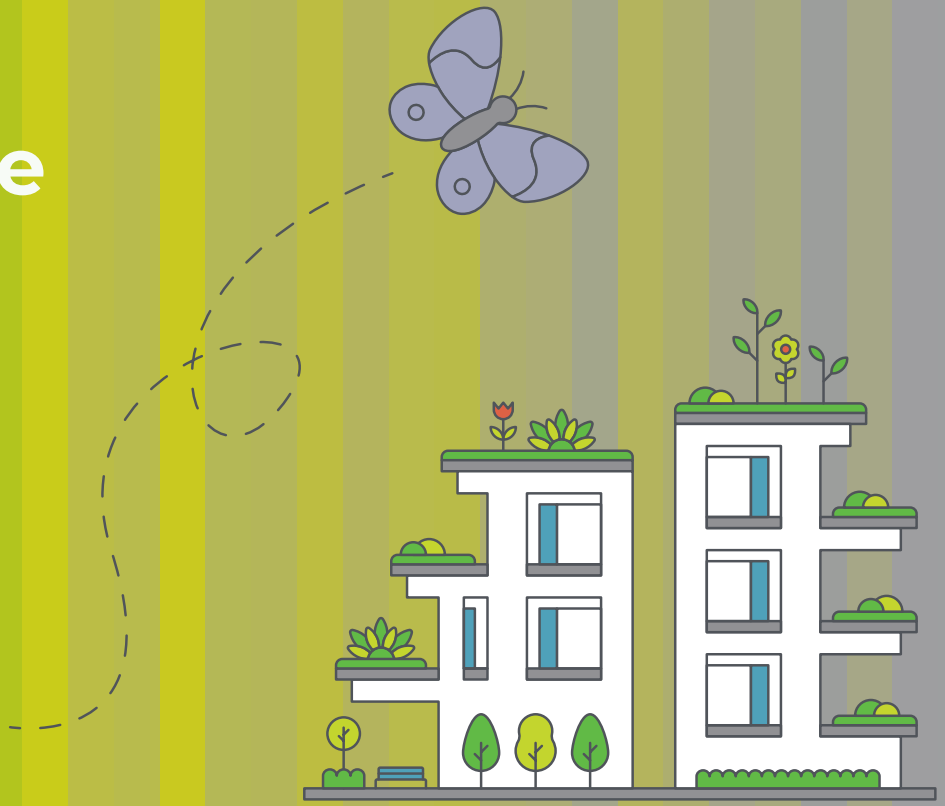
Biodiversity and the Built Environment

IGBC's Insights



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Irish Green Building Council

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Biodiversity, or the variety of plant and animal life, underpins ecosystems and humanity. Yet, biodiversity is threatened across the world, with nature declining at rates unprecedented in human history. In Ireland, only 2% of the country has native woodland, over a quarter of regularly occurring bird species are in danger of extinction, and almost 50% of freshwater systems are in poor and deteriorating condition. Although we often take the benefits of biodiversity for granted, as humans **we depend on biodiversity in myriad ways**. Biodiversity provides us with many services, from the food we eat to the raw materials we use. Ecosystems provide us with clean air, water, and fertile soils, while protecting us against flooding and heat waves.

WHY IS IT IMPORTANT?

Since 1800, global population has increased from 1 billion inhabitants to over 8 billion people, while the scale of global urbanisation, ecological degradation, and human-induced climate change have all accelerated. **Ireland declared a Biodiversity and Climate Emergency in 2019**, but to date biodiversity hasn't received much attention.

The construction and built environment sectors are highly reliant on biodiversity and ecosystem services. Nature provides our sector with the water and raw materials that we need to manufacture construction materials and construct buildings. Trees and other plants contribute to improving air and water quality in our cities, preventing floods, and cooling our environment during heat waves. Many social and commercial benefits are also associated with the preservation of biodiversity in urban settings. For instance, vegetation cover and afternoon bird abundances are positively associated with a lower prevalence of depression, anxiety, and stress; and urban house value is boosted by proximity to public green space.

