and roofs, parks and natural areas amongst others.

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This section of the SPD provides further guidance on the interpretation of part of Core Strategy Policy CS.25 (B) relating to Open Space in the form of Green Infrastructure. Specific advice regarding Outdoor Sport and Play Facilities can be found in the Healthy Communities section of the Developer Requirements SPD.

Role and Function of Green Infrastructure

Green infrastructure (GI) is a cornerstone of spatial planning that is essential to provide wide ranging benefits to various sectors through the use of 'green' and semi-natural features.

Careful planning of GI delivers social, economic and environmental benefits that can be derived in a cost-effective and sustainable manner.

It should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits for local communities, including:

- Providing opportunities for recreation and sports, improving mental and physical health for all ages and users;
- Providing tranquil spaces which contribute towards psychological and social well-being of communities;
- Enhancing visual amenity value— green infrastructure helps to soften the urban form;
- Reinforcing the sense of place and local distinctiveness;
- Providing a network of links for safe walking and cycling;
- Improving and enhancing habitats and biodiversity;
- Cooling the urban environment through the provision of trees and vegetation and/or water bodies;
- Reducing flooding - increased green coverage and sustainable urban drainage increases water storage capacity and reduces flood risk;
- Reducing air pollution and improving local air quality; and
- Protecting and supporting historic and archaeological settings.

Core Strategy Area Strategies

Seven key functions of GI are relevant and applicable to Stratford-on-Avon District:

1. Conservation and enhancement of biodiversity, including the mitigation of the potential impacts of new development;
2. Creating a sense of place and opportunities for greater appreciation of valuable landscapes and cultural heritage;
3. Increasing recreational opportunities, including access to and enjoyment of the countryside and supporting healthy living;
4. Improved water resource and flood management and sustainable design;
5. Making a positive contribution to combating climate change through adaptation and mitigation of impacts;
6. Sustainable transport, education and crime reduction; and
7. Production of food, fibre and fuel.

The Council has set out Green Infrastructure principles to apply in considering development proposals and other initiatives relating to the Area Strategies set out in Section 6 of the Core Strategy. They are found in Policies AS.1 to AS.9 for

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Stratford-upon-Avon and the Main Rural Centres (MRCs). The Council will assess the extent to which each of these principles is applicable to an individual development proposal. Developers will be expected to contribute to the achievement of these principles where it is appropriate and reasonable for them to do so, taking into account the provisions of the Infrastructure Delivery Plan.

The [District Green Infrastructure Study](#)¹, 2011 makes recommendations both District wide and applicable to Stratford-upon-Avon and the Main Rural Centres. The recommendations enable development proposals to incorporate GI and enhance the local GI network such that environmental resources are protected and their potential to deliver multiple benefits is maximised.

Green Infrastructure Key Considerations

- New development should minimise impacts on ecological networks and seek to provide a positive contribution to green infrastructure to influence how settlements are shaped. Working with the natural assets will contribute to a more sustainable development in the long-term and enhance the distinctive local character;
- Applicants should show that open space provision has been considered from the beginning of the design process in order to benefit green infrastructure. Development proposals should seek to link existing and proposed open spaces and landscape structure to form connected open space networks;
- Development proposals should demonstrate how proposed open spaces contribute and respond to the hierarchy of existing landscape and open space networks as part of the wider network of green infrastructure;
- The layout and design of new developments should embrace distinctive features that will give the site and its setting a sense of identity, and link areas together. Local characteristics such as topography, landform, geology, drainage and field patterns should be taken into account. Boundaries and vegetation cover should influence the design;
- The Council will resist badly designed development that would harm the appearance and character of the existing built environment. A net gain in biodiversity should be sought.

N7. Types of Green Infrastructure

Parks & Gardens and Amenity Greenspace

- Country Parks
- Registered parks and gardens
- Formal parks and gardens
- Informal recreation spaces
- Village greens
- Pocket parks.

Most often found in or near housing areas. Provides informal community space

¹ Stratford-on-Avon Green Infrastructure Study, UE Associates, August 2011

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and outdoor informal play facilities.

Unrestricted Natural Accessible Greenspace

- Woodland and scrub
- Grasslands, downlands, commons and meadows
- Heathland
- Wetlands, open and running water
- Wastelands and derelict land
- Countryside in urban fringe areas
- Cliffs, quarries and pits.

Accessible natural greenspace is a valuable multifunctional asset that adds to the diversity of a GI network. It is important that habitats are interconnected and maintained at a high and stable quality. GI can help protect, enhance, restore and create habitats which, in turn, can provide benefits for people, business and nature. Land use designations in Stratford-on-Avon District relating to biodiversity include non-statutory and statutory sites such as Sites of Importance for Nature Conservation, Sites of Special Scientific Interest, Local Nature Reserves and Local Wildlife Sites.



Allotments and Community Gardens

- Allotments
- Community gardens
- Community Orchards.

Community assets include those types of GI that have strong social and cultural significance. They all involve service provision to local communities and provide outdoor meeting places. Historic and cultural aspects of a place often provide the spatial context for several GI community assets.



Other Green Infrastructure Assets

Outdoor sports facilities and **Children and Young People's Equipped Play facilities** are covered in Part L–Open Space of the Developer Requirements SPD. Green infrastructure design features such as green roofs and walls, and street trees are included in the Design section.



