SI01 Biodiversity Design Guide

UNIVERSITY OF LEICESTER

Social Impact Section

The **Social Impact (SI)** section addresses the lack of direction on topics relating to sustainable environments – excluding carbon and energy. It makes reference to areas of legal compliance, but also sets a standard on aspects not previously considered to do with character generation of University spaces. This includes the uses of art and green spaces in different environments to create more **Interesting, Interactive and Immersive Sites (IIIS)**. This is summarised in the *Leicester for Life* Vision Statement.

For more information on our wider commitments of sustainability:

- United Nations' Sustainable Development Goals *(University signed Accord in 2017)*
- Contact Dr Sandra Lee from the Social Impact Team at sll33@le.ac.uk & 0116 252 2306
- Contact Adam Tester from the Gardens Team at at244@le.ac.uk & 0116 229 7941

Introduction

The University has a legal (Wildlife and Countryside Act 1981) and moral obligation to biodiversity, but nature can also be used as a tool to enhance projects and improve relationships with stakeholders. Protecting and enhancing the natural environment is an integral part of the University's approach to climate change adaptation and should be considered in all developments. This document has been written as a short introduction, guide and sources bank outlining expectations for both **retrofits** and **new builds.** The **Expectations Summary** acts as a memory aid only and should not be read in isolation.

- Read Background and refer to Resources in the **Appendix** for wider reading and links
- Developments should follow the **net gain** principles
- Consult **expert advice** via the project ecologist or other experienced professional
- Biodiversity should be considered from **Stage 0 in the RIBA** planning process
- Follow the **Basic Principles** for integrating biodiversity in the built environment
- Involve the Social Impact Team to help **communicate** good work at all stages of project

Basic Principles

The basic principles for designing for biodiversity can be summarised into the following themes, which should be adopted into projects. These themes are explored in the following sections.

Retaining vegetation & habitats	**Creating new habitats**	**Plant new trees**	**Multi-functional green infrastructure (GI)**	**Wildlife-friendly planting**
Artificial lighting	**SuDS**	**Connectivity**	**Target species**	**Engagement**

In practice

Planning

Biodiversity should be acknowledged and plans made to enhance it from the very beginning of a project – see RIBA table. The National Planning Policy Framework states there should be Net Gain for biodiversity and the City Council Senior Nature Conservation Officer will expect to see more than just mitigation in development proposals. Planning ahead and designing in early will therefore save time during the planning process. You should seek to **retain existing vegetation and habitats where appropriate**, particularly when considering older or significantly located trees. It is not acceptable University practice to exchange a mature tree for young trees in the belief this will fully compensate and you should refer to the Plants and Pollinators Policy for more information.

As mentioned in the planning framework, what is removed should be replaced like-for-like (where applicable/able) and as much installed back on site as possible. The planting scheme should also reflect the character of the surroundings e.g. wetland plants near a river setting.
Having space to **plant new trees** on University land is also extremely valuable for potential biodiversity offsetting. Stoughton Road Playing Fields has seen 3250 trees planted in 5 years and is one site option that can be utilised within projects. Larger trees serve greater wildlife benefits so should form 30% of all species planted, which should be predominantly native.

Opportunity
Developments and maintenance projects of any type provide opportunities to **create new habitats.** Non-native species should be avoided unless they have documented value for wildlife and are not invasive. These habitats should **target species** of interest identified within the University Biodiversity Action Plan or wider local and national strategies. Care should be taken on site to minimise impact to existing wildlife; protected species will need special procedures and monitoring. It should be highlighted at this stage that habitats are not just trees and hedgerows and can be created from man-made materials.

To maximise investment, ecological consultancies employed can be asked to make recommendations for enhancements as part of each project. It is essential to make sure that the Gardens Team are involved or have some input early in the design phase where they are expected to maintain sites. To keep costs low, **wildlife-friendly planting** and habitat creation would ideally take place in-house through the Gardens Team; if this is not achievable, external contractors will be required. This would be relevant for installing **green infrastructure** and **SuDS**, which will need to be designed and managed as a multi-functional resource that provides a full range of ecosystem services.