Despite the reliance of our sector on biodiversity, **current spatial patterns of development and methods of construction often have a negative impact on biodiversity**. **There are clear links between four of the** five main sources of biodiversity loss identified by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the built environment, namely **changes in land use, climate change, pollution, and invasive alien species**. These impacts happen **on site** (e.g., habitat destruction and fragmentation) and **off site** as construction materials are produced.

Yet, **a well-designed built environment that takes a positive approach to protecting and enhancing biodiversity can provide many benefits to society**, from preventing flooding and overheating risks, to improving people's health and wellbeing.

Resources:

- Biodiversity & the Built Environment - An Introduction (webinar)
- Nature & Biodiversity | Course Mail
- Report of the Citizens' Assembly on Biodiversity Loss
- National Biodiversity Action Plan (2017-2021)

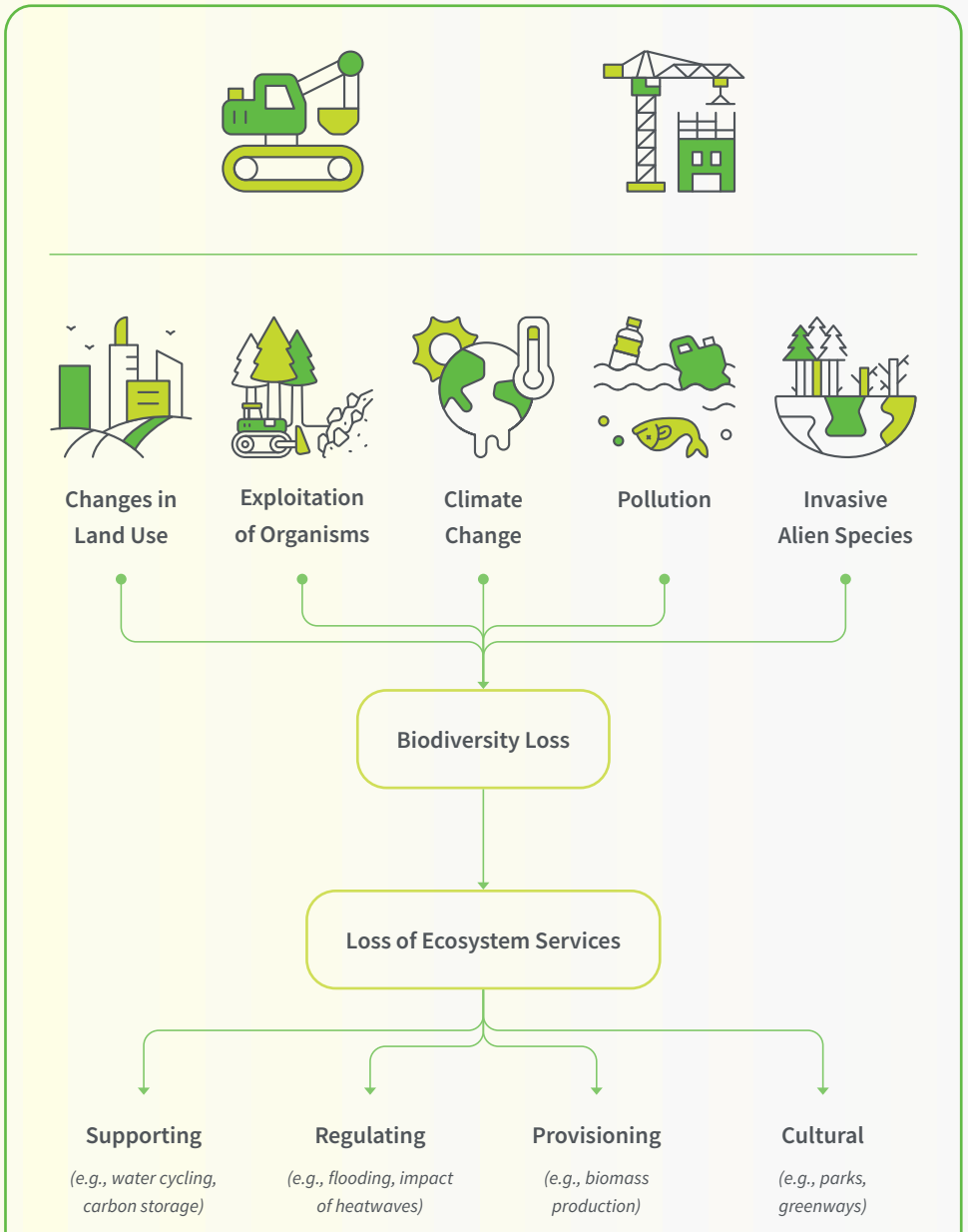


Fig. 1: Impact of the Built Environment on Biodiversity across its Whole Life Cycle
(Credit: IGBC 2023 | Adapted from N. Schiopu, A. Brachet)

THE ROLE OF AN ECOLOGIST

Ecologists and environmental managers are professionally trained people whose work involves understanding, managing, protecting and improving the natural environment. Ecologists would interact with the building profession in a number of ways:

- Completing planning documents
- Undertaking Appropriate Assessments (AA) /Environmental Impact Assessments (EIA)
- Ecological Clerk of Works (ECoW) working on a site

Insuring Biodiversity is included in the built environment requires expert input, as it does with other aspects of projects, such as engineering or plumbing. **It is best practice to have a suitably trained ecologist involved in all projects at an early stage.**

THE ROLE OF BUILDING PROFESSIONALS IN ENHANCING BIODIVERSITY