Green and blue corridors

- River and canal banks, towpaths
- Rivers and canals
- Cycleways and greenways
- Footpaths and bridleways
- White roads and byways open to all traffic

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- Hedgerows and ditches
- Motorway and road verges
- Railway embankments and cuttings.
- Sustainable Urban Drainage (SUDS)

Like most GI features, green corridors can be found at a range of scales and sizes. This affects the extent to which they deliver a variety of functions. They link the network and enable transfer of people and nature across and throughout settlements. Increased levels of isolation cause genetic limitations, and the ability for biodiversity to disperse and colonise can be limited by isolation. Well-connected access routes will encourage people to use active travel options. Blue corridors include rivers, streams, overland flow paths, surface water ponding areas, watercourse buffer areas and multi-use flood storage areas.

N8. Sustainable Drainage Systems (SUDS)

Sustainable Drainage Systems (SUDS) mimic natural drainage processes to reduce the effect on quality and quantity of surface water runoff from developments and provide amenity and biodiversity benefits.

There are numerous types of sustainable drainage systems that can be used including:

- Soakaways – Infiltration of water into the ground (success rate depends on soil type);
- Filter Drains – Gravel filled trenches;
- Swales – Vegetated shallow channels;
- Infiltration Basins – Vegetated depressions to store rainwater, usually dry except during/after heavy rain;
- Detention Basins– Vegetated depressions storing rainwater, usually dry except during/after heavy rain;
- Ponds – Permanent pools of water;
- Tanks – Usually underground storage containers for rainwater;
- Permeable surfaces – Allows water to infiltrate rather than ‘run-off’;
- Green Roofs – Planted roofs.

Opportunities to integrate SUDS within the landscape design of a development should be taken and needs to be identified at the earliest opportunity. In particular, applicants should ensure that existing trees and hedges are taken into consideration when designing SUDs, so that it does not result in any conflict and that SUDS features have sufficient space around them, at least 3.5m width, to allow access for maintenance and for new planting of appropriate species. SUDS schemes should not simply be an engineering driven solution to drainage problems but should also be designed to provide attractive amenity areas which are beneficial to wildlife and appear as ‘natural’ as possible.

Consideration also needs to be given to safety. It is important to keep the depths of all features as shallow as possible and avoid ‘bomber-crater’ like basins at the end of the site. Small features throughout the site will help to avoid these types of basins. Ponds

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should be designed so that if people/children do enter, it is easy to get back out, or for someone enter to assist them. This generally includes a dry bench along the top, shallow gradients on the banks (no greater than 1 in 3) and where possible, a wet bench at the base to discourage people going further. Visibility through to the water is also imperative. Where fencing is considered necessary due to presence of children, careful consideration should be given to the type of fenced to be used. It should be high enough to prevent access by young children, but low enough to allow entry when necessary. The fencing should be a vertical pale, rather than a horizontal rail construction, which can be used as a climbing frame.

Where design and safety are still a concern, a risk assessment from the Royal Society for Prevention of Accidents (RoSPA) will be required. Further guidance may be found in Chapter 36 of the SUDS Manual (CIRIA 753). See the link below in the find out more section below.

Attenuation ponds/basins on sites adjacent to or near to the railway boundary should only be included in proposals with the agreement of Network Rail and should not be included in proposals that are adjacent to a railway cutting.

Where a proposed SUDS scheme is adjacent to a railway infrastructure the following considerations should be taken into account:

- Proposals must not import a risk of flooding, pollution or soil slippage onto the existing operational railway.
- Soakways should not be within 30 metres of railway boundary.

Applicants should give early consideration to the multiple benefits and opportunities of SUDS to help to deliver cost effective SuDS scheme with the best results. CIRIA (Construction Industry Research and Information Association) provides a free tool and guidance Benefits of SUDS Tool (BeST) which makes assessing the benefits of SUDS easier, without the need for full scale economic inputs.

<http://www.susdrain.org/delivering-suds/using-suds/benefits-of-suds/SuDS-benefits.html>

Details of SUDS maintenance should be included in the management plan, specification and schedule of works, which is produced as part of the landscape maintenance strategy. This includes the long term-management, particularly important for medium and large scale housing developments.

Where the use of large scale SUDS features may be constrained because of the amount of land available, other SUDS techniques should be considered, which do not result in additional land take.

Typically these include the use of:

- Soakaways;
- filter drains;
- swales;
- underground tanks;
- green walls/roofs;
- permeable surfaces; and
- water butts.

Further advice and guidance on SUDS is available from Warwickshire County Council

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the Lead Local Flood Authority, who are responsible for approving SUDS schemes and have published a Surface Water Management Plan and associated documents. Further information on these documents is available, using the links in the Find out more section below.