Look out for projects requiring **a)** ground-breaking or **b)** scaffolding, as these are good indicators for potential enhancements. These are best assessed on a case-by-case basis and project **budget** should be allocated from the beginning. The first approach is to **exhaust all possible methods** of enhancement by using this Design Guide and its source materials. If this process has been followed and opportunities are still limited, the **Sustainability Offsetting Treasury (SOfT)** can be used to financially support sustainability projects through the Social Impact Team. This approach should be established at Stage 0 should it be required and contact made with the team to agree funds.

Circular economy
Biodiversity should be considered **globally** and not just locally within a project. A circular economy keeps resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and regenerating products and materials at the end of each service life. You should source products and materials that divert waste from landfill or have reputable sustainability certification; this can reduce the ecological impact of development on a wider scale.

This also applies to natural 'waste' material. Where the argument to remove vegetation has been made, you should aim to retain biodiversity value by **keeping as much on site as possible**. It will require communication and an agreement with the Gardens Team to ensure no conflict or adverse effects, but can reduce the cost of skip hire and removal.

Examples of natural material that can be repurposed:

Lifted Turf	• Pile rolled turf in a corner where they make an excellent insect or hedgehog hotel • Alternatively, roll them out and let it degrade naturally in a designated place
Stones, bricks and gravel	• Create small mounds of pebbles or dig trenches and fill with stones. These will be used by beetles, spiders and other insects. • Reuse in ponds and rainwater gardens
Trees	• Dead trees with no structural problems can be left standing to encourage habitation by insects and birds such as woodpeckers or owls.

Logs and vegetation	• Can be used for decoration, seating or for mulching down as compost. Holes can be drilled into logs and left in the sun as homes for bees.

You can ask to have these features created by your ecologist and creatively communicated to educate staff and students by the **Social Impact Team**.

Connectivity

Regardless of whether an animal is aerial, terrestrial or aquatic, it is essential that habitats remain connected to allow freedom of movement. This will enable species to find what they need to survive – which can include each other. Green wedges or corridors can be natural formations such as trees, shrubs, hedgerows and rivers, but also can be man-made – like railways. Barriers can include roads and fences but also non-physical features, such as **artificial lighting**. The campus is very close to routes extending from the countryside into the city so green spaces should be linked to allow wildlife safe passage. University of Leicester is connected to the countryside via Welford Road Cemetery and Victoria Park, which are linked by the Railway and River Soar running through and close to the Local Nature Reserve, Aylestone Meadows. Numerous wildlife species are excellent urban adaptors and these environments should be considered a valuable habitat worth protecting and connecting.

Communication

Communication is an essential part of any project and promoting positive actions for biodiversity can be a valuable method of mitigating and preventing complaints. Tree removal can cause concern for both University audiences and external stakeholders but can be lessened by communicating why it has occurred and how they will be replaced. However, this approach only works if the ecological impact of removing the trees is honestly addressed when considering the huge value placed on mature and large tree species.

Education is at the heart of the University and physical changes, installations and conceptual ideas should be explained if there is the potential to create a more **engaging** environment for staff and students (See *Leicester for Life).* The **Social Impact Team** and **Marketing and Communications Officer for Estates** can assist you by exploring how you might draw attention to good work e.g. using recycled plastic products or installing bird boxes. Where possible, ask your product provider to create signage for you in collaboration with this team.

Expectations summary

- Retain existing habitats and keep natural waste on site as agreed with Gardens Team
- What is removed should be replaced like-for-like and installed back on site
- Habitats should target species of interest and non-native plants avoided
- Consider biodiversity globally in your product selection
- Link habitats for safe wildlife passage and remove potential barriers
- Mature, large and connecting trees have very high value and University policy should be consulted
- Where enhancements cannot be made, invest in the Sustainability Offsetting Treasury (SOfT)
- Always involve the Gardens Team, particularly early in design stage if they are expected to maintain the site
- Communicate projects to educate, mitigate and spread positive messages

Sustainable Drainage System (SuDS)

This section includes information on designing SuDS for people and wildlife, as well as being an important step towards University climate change mitigation. This approach can result in biodiverse green spaces that also offer other amenity benefits alongside their original function. Green roofs and walls (not included in this section) can be considered SuDS but have their own guidelines within this document.

The potential to **retrofit** SuDS should be assessed as part of all projects. This can be achieved by disconnecting down pipes and diverting surface water away from drains through basins, rain gardens and planters – turning open spaces into immersive and aesthetically pleasing areas. SuDs should be incorporated into all **new developments,** which can reduce and slow run-off and be channelled into features like ponds and guided by conveyance feature like grass swales. **Roads** contribute to the problem of oils and pollutants in water so designs should aim to clean water using SuDS and the appropriate controls.