Opportunities to enhance biodiversity exist at all stages of a building life cycle - see Fig. 2, **meaning that everyone in the value chain can contribute to a positive outcome by focusing on impacts.** Developers can show ambition by choosing the right locations and developing impactful biodiversity strategies for their projects. Designers can advocate for enhancing biodiversity and specify more eco-friendly materials. Contractors can act to minimise the impact on biodiversity on site, etc.

Acting for biodiversity in the built environment is key for improving people's health and wellbeing, and makes financial sense. Developers can get higher market value for properties close to nature, while building owners can reduce operational expenditure through the use of nature-based solutions.

There is also **a growing desire for biodiversity to be captured in ESG reporting, driven by investor expectations and emerging regulation.** For instance, the Taskforce on Nature-related Financial Disclosures (TNFD) aims at developing and delivering a risk management and disclosure framework for organisations to report and act on evolving nature-related risks, with the ultimate aim of supporting a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. The EU Taxonomy outlines the key criteria to be met for an economic activity to be regarded as "green", with a view to tackling greenwashing. In simple terms, the more environmentally friendly a project is, the easier it should be to obtain funding at a lower interest rate. Protection and restoration of biodiversity and ecosystems is one of the six objectives of the Taxonomy Regulation.

Regulatory and planning requirements are also likely to become stricter in the next decade. Under the Environment Act 2021, all planning permissions granted in England (with a few exemptions) will have to deliver at least 10% biodiversity net gain from an as yet unconfirmed date in November 2023. In Ireland, the final report of the Citizens' Assembly on Biodiversity Loss (action 144) recommend updating planning policy to require all new developments to have a significant net-gain for the environment and biodiversity.