Find out more

Strategic Flood Risk Assessment (2013)

<https://www.warwickshire.gov.uk/sfra>

SUDS (C753) (CIRIA 2015)

http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

Warwickshire County Council's Local Flood Risk Strategy

<https://apps.warwickshire.gov.uk/api/documents/WCCC-1039-45>

Warwickshire County Council's Surface Water Management Plan

<https://apps.warwickshire.gov.uk/api/documents/WCCC-1039-45>

Living Roofs and Walls: Technical Report: Supporting London Plan Policy

<https://www.london.gov.uk/sites/default/files/living-roofs.pdf>

Independent resource on green roofs founded by Dusty Gedge

<http://livingroofs.org/>

N10. Incorporating biodiversity in and around developments

The NPPF supports *'development whose primary objective is to conserve or enhance biodiversity; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged...'* This expectation is set out in Core Strategy Policy CS.6 Natural Environment which requires:

Making provision, where appropriate, for measures that will secure the creation and management of additional habitats, to strengthen networks of habitats, to foster landscape scale conservation in line with identified opportunities and priorities, to address the priorities of the Local Biodiversity Action Plan and to support an increase in the local populations of species of principal importance.

To assist with this requirement, the following Table 1. sets out examples of opportunities for including biodiversity in and around development, including:

- Bird nesting provision;
- Access for hedgehogs;
- Newts and amphibian ponds, refuge and kerbs;
- Bat roosts, lighting and habitat creation;
- Otter and water vole habitat protection;

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- Landscape guidelines; and
- Urban locations/gardens provision for pollinators.

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Table 1. Incorporating biodiversity in and around developments

WHAT:	WHERE:	HOW:
<p>Swifts Boxes/Bricks/Nesting Provision</p> <p>http://www.swift-conservation.org/OurLeaflets.htm</p> <ul style="list-style-type: none"> • Swift Nest Bricks - Installation & Suppliers. 	<p>Settlements where swifts are known to nest and where nesting provision could be targeted in new housing:</p> <ul style="list-style-type: none"> • Bidford-on-Avon • Binton • Burmington • Butlers Marston • Cherington • Combrook • Farnborough • Fenny Compton • Gaydon • Halford • Harbury • Henley-in-Arden • Ilmington • Lighthorne • Little Compton • Long Compton • Middle/Upper Tysoe • Napton-on-the-Hill • Newbold-on-Stour • Northend • Oxhill 	<p>Installation location (integral provision of swift bricks preferred over externally mounted boxes):</p> <ul style="list-style-type: none"> • Under the roof/eaves in the top course of blockwork in shaded areas out of direct sunlight and away from windows. • Minimum 5m off the ground. • Entrances to nesting provision should not be obstructed by trees, ladders or aerials. <p>North facing - OK South facing - No East facing - only if well shaded West facing - only if well shaded</p>

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WHAT:	WHERE:	HOW:
	<ul style="list-style-type: none"> • Pillerton Hersey • Preston-on-Stour • Priors Marston • Radway • Ratley • Shotteswell • Stretton on Fosse • Tiddington • Tredington • Upper Brailes • Warmington • Whichford • Winderton 	
<p>Swallow Nesting Provision</p> 	<p>Swallows prefer outbuildings which provide dark ledges and nooks and crannies for nesting.</p> <p>Swallows can enter a building through a very small hole and need very little light.</p>	<ul style="list-style-type: none"> • Make a small opening, minimum 50 mm high and 200 mm wide, under the garage or barn eaves or leave a window or door open. • Fix a nest platform where you would like them to nest, high in the building, out of the reach of cats. • Use a pre-formed swallow nest cup

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WHAT:	WHERE:	HOW:
<p>House Sparrow Terrace Nesting Provision</p>	<p>House Sparrows prefer to nest in groups or colonies.</p> 	<ul style="list-style-type: none"> • Ideally place the terrace (integral provision preferred over externally mounted boxes) two metres or more above the ground. • Install on the surface of the wall using the plugs and screws provided, or install directly into the wall. <p>North facing - OK South facing - No East facing - only if well shaded West facing - only if well shaded</p>
<p>Barn Owl Loft</p> <p>http://www.barnowltrust.org.uk/barn-owl-nestbox/barn-owl-nestboxes-building-projects/</p> 	<p>A tall building in which a small hole can be made at least 3 metres above ground overlooking open ground (not screened by trees or other buildings). The ideal building will be at least 4 metres tall within which a small owl hole and nest space can be created close to the top.</p> <p>Where there is no residual loft space the owls' nest space can often be incorporated within the fabric of the roof or upper-wall.</p> <p>Barn Owls can become tolerant of regular noise and activity around their nest or roost provided they have somewhere to hide.</p>	<ul style="list-style-type: none"> • Owl hole minimum size: 100mm wide x 200mm high, optimum size 130mm x 250mm, maximum size 200mm x 300mm. • Floor area of nest chamber: absolute minimum 0.4m² (e.g. 500mm x 800mm or 400mm x 1m), ideal size is 1m². • Owl spaces should be constructed inside the building but outside of the 'U-value envelope'. Thus, the envelope/membrane may have to be slightly diverted. • Human access is essential as the nest space will need to be cleared out very occasionally. • A generous removable inspection hatch or door in the back of the owl space (accessible from the building interior) is usually the preferred option but in some cases an external arrangement may be a practical option. • In the case of a loft partition, create an integral crawl-through doorway. • The access should permit all or most of the nest space floor to be reached by hand.