Hierarchy of treatment stages within the management train

Prevention	Site housekeeping measures including removal of soil and other detritus from hard-surfaces to reduce impact on water quality downstream. Use design to prevent polluted run-off from entering system. **Scale:** individual buildings
Source control	Controlling rainfall at or very close to source by using e.g. permeable paving, green roofs, rain gardens and filter strips. Incorporates rain-harvesting features such as water butts. **Scale:** individual buildings *E.g. Bioretention areas, Filter strips, Rain gardens, Green roof & walls, permeable surfaces*
Site control	Controlling run-off received from source control features in detention and retention basins, swales or other surface features. **Scale:** small residential or commercial developments
Regional control	Controlling and storing the cleanest run-off received from the site. **Scale:** large housing developments, multiple sites which can be targeted for larger 'community-scale' SuDS features such as a wetland or group of wetlands. This is the final treatment stage and where there is any discharge via a controlled outflow to a stream or river, there should not be any negative impacts on water quality. Ideally, the discharge should improve stream water quality
Conveyance features	Move water between the different treatment stages. This should be done using above-ground features such as swales and channels to maximise wildlife and people benefits *E.g. Swales*

Plants and ponds can also play an important part of water management and should be retained and installed at every opportunity.

Ponds

Ponds of any size can be very valuable for wildlife, particularly in hot weather. Frogs, toads and newts will use even small bodies of water to breed and larger ponds will support waterfowl. Ponds have a different ecosystem to temporary water basins and therefore should not be treated the same. They should rarely be removed as part of development, but if they are, they need to be replaced like-for-like (no fish) with a well-structured habitat around it. Pond assessments should be made by a qualified ecologist before this happens and translocation of any animals found must take place. Keeping good pond health in general is very important, regardless if they are new or old. Post-construction check-ups should be made and you can request an 'after-care' package through your ecologist as they take time to settle.

Trees and shrubs

The growth characteristics of the plants and their subsequent management are important. When managed well, woody plants soak up more water and provide a range of benefits for a variety of wildlife. A diverse range of structured planting will provide wildlife with cover to safely forage and breed in. Create areas of wet scrub and native woodland, i.e. around larger detention and retention ponds and wet grassland to benefit a range of wildlife.

Grassland

Grasslands are particularly important for wildlife. Structure is crucial and a variety of lengths should be created throughout a site. Leave some areas uncut over winter and other areas cut every two to three years to further enhances structural diversity. Research indicates that tapestry lawns can produce up to 90% more flowers, contain over 25% more invertebrate life and support up to 10 times as many visits from twice as many pollinator species as wildlife turf. Mowing is reduced by up to two thirds, rainfall can be absorbed up to twice as fast as a turf lawn and tapestry lawns need no additional fertilisers. All lawns planned should be species-rich for pollinators.

Expectations summary

- New lawns should be species-rich and lawns not highly used should use a Grass-Free Lawn approach
- Soft SuDS to be used in all new developments and assessed for their potential to be retrofitted in others

- Plant a diverse landscape utilising a variety of native trees, shrubs and small plants
- SuDS should be used clean water run-off from roads and paths with potential for pollutants
- Ponds should be retained and new ones installed. Wildlife ponds should not include fish or require filters

Green Roofs

A green roof is created when a planting scheme is established on a roof structure – flat or sloped. Green roof technology utilises a waterproof membrane to prevent water ingress into the building and resists damage from root penetration. The roofing system can also provide thermal performance, roof drainage falls, air tightness and vapour control to the building.

The following provides a guide for a cost benefit analysis.

Environmental – what is the carbon cost of the green roof in comparison to its benefit? What is our return on carbon investment? Can you use grey water? Green roofs requiring irrigation should only use reclaimed rain or greywater.

Ecological – how much ecological benefit is it giving? Score the roofs according with intensive roof garden highest and extensive sedums lowest - BUT you need to have the right planting mix for it to be worth anything.

Economical – is it financially realistic? NB. Note lifecycle cost vs upfront capital investment.

Aesthetic – Can anyone see it? Will it improve how the University looks (particularly from higher building windows)?

Psychological – Will it benefit those who see it? Mindfulness garden etc.