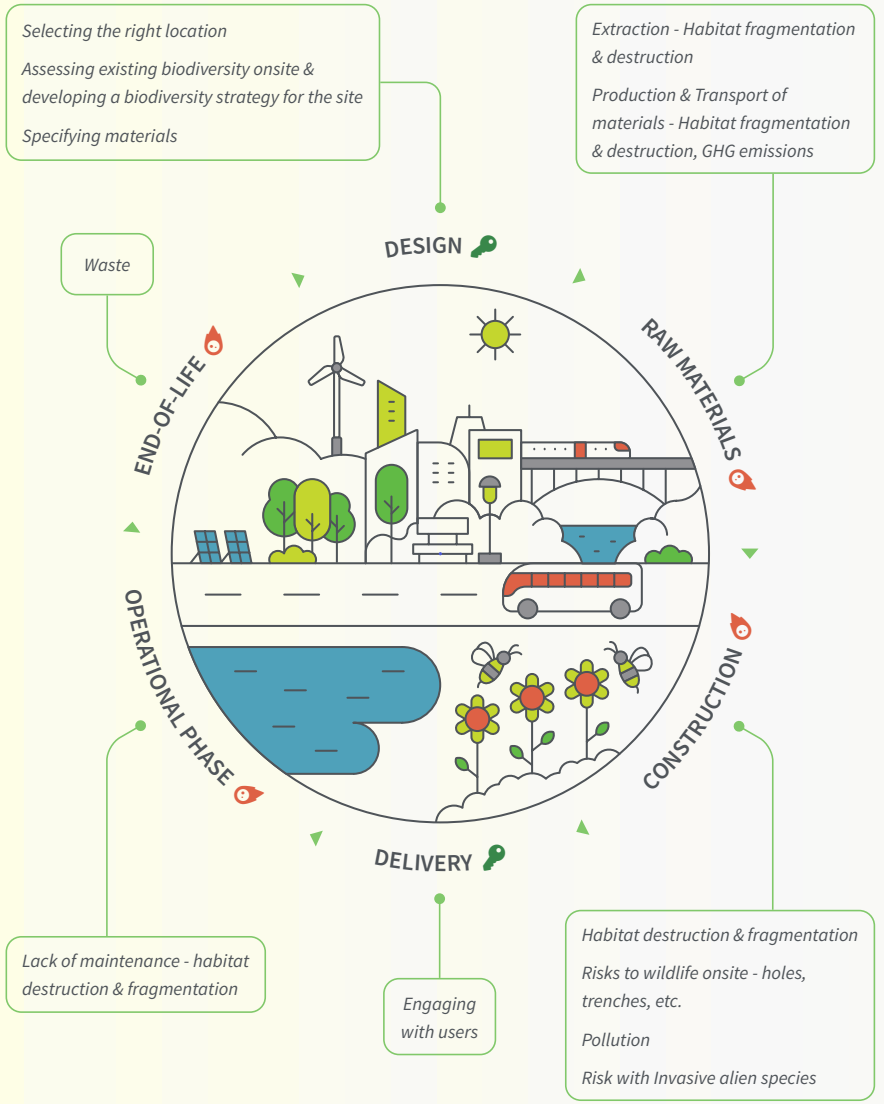


Fig. 2: Impact on Biodiversity across a Building Whole Life Cycle
(Credit: IGBC 2023 | Adapted from Observatoire de l'Immobilier Durable / Wild-Trees)

BIODIVERSITY & CLIMATE RESILIENCE

Recent events, such as the pandemic lockdowns, have highlighted the importance of accessing nature for health and well-being. Engaging with nature and plants has been shown to decrease both psychological and physiological stress. Trees and other vegetation also play a vital role in enhancing air and water quality in urban areas, preventing floods, and mitigating the effects of heat waves by cooling the environment. While extreme weather events are becoming more frequent and severe due to climate change, **nature-based solutions (NBS) can strengthen resilience and promote better health and well-being**.

What are nature-based solutions?

Nature-based solutions (NBS) refer to a suite of actions or policies that harness the power of nature to address some of our most pressing societal challenges, such as threats to **water security, rising risk of extreme weather events, or climate change**. These solutions involve protecting, restoring, and sustainably managing ecosystems in ways that increase their resiliency and ability to address those societal challenges, while also **safeguarding biodiversity and improving human wellbeing** (Source: WWF). Well-designed NBS provide multiple benefits and are **competitive in terms of efficiency and cost with engineered solutions** (grey infrastructures) **over time**.