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WHAT:	WHERE:	HOW:
<p>Hedgehogs</p> <p>http://www.britishhedgehogs.org.uk/leaflets/A-guide-to-helping-hedgehogs.pdf</p>		<ul style="list-style-type: none"> • Make sure hedgehogs have easy access to gardens. Ensure boundary fences or walls have a 13cm x 13cm gap in the bottom to allow hedgehogs to pass through. • Use of pre-formed gravel board • 1 space every 8m
<p>Newts/Great Crested Newts (GCN)/Amphibians</p> <p>http://www.froglife.org/wp-content/uploads/2013/06/GCN-Conservation-Handbook_compressed.pdf</p>	<p>Ponds/Sustainable Urban Drainage systems /Attenuation Ponds</p> 	<p>Creation of new</p> <p>Surface area between 100 and 300m²</p> <ul style="list-style-type: none"> • Depth may vary; both deep (up to around 4m) and shallow ponds may be used • ponds should retain water for 12 months • Substantial cover of submerged and marginal vegetation • Open areas to facilitate courtship behaviour • Good populations of invertebrates and other amphibians, for prey • Ponds in clusters, rather than in isolation within 250m of each other • Absence of shading on the south side • Absence of fish • Absence or low density of waterfowl • Minimal disturbance from children

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WHAT:	WHERE:	HOW:
<p>Newts/Great Crested Newts (GCN)/Amphibians</p>	<p>Creation of Refugia</p>	<p>Great crested newts are known to spend a considerable proportion of their terrestrial phase either underground or just above ground under refuge sites.</p> <p>Piles of rubble, rock, log piles and earth banks (with plenty of mammal burrows and ground fissures present) in moist, shaded places or under dense ground cover, rough grassland and scrub make good hibernation and refuge sites. These features may be located in sheltered areas which are neither too dry nor prone to winter flooding or freezing.</p>
<p>Newts/Great Crested Newts (GCN)/Amphibians</p>	<p>Amphibian Kerbs</p> 	<p>Lots of small animals die by falling into open drains or manholes. Amphibians naturally proceed along any vertical barrier they meet. In a road situation, this is a kerb line where it meets the road surface. When they encounter a gully pot where there is no gap between it and the vertical kerb face, they often fall in. The Wildlife Kerb provides safe route around road gullies for amphibians on the move. They should be used in particular where gullies are proposed within the proximity of existing or proposed ponds. Dropped kerbs should be also positioned near to gullies in particular where ponds are present. Alternatively, drains could be positioned at least 10cm away from the kerb to provide a corridor for amphibians to travel and reduce risk of falling into the drain.</p>

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WHAT:	WHERE:	HOW:
<p>Bat Roosts</p> 	<p>Bats use different roosts throughout the year depending on their seasonal needs. Warm roosts in the summer and cool hibernation roosts in the winter. In the summer females gather in maternity roosts and males congregate elsewhere.</p> <p>It is always best to provide a number of different options for bats, so that they can choose the right roost with a temperature based on their needs.</p> <p>Find more information at: http://www.bats.org.uk/pages/accommodating_bats_in_buildings.html http://roost.bats.org.uk/principles/requirements-roost-retention-and-creation</p>	<ul style="list-style-type: none"> • Integral boxes (integral provision in buildings preferred over externally mounted boxes) • Bat boxes on trees. • Bat roosts in buildings • Crevice-dwelling and roof-void dwelling bats needing an internal flying area • Larger access for bats that fly rather than crawl into their roost. <p>Siting:</p> <ul style="list-style-type: none"> • Summer maternity roosts have a southerly or westerly aspect for maximum solar heating. • Male roosts and hibernation sites typically have a northerly aspect.
<p>Bat Lighting</p>	<p>Where development may impact upon bat roosting and bat foraging/commuting, the impact will be considered as part of the development. This may require modifications to the layout of the site, or securing further details of</p>	<p>Most bat species find artificial lighting to be very disturbing, so it is important to ensure that artificial light sources are not directed onto roosts, access points or flight paths or foraging areas.</p> <ul style="list-style-type: none"> • Consider no light or variable lighting regimes. • Try to use lights that are low UV and thus less likely to attract insects. • Avoid blue-white short wavelength lights.

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WHAT:	WHERE:	HOW:
	<p>external lighting via planning conditions.</p>	<ul style="list-style-type: none"> • Ensure that external lighting is pointed downwards to avoid up-spill into the environment. • Reduce height of lights to minimise spill and reduce overall illumination • Reducing light intensity to >3 lux • Habitat creation to provide light barriers which restricts the amount of light reaching the sensitive area. Barriers can be in the form of newly planted vegetation, walls, fences or buildings.
<p>Bat Habitat Creation</p>	<p>The activity of flying between the roost and foraging area is known as commuting. Bats use set routes for commuting which are known as commuting corridors, flight paths or fly-ways.</p> <p>These routes tend to make use of linear features such as avenues of street trees, tree-lines along waterways, hedgerows, vegetated railway corridors, gardens and woodland edges as linkages in the landscape.</p>	<p>Maintaining or creating good foraging areas for bats means establishing areas that attract insects, especially nocturnal insects. These habitat features include rivers, ponds, unimproved grassland, ancient semi-natural woodland and hedgerows planted with native vegetation.</p>