Educational – Can it be used in student projects or as a case study? Can it be accessed by people? Ditto previous factor.

All developments should be assessed for green roof potential. The primary concern will be establishing the weight-loading capacity before choosing your roof type, but the above factors should also be considered when choosing your design. Companies will offer variations on different products, but you should ask to see previous and up to date case studies.

Light ↓ **Heavy**	**Extensive** These roofs have a **shallow** growing medium and does **not** require irrigation. Often offered as a pre-planted mat, this makes it one of the lightest option but its value for biodiversity is limited and therefore should not be first choice. **Plants:** Mosses, sedums, succulents, herbs and grasses	
	Semi-intensive The growing medium for these roofs are **deeper** and can **sometimes** require irrigation because of this. It is a heavier roof but value for biodiversity is increased due to increase root depth. **Plants:** Perennials, sedums, grasses, herbs and small shrubs	
	Intensive Described as a roof garden, the growing medium here is at its **deepest.** It is usually installed as a recreation space and would be the heaviest option. It **would** need irrigation and has the potential to be the most biodiverse and engaging option. Food cultivation should be pursued in this option. **Plants:** Perennials, lawn, shrubs, trees and food growing	

Further information and guidance is available in this report.

Biosolar roofs

Solar panels are at their most efficient when they are working at between 23 – 25°C. A combined green roof with solar panels helps to keep the ambient temperature between these figures, helping the panels work more efficiently. An appropriate plant mix can be allowed to grow without blocking lights to the panels, maximising the space for biodiversity and energy efficiency. This approach should be used instead of *just* a green roof *or* solar panels.

Other features

Regardless of roof type – whether it is planted or not, other features for wildlife should be added to a roof space to increase value. If space is sufficient to support it you should aim to create a varied (mosaic) habitat, which can be achieved by using different natural materials:

- Sand dunes
- Bricks (clean)
- Shallow water trays
- Stone piles
- Logs
- Bird boxes

Providing these extra materials will help supply wildlife with their 3 key needs; **Food, water** and **shelter.**

Expectations summary

- Explore for all new developments and assess for potential in retrofit designs
- Use a biosolar roof approach
- Extensive (see above table) use a combination of wildflower seeds, native plants and sedum species. Avoid lightweight sedum blankets/mats as they do not promote habitat diversity
- Intensive: 70% of the roof area should be soil and vegetation (including water features). NB. Roof area = the area/section that has been identified for the green roof. i.e. 30% could be other materials such as pebbles, wood, plastic liners for water retention etc..
- Only use grey or rainwater for irrigated systems (NB. Grey water is water that has had secondary use or is relatively clean "without fecal contamination". Examples are rain water and water from domestic appliances.)
- Unless it is a research project, avoid allowing the roof to self-seed as this may result in unwanted invasive plants. Ask for a customised and local to Leicester seed mix
- Always seek to include other features on the roof, even if a fully planted roof isn't possible
- Consider the value for education in your design and request safety barriers to be installed where access may be of use (without special training required)

Green walls

Also known as living walls and vertical gardens, green walls are where vegetation is growing on or against any vertical surfaces. These systems vary greatly in their design and can be applied **inside** as well as **outdoors.** The benefits are the same as those relating to the green roof. Although indoor installations do not have a direct ecological impact, they create a biophilic environment and can be used as a reminder of nature for good health and wellbeing (See *Biophilic* Design Guide). Although artificial green walls using plastic plants would also achieve this, they do not have the carbon absorption benefit and would contradict the University's approach to valuing plastic. Indoor green walls should consider food cultivation and not be installed without educational signposting – consult Social Impact Team. Green walls requiring irrigation should only use rainwater or greywater.

The three main types of green walls can be defined as below, although their names and descriptions may vary when researching online:

Irrigated Systems

These are purpose-made modules or blankets / panels, which are water-fed and support a wide range of plants. They may be either substrate (soil-based) or hydroponic (soil-free) and can be visibly spectacular, but can be expensive to build and maintain. They should be included in new developments when the budget is sufficient for them to be installed sustainably. As they can be considered a statement piece, they must communicate a sustainability message through art, design or signage. This type of system is not mandatory when simpler, cheaper and less carbon intensive options outlined below are possible.