Why are NBS important?

NBS include various approaches, such as **creating green spaces** in urban areas, and using natural processes to **manage water, prevent flooding and mitigate disaster risks**. NBS can also contribute to creating habitats for plants and animals and are important in reducing energy demand and storing and sequestering carbon.

There is a wide range of NBS but to provide a glimpse into their diversity and how they relate to the built environment, let's consider two examples.

GREEN ROOFS are vegetative roofs designed to support plant growth. They are installed on flat or low-sloping roofs of buildings, and **can provide numerous benefits such as thermal regulation, water management and carbon sequestration**. **Green roofs also have a positive impact on biodiversity**, with the impact being higher in **intensive** (soil depth: 200-750mm+) and **semi-intensive roofs** (150-250mm).

Intensive green roofs can accommodate taller plants such as shrubs and trees, creating natural habitats in the urban environment and attracting more insects and birds. Due to structural loading capacity, extensive green roofs are often more suitable for existing buildings as they use less growing media (100-200mm). They provide habitats closer to dry/sandy areas. **Native, nectar-rich species should be preferred**, and monoculture (e.g. sedum) avoided were possible to enhance biodiversity, limit risks associated with this type of culture (e.g., disease outbreaks), and create a real "**Living Roof**". Another good approach is to leave at least a part of the green roof to **self-vegetate** from windblown and bird lime seed dispersal. Known as **Brown roofs**, these are the best way of replicating exactly the wild urban spaces that are found at ground level.

Vertical greening can also improve urban biodiversity, while filtering pollutants in the air. Ideally, this should take the form of **climbers/trellis systems**, as modular systems can be costly and some require high water use - Learn more.

Fig. 3: Examples of intensive and extensive green roofs

(Credit: Living Roofs, Inc.)

SUSTAINABLE DRAINAGE SYSTEMS (SuDS) are drainage solutions providing an alternative to the direct channelling of surface water through networks of pipes and sewers to nearby watercourses. SuDS attenuate water locally and **reduce the impacts of extreme floods, improving water quality while enhancing the amenity and biodiversity value of the environment**. When looking at SuDS and developments one should consider protecting, reconnecting and restoring existing rivers and floodplains while also protecting, enhancing and, when needed, constructing **wetlands**.

Fig. 4: Multi-functional open space, Rieselfeld, Freiburg, Germany
(Credit: Essex County Council)

Resources:

- Biodiversity and the Built Environment - Climate resilience (webinar)
- Connecting Nature Enterprise platform
- Green & Blue Roof Guide (Dublin City Council)
- Sustainable Drainage Design & Evaluation Guide (Dublin City Council)

ACTING FOR BIODIVERSITY

With a growing population, a significant number of new homes and infrastructure must be provided in Ireland by 2030. Based on the density recommendations included in the National Planning Framework and current trends, it is estimated that a land surface equivalent to a third of County Dublin will need to be urbanised by 2030 to deliver the 400,000 homes planned in Ireland 2040 - an estimate which does not even include the land required to build associated infrastructure. **Reusing what has already been built, and transitioning to more compact forms of development, is hence essential to reduce habitats loss and fragmentation. The selection of the site is one of the most important steps in terms of impact on biodiversity**.

Design Phase

Once the decision to build or renovate has been taken, **strategies must be developed to maintain existing habitats as much as possible**, and **enhance biodiversity**.

A first step in that process is to **know your site and its surroundings**, and to **understand the biodiversity baseline**. To gain that level of knowledge and develop an impactful strategy, **expert advice and input is needed. Involving an ecologist at an early stage to help minimise the impact on site and enhance biodiversity is a best practice**, and should be the norm for all projects over 5000 sqm (Source). If you need an ecologist, please check CIEEM website.