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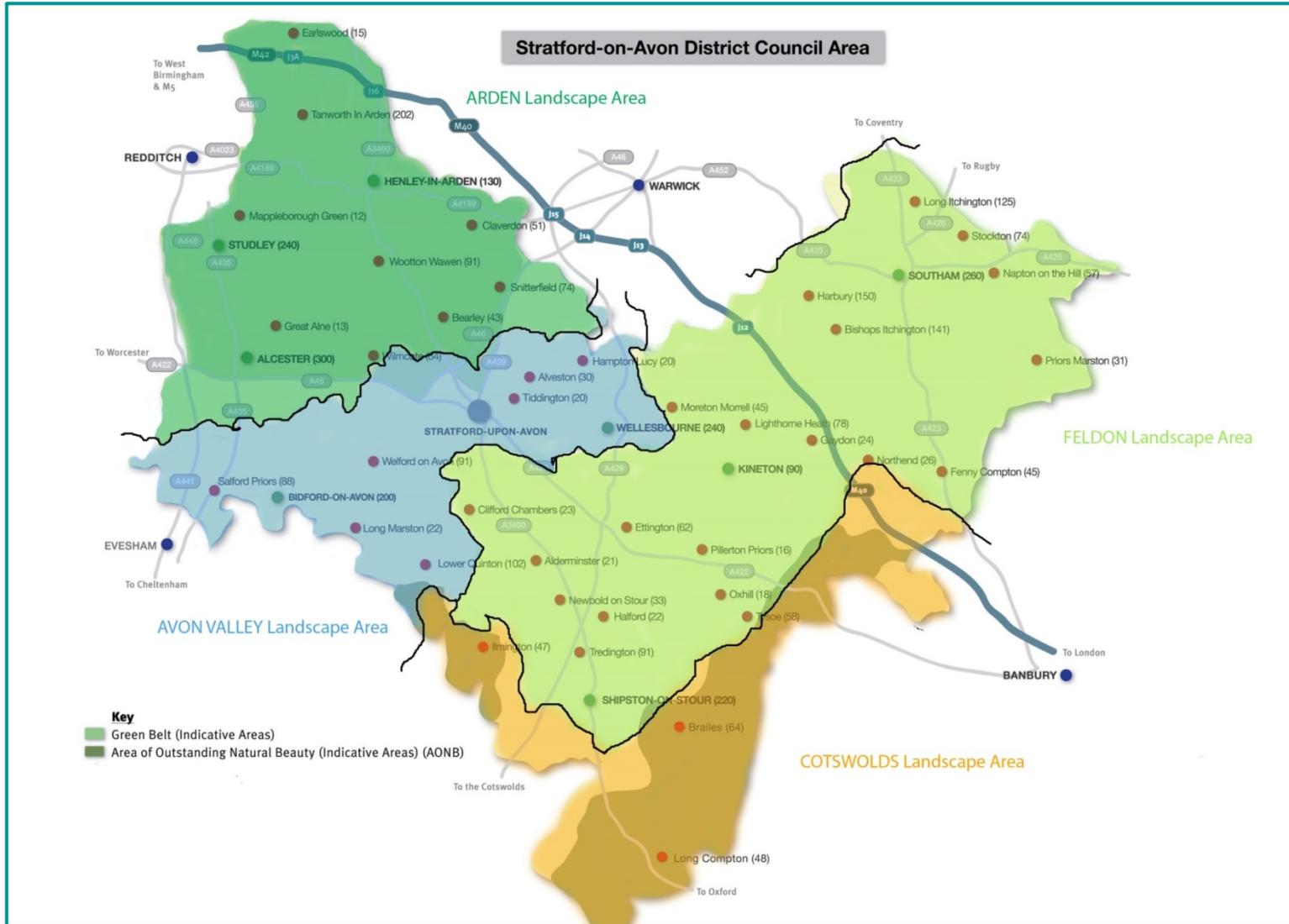
WHAT:	WHERE:	HOW:
	<p>Retaining dark corridors that link roosts or foraging areas planted with mature native vegetation to encourage insects and provide cover.</p>	
<p>Otters/Water Voles</p>		<p>Providing 30m buffers on rivers and streams known to be used by these species. Appropriate native planting along the banksides.</p>
<p>Landscaping Schemes</p>	<p>Rural Locations:</p>	<p>Warwickshire Landscape Guidelines. See Lists and Plan in Appendix 1. for Arden, Avon Valley Feldon and Cotswolds Landscape Area.</p>

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WHAT:	WHERE:	HOW:
	<p>Urban Locations/Gardens Where Warwickshire Landscape Guidelines are less relevant:</p> <p>https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/perfect-for-pollinators</p>	<ul style="list-style-type: none">• Aim to have plants that are attractive to pollinating insects in flower from early spring to late autumn. Winter flowering plants can also be of benefit.• Grow garden plants with flowers that attract pollinating insects. Blue flowers/shape of flowers/fragrant at night.• Avoid plants with double or multi-petalled flowers. Such flowers may lack nectar and pollen, or insects may have difficulty in gaining access. Single flowers are best.

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N14 Species Lists



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Species lists – Arden

The following is a list of those tree and shrub species which are common and characteristic to the Arden, and which contribute to its regional identity. Other native tree species may also be appropriate to individual sites – professional advice is recommended and is available from the sources listed at the back of this report.