Green Façades
One of the cheapest options on the market, these are made of climbing or trailing plants that are established in troughs or directly into the ground. A framework can be attached to the structure aiming to be covered, which is typically a stainless steel cable trellis or mesh. This approach can be used top-down or bottom-up and the plant simply acts as it would do in the wild, attaching to the frame provided.

Intermediate green walls
Somewhere between the two concepts mentioned are intermediate green walls. These may refer to the following types:

- *Green Screens* – Commercially pre-grown in nursery, these are composed of climbing plants on a free-standing steel framework. Creating an instant hedge, they are usually installed with automatic irrigation
- *Live curtains* – Combine the features of green facades and living walls, this systems is made of plants on a climbing structure, but rooted off the ground in planter boxes as hydroponic systems
- *Urban hedges* – Can be considered part of the green wall concept as they are interchangeable with green facades of living walls for some of their features and ecosystems services
- *Stone walls* – These can be colonised by vegetation as their features include a mixture of different size stones with small gaps in between to exclude rats but allowing for plants to grow and insects to inhabit

Other features
Living wall technology and design is always progressing, so latest products and technologies should always be explored. Ledges, nest boxes and insects hotels would be a welcome addition to green walls and can be placed at varying height depending on the species that you are aiming to attract. Signage for education and communication should be included and can be requested as part of the overall cost of installation.

Expectations summary

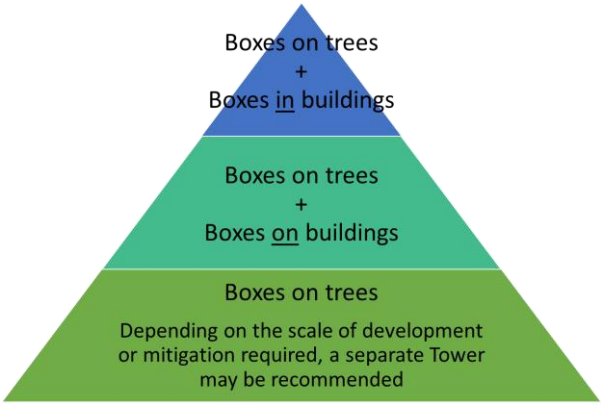
- Irrigated green walls should only be considered if using harvested rainwater or greywater sources
- Include features such as ledges, nest boxes, and insect hotels
- Consider indoor green walls to educate and create healthy indoor environments
- Explore the full range of green wall types and choose the design based on a sustainable, long-term plan

Building Integrated Retrofit and Design

Some species are either dependent on or benefit greatly from man-made structures and environments. Birds, bats and insects are animals that take advantage of nesting/roosting opportunities, but this habitat may be destroyed or removed with development. Built-in (integral) features for wildlife i.e bird nest bricks, should be included into all new builds and retrofitted where bricks or roof tiles are removed. Existing nests and roost sites **should be retained as first priority** but when this is not possible, the following hierarchy applies.

To consider

- Built-in nest / roosting bricks last the lifetime of the building
- Integral nest / roosting bricks should not completely replace boxes on trees
- Variety of designs, materials and colours exist
- Always consult expert advice e.g. ecologist
- Read product and installation advice in **Resources**
- Towers to be treated with caution as possible alternative and should be researched thoroughly
- Use art and design to enhance installations and communicate



Integral Box Hierarchy

Integral bird boxes

		General advice
For all other birds	• Minimum box height at 2 metres • Various panels and entrance hole sizes exist for different birds	• Sparrow Terrace not recommended • Place in undisturbed areas • Away from potential attack by squirrels and rats • Avoid south-facing external boxes where possible; reinforce against overheating if necessary • Clear flightpath to nest • Install in small groups of 2/6 and 1 metre apart
For Swifts *(target species)*	• Minimum box height at 5 metres • Install call speaker system to increase chance of box habitation. • Hole size should be smaller to exclude Starlings • If not designed in, a concave nest cup should be added to the box	

Integral bat boxes and roosts

- Sheltered position near trees but do need a clear flightpath
- South-facing preferred for warmth
- Minimum box height at 5 metres
- Provisions for bats can also be made by creating formal entrances to spaces where bats already reside, utilising cavity walls and roof spaces

Integral insect boxes

- South-facing or sunny wall preferred for warmth
- No vegetation obstructing holes
- At least 1 metre from the ground with no upward limit
- Based on standard brick dimension with various colour (Brick is considered non-load bearing material)