Involving **organisations** that work directly with biodiversity, **such as the** All-Ireland Pollinator Plan **or** BirdWatch Ireland, from the outset **can also provide valuable insights**.

When planning a strategy, you should:

- **AVOID** - the greenest building is the one that does not contribute to habitat destruction and fragmentation
- **REDUCE** impact on habitats
- **ENHANCE** biodiversity.

The main aim should be to **retain existing habitats and species** where at all possible and **to include gains for biodiversity** in your design and standards. Compensation should only be considered as a last resort and take place on site or in an adjacent area.

> "**Biodiversity Net Gain: developments that leave the biodiversity in a measurably better state than before.**"

Your design would need to **be mindful of maintenance from the outset**, and **involve extensive stakeholder engagement** as these are crucial for successful projects. **Engaging with the local community** to understand their needs and expectations, and to raise awareness of the importance of biodiversity, would allow one to cultivate a sense of responsibility, protection, and pride for the site they live in. Equally important is engaging with everyone involved in the project. For example, it's **essential that contractors understand what you are trying to do**, why it's important, and that they get specific instructions.

What to include in an impactful strategy?

Although your strategy will be to a large extent site-specific, it must allow for wildlife movement, protection, etc. In simple terms, **your development or renovation must provide protection** - such a warmer and more secure environment, **food/nutrients** and **shelter** - such as nests, dens, and roosts.

Key elements to consider include (but are not limited to):

- **Lighting Pollution**

Avoid or minimise light pollution on ecological receptors.

- **Ecological Corridors**

A building or a new development does not operate in isolation. It is important to understand the wider context, and to **identify existing and potential wildlife corridors, and to see how the project can integrate with them**. A wildlife corridor is an area of habitat connecting wildlife populations separated by human activities or structures. They enable movement of wildlife and dispersal of plant species, and facilitate seasonal migration, reproduction, feeding and adaptation to environmental change.

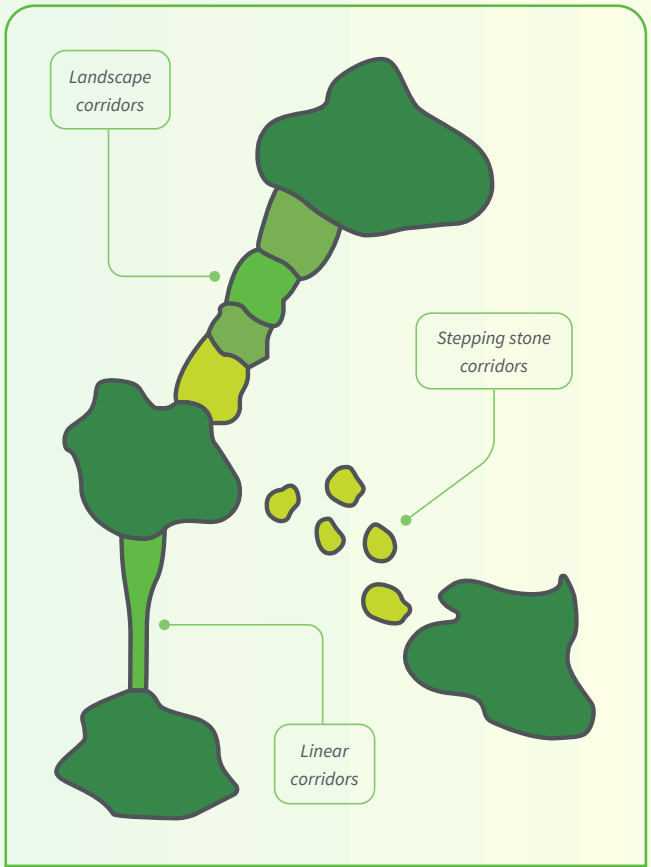


Fig. 5: Morphological types of ecological corridors
(Credit: Curcic, Djurdjic, 2013)

• Boundary Treatment Selections (including hedgerows)

The Local Authority's development plan typically determines the boundary treatments of new developments. To enhance their biodiversity value, **hedgerows**, **walls**, **and verges** forming these boundaries should be designed to create **connective corridors**. This would not only **provide food and shelter** for wildlife but also **allow them to travel safely** along the corridors linking the development to the surrounding landscape.