Main soil types – clay loams and sandy soils

● Dominant species

○ Other appropriate species

		WOODLANDS		HEDGES AND HEDGEROW TREES	WET AREAS AND RIVERSIDES
		Clay Loams	Sandy Soils		
Trees					
Field maple	<i>Acer campestre</i>	○			
Common alder	<i>Alnus glutinosa</i>	○			●
Silver birch	<i>Betula pendula</i>	○	●		
Downy birch	<i>Betula pubescens</i>	○			
Ash	<i>Fraxinus excelsior</i>	●			○
Holly	<i>Ilex aquifolium</i>	○	○		
Crab apple	<i>Malus sylvestris</i>	○	○		
Aspen	<i>Populus tremula</i>	○	○		○
Wild cherry	<i>Prunus avium</i>	○			
Sessile oak	<i>Quercus petraea</i>		●	●	
Pedunculate oak	<i>Quercus robur</i>	●	●	●	
White willow	<i>Salix alba</i>				●
Crack willow	<i>Salix fragilis</i>				●
Rowan	<i>Sorbus aucuparia</i>		○		
Small leaved lime	<i>Tilia cordata</i>	○			

Shrubs

Field maple	<i>Acer campestre</i>			○	
Dogwood	<i>Cornus sanguinea</i>	○		○	
Hazel	<i>Corylus avellana</i>	●		●	
Midland hawthorn	<i>Crataegus laevigata</i>	○	○	○	
Hawthorn	<i>Crataegus monogyna</i>	○	○	●	
Holly	<i>Ilex aquifolium</i>			○	
Wild privet	<i>Ligustrum vulgare</i>	○		○	
Blackthorn	<i>Prunus spinosa</i>	○		○	
Goat willow	<i>Salix caprea</i>	○	○		○
Guelder rose	<i>Viburnum opulus</i>	○		○	○

Planting should contain at least 80% of dominant species

Species lists – Avon Valley

The following is a list of those tree and shrub species which are common and characteristic to the Avon Valley, and which contribute to its regional identity. Other native tree species may also be appropriate to individual sites – professional advice is recommended and is available from the sources listed at the back of this report.

Main soil types – poorly drained clays and sandy soils

● Dominant species

○ Other appropriate species

		WOODLANDS		HEDGES AND HEDGEROW TREES	WET AREAS AND STREAMSIDES
		Clay Soils	Sandy Soils		
Trees					
Field maple	<i>Acer campestre</i>	○		○	
Common alder	<i>Alnus glutinosa</i>	○			●
Silver birch	<i>Betula pendula</i>		●		
Ash	<i>Fraxinus excelsior</i>	●		●	○
Crab apple	<i>Malus sylvestris</i>	○	○		
Aspen	<i>Populus tremula</i>	○	○		○
Wild cherry	<i>Prunus avium</i>	○			
Pedunculate oak	<i>Quercus robur</i>	●	●	●	
White willow	<i>Salix alba</i>				●
Crack willow	<i>Salix fragilis</i>				●

Shrubs

Field maple	<i>Acer campestre</i>			○	
Dogwood	<i>Cornus sanguinea</i>	○		○	
Hazel	<i>Corylus avellana</i>	○		○	
Midland hawthorn	<i>Crataegus laevigata</i>	○	○	○	
Hawthorn	<i>Crataegus monogyna</i>	○	○	●	
Spindle	<i>Euonymus europaeus</i>	○		○	
Alder buckthorn	<i>Frangula alnus</i>	○		○	○
Wild privet	<i>Ligustrum vulgare</i>	○		○	
Blackthorn	<i>Prunus spinosa</i>	○		○	
Purging buckthorn	<i>Rhamnus catharticus</i>	○		○	
Goat willow	<i>Salix caprea</i>	○	○		○
Osier	<i>Salix viminalis</i>				○
Elder	<i>Sambucus nigra</i>	○			
Wayfaring tree	<i>Viburnum lantana</i>	○		○	

Planting should contain at least 80% of dominant species

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Species lists – Cotswold

The following is a list of those tree and shrub species which are common and characteristic to the Cotswolds, and which contribute to its regional identity. Other native tree species may also be appropriate to individual sites – professional advice is recommended and is available from the sources listed at the back of this report.

Main soil types - clay soils and free draining loams

- Dominant species
- Other appropriate species

		WOODLANDS		HEDGES AND HEDGEROW TREES	WET AREAS AND STREAMSIDES
		Clay Soils	Sandy Soils		
Trees					
Field maple	<i>Acer campestre</i>	○	○	○	
Common alder	<i>Alnus glutinosa</i>	○	○		●
Beech *	<i>Fagus sylvatica</i>		●		
Ash	<i>Fraxinus excelsior</i>	●	●	●	○
Crab apple	<i>Malus sylvestris</i>	○	○		
Pedunculate oak	<i>Quercus robur</i>	●	●	●	
White willow	<i>Salix alba</i>				●
Crack willow	<i>Salix fragilis</i>				●
Shrubs					
Field maple	<i>Acer campestre</i>			○	
Dogwood	<i>Cornus sanguinea</i>	○	○	○	
Hazel	<i>Corylus avellana</i>	○	○	○	
Midland hawthorn	<i>Crataegus laevigata</i>	○	○	○	
Hawthorn	<i>Crataegus monogyna</i>	○	○	●	
Spindle	<i>Euonymus europaeus</i>	○	○	○	
Wild privet	<i>Ligustrum vulgare</i>	○	○	○	
Blackthorn	<i>Prunus spinosa</i>	○	○	○	
Purging buckthorn	<i>Rhamnus catharticus</i>	○	○	○	
Goat willow	<i>Salix caprea</i>				○
Elder	<i>Sambucus nigra</i>	○			
Wayfaring tree	<i>Viburnum lantana</i>	○		○	

Planting should contain at least 80% of dominant species

* Beech is not native to Warwickshire, but is associated with the thin soils in the Cotswolds.