Expectations summary

- Always seek to retain existing nest sites and be aware of hidden habitats
- Integral nest / roosting bricks as preferred option and follow Box Hierarchy
- Integrate boxes/bricks for all three animals in new developments and retrofits; bird, bat and insect
- Choose the appropriate box/brick for your project and follow expert advice for installation

Lighting

Artificial lighting disrupts the natural patterns of light and dark, which can disturb invertebrates, birds and other mammals. International and domestic legislation protects all species of bat and their roost sites (whether bats are present at the time or not). Lighting has the potential impact the overall population as it may cause disruption to roosting; commuting, foraging, drinking and migrating. Some bat species have been shown to be impacted by significantly lower lighting levels than others, certain colour temperature environments also play a factor in the level of impact. However, all bats require dark roosting areas, corridors through the landscape and habitats to feed, which should be considered within the Masterplan.

It is important to remember that there is **no legislation requiring an area or road to be lit.** However, local authorities have a duty to ensure impacts upon legally protected species are avoided. The latest guidance notes on *Bats and artificial lighting in the UK* was published August 2018 by the Bat Conservation Trust (BCT) and Institute of Lighting Professionals (ILP). No specific lighting recommendation is made within this Design Guide, but steps are outlined and important points highlighted to ensure the appropriate decision can be made.

Follow these steps where the impact on bats is being considered as part of a proposed lighting scheme:

Step 1	**Could bats be present on site?** Consult local sources of ecological information or seek advice from an ecologist.
Step 2	**Determine the presence of – or potential for – roosts, commuting habitat and foraging habitat and evaluate their importance** Appoint ecologist to carry out daytime and, if necessary, night-time bat surveys and to evaluate the importance of the site's features and habitats to bats**.**
Step 3	**Avoid lighting on key habitats and features altogether** No illumination of any roost entrances and associated flightpaths, nor on habitats and features used by large numbers of bats, by rare species or by highly light-averse species.
Step 4	**In other locations of value for bats on site, apply mitigation methods to reduce lighting to a minimum** Set dark habitat buffers and acceptable lux limits with ecologist guidance • Spatial design Building design Landscaping
Step 5	**Demonstrate compliance with lux limits and buffers** Lighting professional to prepare final lighting scheme design and/or lux calculations or undertake baseline light surveys as necessary. Post-completion bat and alighting monitoring may be required.

Expectations summary

- See link to *Bats and artificial lighting in the UK* guide in Resources section
- Follow steps for mitigation
- Do not provide excessive lighting and use only what is required for safety.
- Follow bat-friendly recommended advice, which may include:
- Minimise light spill, eliminate spare bulbs and upward pointing light
- Use narrow-spectrum bulbs to lower the range of species affected by lighting
- Reduce the height of lighting columns. Light at a lower level reduces impact. However, higher mounted heights allow lower main beam angles, which can assist in reducing glare

Building fabric

Roof membranes

There is a conflict between bats and non-woven Breathable Roofing Membranes (BRMs) used in construction as a replacement for traditional bituminous roofing felts. Bats can inhabit cavities in roof spaces and as they are excellent crawlers, non-woven BRM material can become 'fluffed up' and entangle bats by their sharp claws. This may cause death of the bat and result in damage to membrane functionality of water tightness, breathability and general longevity. Where proposed developments will affect sites known to be used by bats, solutions must be found that do not result in their death or displacement – without suitable provisions made. Traditional bitumen felt and sarking boards are recommended if bats are discovered. It is essential that a qualified ecologist is consulted where bat roosts are identified, regardless of whether bats are observed.

Bird collisions with windows and buildings

Bird fatalities and injuries can occur from collisions with glass and other clear installations, due to their inability to see the obstacle as a solid object. They typically see a reflection of the sky and trees and believe there to be a way through. Double glazed windows tend to pose a greater risk than single glazed, since they produce clearer reflections. Certain measures can be put into place to reduce the likelihood of this happening, including:

- Silhouette stickers
- Blinds, netting and curtains
- UV reflective products (Birds can see UV light)

However, prevention through design will be more effective at reducing risk of bird collisions. During design, architects should limit use of glass, employ bird-friendly patterns (visible to birds) or use shades. More information can be found online.

Building façade

The University supports the integration of integral boxes for nesting and roosting animals. However, certain building designs may not allow for their installation. This appears to be the case with 'brick-face' cladding as no products have been found on the market, which are compatible. Metal-clad building designs also cause some design uncertainties. Integral boxes are always the preferred option over boxes built on buildings; therefore every effort should be made to overcome these issues early in the design stage.

Expectations summary

- Non-woven BRMs should not be used in a developments where bats roost. Always seek expert bat advice.
- Avoid or mitigate against the risk of bird collisions with glass windows and other installations
- Design in integrated bird, bat and insect nest / roosting bricks at the start of the project

Other related Design Guides

• **ES04** Lighting Systems Design Guide	Use in relation to section on *Lighting* and comments on *Connectivity*
• **GD01** Low Energy Design Guide • **GD03** Sustainable Design Planning • **GD04** LZC & Renewable Technologies	Use in relation to section on *Green roofs, Green walls* and *Building fabric*
• **GD02** BREEAM	Make use of Biodiversity Design Guide to improve BREEAM score for ecology and health and wellbeing
• **GD06** Soft Landings & Handover	Use in relation to comments on *Communication*
• **US01** Underground Services • **ES08** CCTV Installation • **ES12** IT/Telephony	Consider in relation to *Opportunities* where ground-breaking or scaffolding / climbing may be required

Appendix

Background

What is Biodiversity?

Biodiversity is a word used by biologists to describe the richness and variety of life (bio = 'life' and 'diversity' = range or variety). It acts as a catch-all expression as well as referring to the genetic variation (size, colour etc.) within species and variation in habitats in which these species live. Crucially, it does not just refer to rare or endangered species, but includes wildlife familiar to us all in the places where we live and work and certainly what we might see on campus.

What is the University's stance?

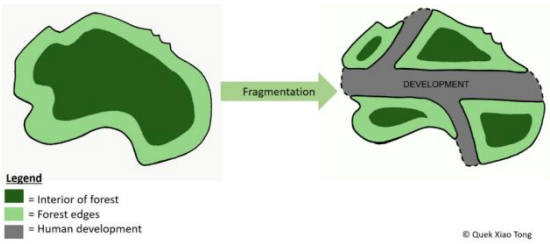
Species **Partnership and community** **Estates** **Compliance** **Insight** **Education** **Staff and student experience**	'To integrate the principles of biodiversity conservation into estate planning and management with the intent to enhance existing habitats and create new spaces where possible. The University should be a role model to students and act as a responsible landlord to all wildlife residents.' *Biodiversity Action Plan*

Cumulative Impact

Cumulative environmental effects can be defined as effects on the environment, which are caused by the combined results of past, current and future activities. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

A good example of this is the loss of front gardens for car parking or lawn maintenance reasons. The impact of this is reduced habitat for wildlife and increased water runoff into UK drainage systems. The University should demonstrate that it is mindful of this in its Masterplan and work to future-proof against this by

Habitat Fragmentation

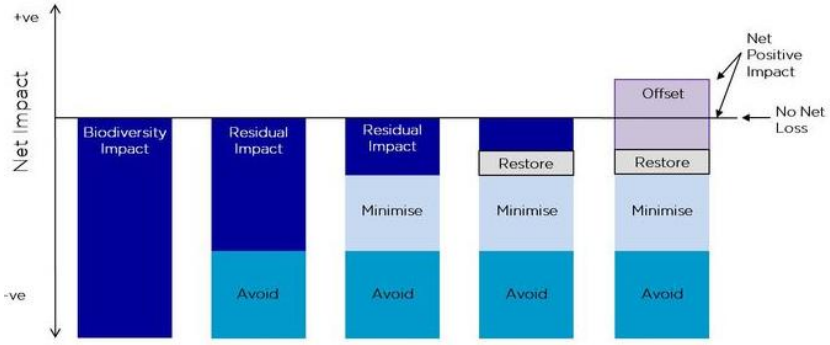


Habitat fragmentation is the process in which a larger habitat is divided into smaller areas, typically via development. This increases 'edge areas' that may be able to sustain fewer species. This breaks down connectivity between sites and hinders animal movement enabling to find what they need to survive. This applies to aquatic, terrestrial and aerial animals.

Mitigation and Net Gain

The University is committed to ensuring a biodiversity Net Gain for all development projects

- Avoid
- Minimise
- Restore
- Offset



Resources

These resources have been used to either directly inform or provide additional information of value. Some links have been used for more than one topic, but are located in the sub-section where they have been used the most.