Species lists – Feldon

The following is a list of those tree and shrub species which are common and characteristic to the Feldon, and which contribute to its regional identity. Other native tree species may also be appropriate to individual sites - professional advice is recommended and is available from the sources listed at the back of this report.

Main soil type – poorly drained clays

- Dominant species
- Other appropriate species

		WOODLANDS	HEDGES AND HEDGEROW TREES	WET AREAS AND STREAMSIDES
Trees				
Field maple	<i>Acer campestre</i>	○	○	
Common alder	<i>Alnus glutinosa</i>	○		●
Ash	<i>Fraxinus excelsior</i>	●	●	○
Crab apple	<i>Malus sylvestris</i>	○		
Pedunculate oak	<i>Quercus robur</i>	●	●	
White willow	<i>Salix alba</i>			●
Crack willow	<i>Salix fragilis</i>			●
Shrubs				
Field maple	<i>Acer campestre</i>		○	
Dogwood	<i>Cornus sanguinea</i>	○	○	
Hazel	<i>Corylus avellana</i>	○	○	
Midland hawthorn	<i>Crataegus laevigata</i>	○	○	
Hawthorn	<i>Crataegus monogyna</i>	○	●	
Spindle	<i>Euonymus europaeus</i>	○	○	
Wild privet	<i>Ligustrum vulgare</i>	○	○	
Blackthorn	<i>Prunus spinosa</i>	○	○	
Purging buckthorn	<i>Rhamnus catharticus</i>	○	○	
Goat willow	<i>Salix caprea</i>	○		○
Osier	<i>Salix viminalis</i>			○
Elder	<i>Sambucus nigra</i>	○		
Wayfaring tree	<i>Viburnum lantana</i>	○	○	

Planting should contain at least 80% of dominant species

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N15 Plant Species for Encouraging Bats

Plant species	Common name	Native (N)	Type	Benefit	Soil	Light	Extensive Green Roofs	Living walls	Rain gardens	Hedges /trees	Beds /Borders
Acer campestre	Field maple	N	T/S	C	Any	Sun/shade				Y	
Acer platanoides	Norway maple		T	S	Well drained / alkaline	Sun/shade				Y	
Acer saccharum	Sugar maple		T	S	Any	Sun/shade				Y	
Achillea millefolium	Yarrow	N	HP	C,F	Well drained	Sun	Y				
Ajuga reptans	Bugle	N	HP	C,F	Any	Sun/shade	Y		Y		
Anthriscus vulneraria	Kidney vetch	N	HP	F	Well drained	Sun	Y				
Aubrieta deltoidea	Aubrieta		H	F	Well drained	Sun/shade		Y			
Betula pendula	Silver birch	N	T	C	Sandy/Acid	Sun				Y	
Cardamine pratensis	Cuckoo-flower	N	HP	F	Moist	Sun/shade			Y		Y
Carpinus betulus	Hornbeam	N	T	C	Clay	Sun				Y	
Centaurea nigra	Common knapweed	N	HP	C,F	Dry, not acid	Sun	Y				Y
Centranthus ruber	Red valerian		HP	F	Well drained / alkaline	Sun	Y				Y
Clematis vitalba	Old man's beard	N	C	F	Well drained / alkaline	Sun				Y	
Corylus avellana	Hazel	N	S	C	Any dry	Sun/shade		Y		Y	
Crataegus monogyna	Hawthorn	N	S	S,C	Any	Sun/shade				Y	
Daucus carota	Wild carrot	N	Bi	S,C,F	Any	Sun	Y				Y
Dianthus spp.	Pinks	N	A-Bi	F	Well drained	Sun	Y	Y			Y
Digitalis purpurea	Foxglove	N	Bi	C	Well drained	Shade / partial shade				Y	Y
Erica cinerea	Bell heather	N	S	F	Sandy	Full sun					Y
Erysimum cheiri	Wallflower		Bi-P	F	Well drained	Sun		Y			
Eupatorium cannabinum	Hemp agrimony	N	H	F	Moist	Sun/shade			Y		Y
Fagus sylvatica	Beech	N	T	C,R	Well drained alkaline	Sun/shade				Y	
Foeniculum vulgare	Fennel		H	F	Well drained	Sun					Y
Fraxinus excelsior	Common ash	N	T	C,R	Any	Sun/shade				Y	
Hebe spp.	Hebe species		S	F	Well drained	Sun/shade				Y	Y
Hedera helix	Ivy	N	C	F,C	Any	Sun/shade		Y	Y	Y	Y
Hesperis matronalis	Sweet rocket		H	F	Well drained / dry	Sun/shade					Y
Hyacinthoides non-scripta	Bluebell	N	B	F	Loam	Shade/ partial shade		Y		Y	Y
Ilex aquifolium	Holly	N	T	C	Any	Sun/shade				Y	
Jasminum officinale	Common jasmine		C	F	Well drained	Sun		Y			Y
Lavandula spp.	Lavender species		S	F	Well drained / sandy	Sun		Y			Y
Linaris vulgaris	Toadflax	N	HP	C	Well drained /alkaline	Sun	Y				Y
Lonicera periclymenum	Honeysuckle	N	C	F	Well drained	Sun		Y		Y	
Lotus corniculatus	Bird's foot trefoil	N	HP	F	Well drained /dry	Sun	Y				Y

98 Nectar plants for moths (Butterfly Conservation website) http://www.mothscount.org/text/64/nectar_plants.html
 99 Moth caterpillar food plants (Butterfly Conservation website) http://www.mothscount.org/text/66/caterpillar_foodplants.html
 40 Natural England: <http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/threats/Horizon-scanning-plants.aspx>
 41 NNSG: <https://secure.fera.defra.gov.uk/nonnative/species/home/index.cfm>

Plant species	Common name	Native (N)	Type	Benefit	Soil	Light	Extensive Green Roofs	Living walls	Rain gardens	Hedges /trees	Beds /Borders
Lunaria annua	Honesty		Bi	F	Any	Sun/ partial shade	Y				Y
Malus spp.	Apple		T	C	Any	Sun				Y	Y
Matthiola longipetala	Night-scented stock		A	F	Well drained /moist	Sun			Y		Y
Myosotis spp	Forget-me-not species	N	A	F	Any	Sun	Y	Y			Y
Nicotiana glauca	Ornamental tobacco		A	F	Well drained /moist	Sun/ partial shade			Y		Y
Oenothera spp.	Evening primrose species		Bi	F	Well drained /dry	Sun	Y				Y
Origanum vulgare	Marjoram	N	HP	F	Well drained /dry	Sun	Y	Y			Y
Populus alba	White poplar	N	T	C	Clay loam	Sun				Y	
Primula veris	Cowslip	N	HP	F	Well drained /moist	Sun/ partial shade	Y				Y
Primula vulgaris	Primrose	N	HP	F	Moist	Partial shade	Y	Y		Y	Y
Prunus avium	Wild cherry	N	T	C	Any	Sun				Y	Y
Prunus domestica	Plum		T	C	Well drained /moist	Sun				Y	Y
Prunus spinosa	Blackthorn	N	S	C	Any	Sun/ partial shade					Y
Quercus petraea	Sessile oak	N	T	C,R	Sandy loam	Sun/shade				Y	
Quercus robur	Common oak	N	T	C,R	Clay loam	Sun/shade				Y	
Rosa carina	Dog rose	N	S	C	Any	Sun			Y	Y	Y
Salix spp.	Willow species	N	S	S,C	Moist	Sun/shade			Y	Y	
Sambucus nigra	Elder	N	T	C	Clay loam	Sun					
Saponaria officinalis	Sopawort	N	HP	F	Any	Sun					Y
Saxifraga oppositifolia	Saxifrage	N	HP	C	Well drained	Sun	Y	Y			Y
Scabiosa columbaria	Small scabious	N	HP	F	Well drained /alkaline	Sun	Y				Y
Sedum spectabile	Ice plant		HP	F	Well drained /dry	Sun	Y				Y
Stene dioecia	Red campion	N	HP	F	Any	Shade/ partial shade		Y	Y	Y	Y
Sorbus aucuparia	Rowan	N	T	C	Well drained	Sun				Y	
Stachys lanata	Lamb's ears		HP	F	Well drained /dry	Sun	Y				Y
Symphoricarpon spp.	Michaelmas daisies		HP	F	Any	Sun					Y
Tagetes patula	French marigold		A	F	Well drained /moist	Sun					Y
Thymus serpyllum	Creeping thyme	N	HP/S	F	Well drained /dry	Sun	Y	Y			Y
Tilia x europaea	Common lime		T	C	Any	Sun/shade				Y	
Trifolium spp.	Clover species	N	H	F	Any	Sun	Y				Y
Valeriana spp.	Valerian species	N	HP	F	Moist	Sun/ partial shade			Y		Y
Verbascum spp	Mulleins	N	Bi,HP	C	Well drained	Sun	Y				Y
Verbena bonariensis	Verbena		HP	F	Well drained /moist	Sun					Y
Viburnum lantana	Wayfaring tree	N	S	C	Any	Sun/shade				Y	Y
Viburnum opulus	Gaulther rose	N	S	C	Moist	Sun/shade			Y	Y	
Viola tricolor	Pansy	N	A	F	Well drained /moist		Y	Y			Y

Type	Benefit
HP - Herbaceous perennial	C - Moth caterpillar food plant
Bi - Biennial	S - Sap sucking insects (eg whiteflies)
BIP - Biennial perennial	F - Flowers attract adult moths
T - Tree	R - Good root potential
S - Shrub	
A - Annual	
B - Bulb	
C - Creeper/ climber	