Introduction & Basic Principles

- United Nations Sustainable Development Goals
- Wildlife and Countryside Act 1981, Defra website
- Designing for Biodiversity: A technical guide for new and existing buildings by Gunnell et al, 2013

In practice

- Ciria Biodiversity Net Gain Principles (2015) Look out for Practical Guide C776A (Published Dec 2018)
- Space for Wildlife, Leicester, Leicestershire and Rutland Biodiversity Action Plan 2016 - 2026
- University of Leicester Plants and Pollinators Policy (2019)
- National Planning Policy Framework 2018 (Section 15)
- University of Leicester Biodiversity Action Plan (Can also be requested from Social Impact Team)
- Building with Nature, User Guide for Policy Makers
- Cradle to Cradle Products Certification Program

SUDS

- Ciria Guidance on the construction of SuDS (C768)
- Sustainable Drainage Systems, A guide for local authorities and developers by RSPB and WWT
- Rainwater harvesting tank combining rainwater storage, controls, pumps and mains water back-up
- Grass-free Lawns PhD research project from University of Reading and 'how-to' guide
- SuDS Consultants, integrating form, function and education

Green roofs

- Green roof consultants with Gary Grant and Dusty Gedge
- The University of Sheffield's Green Roof Centre, Guide, Code and Research
- Green Roof Technology, form and function
- Building for Green Roofs in Schools by Architectural Services Department
- Bauder Biosolar Roofs

Green Walls

- University of Staffordshire, types of green wall
- ANS global
- Research on Green facades – a view back and some visions by Manfred Kohler
- The Animal Biodiversity of Green Walls in the Urban Environment by Caroline Chiquet

Building Integrated retrofit and development/design

- Swift Conservation website managed by Edward Mayer, Swift consultant
- Action for Swifts Blog written by Dick Newell, Integral bird box expert
- Green and Blue company Bee Brick (See – Designing for Biodiversity – Basic Principles section)
- Integrated bird boxes on NHBS website
- Facts about Swift Bricks by RSPB, Action for Swifts, Swift Conservation
- Manthorpe Swift Brick (can be used by other birds)

Lighting

- UK Guidance on Bats and Artificial Lighting 2018
- Landscape and urban design for bats and biodiversity by the Bat Conservation Trust

Building fabric

- Bats and BRMs, research and current solutions
- Birds and glass, design and products

RIBA work stages							
Stage 0 Strategic Definition	**Stage 1** Preparation & Brief	**Stage 2** Concept Design	**Stage 3** Developed Design	**Stage 4** Technical Design	**Stage 5** Construction	**Stage 6** Handover & Close Out	**Stage 7** In Use
Development Process							
Appraisals • Establish objectives • Design team selection • Initial feasibility studies • Land identification • Secure land purchase option • Produce Masterplan • Complete land purchase		*Design* • Identify opportunities and constraints • Prepare Section 106 agreement and Community Infrastructure Levy • Detailed planning application (note 1)	*Pre-construction* • Preparation of detailed production information (drawings, specifications etc.) Application for statutory approvals	*Pre-construction* • Preparation of detailed production information (drawings, specifications etc.) • Application for statutory approvals • RIBA 3 information	*Construction* • Construction works • Divestiture of development	Needs to refer/consider/link with UoL Soft Landings Process	*Use* • Ongoing monitoring and maintenance by management company • Review of project performance in review
Biodiversity consideration							
Consultation and/or scoping study							
	Detailed survey and impact assessment						
	Design of development to incorporate biodiversity objectives						
			Prepare and agree enhancement, mitigation and compensation (e.g. financial or biodiversity offsetting)				
					Implement agreed enhancement, mitigation and compensation		
					Management, monitoring and aftercare		
Consultation with the Social Impact Team and Estates Marketing and Communications Officer to encourage appropriate communication at each stage of the project							
Planning Process							
Pre-application guidance and advice on application type		Guidance and advice on application type	Validation and registration. Pre-decision assessment. Formal determination of Planning application (note 1)		Compliance monitoring		Annual monitoring report, which includes reporting the effects of development consents on priority habitats and species
Procurement process							
		Timescale for tendering will depend on the level of detail required and the form of procurement being used. Refer to Project Programme.	• Award contract • Tender returns and appraisal	*Note: Planning may also take place at the end of stage 2 – Refer to specific PP.			