Among these boundaries, hedgerows are considered the most valuable. Under the Wildlife Acts, it is an offence to destroy

Fig. 6: Hedgehog Highway Sign from the Hedgehog Street Campaign - UK. *(Credit: Joanne Davenport)*

vegetation on uncultivated land between the 1st of March and the 31st of August each year. Although this section provides an exception to the rule for "clearance of vegetation during road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided", **it is a best practice to preserve hedgerows** and **supplement them with additional planting** to establish **new ecological corridors**.

To enhance their biodiversity value, hedgerows, walls, and verges forming these boundaries should be designed to create connective corridors and/or allow for animal access where appropriate, for example through the provision of mammal access points (see Fig. 6).

• Designing Building for Biodiversity

Biodiversity conservation and enhancement are not limited to gardens or green spaces. **Even in urban settings, buildings can be designed or modified to support local wildlife**. For instance, bird nest cavities can be incorporated into the design of buildings, particularly for species like swifts. Existing building features that are beneficial for wildlife should also be preserved. Furthermore, taking steps to protect animals from hazards such as glass windows is crucial. Simple actions, such as putting up

Fig. 7: Swift Nest-Places.
(Credit: Swift Conservation Ireland)

signs on glass buildings to increase their visibility to birds, can make a significant difference in protecting biodiversity.

• Groundworks and landscaping

Over one-quarter of all living species on planet Earth live in the soil. From water storage and purification, to carbon sequestration, soil provides many ecosystem services. Considerations should be given to **limiting soil sealing** as it is considered among the most dangerous of land degradation processes. The negative impacts of soil sealing are numerous, from decreasing biodiversity to modifying the microclimate and increasing flood risk.

• Urban watercourses

Implement buffer zones and rehabilitate watercourse (where possible). Learn more

• Selecting materials

Globally, 90% of biodiversity loss is associated with raw materials extraction. As our industry is resource intensive, **building designers should be particularly mindful of the environmental impacts of the building materials they specify**. Specifying reused materials or sustainably sourced biobased materials can reduce this impact.

Key Considerations for planning changes to a building

Although most of the actions mentioned in the design phase section are relevant for major renovation, some specific considerations should be taken into account when renovating.

- Breeding and resting places of protected wildlife are afforded protection under the Wildlife Acts. Therefore, disturbance to wildlife or their breeding/resting places is an offence.
- A grant of planning permission does not give developers or owners the right to disturb wildlife.
- When renovating a building, it is the responsibility of the developer or owner to ensure that existing biodiversity is respected and any potential risks are taken into account.
- If wildlife is discovered during renovation works, it is important to contact a Conservation Ranger from the National Park and Wildlife Service (NPWS) immediately for advice.
- If the works have the potential to disturb wildlife and result in an offence, a derogation license is required. For example, if the building is potentially used as a roost by bats.
- If the proposed activity can be timed, organised and carried out so as to avoid committing offences, no licence is required.

Source: BirdWatch Ireland

TOOLS

Professionals can access a range of tools for measuring biodiversity, including general certification schemes that cover biodiversity and specific tools for in-depth analysis. These are some examples relevant to Ireland.

GENERAL GREEN BUILDINGS CERTIFICATION SCHEMES COVERING BIODIVERSITY

Home Performance Index (HPI)

IGBC's certification scheme for sustainable homes, HPI v.3.0, requires a **Biodiversity Net Gain (BNG)** report **for projects over 5000 sqm** (Indicator EN 5.0). To get certified, the developer **must appoint an ecologist** who redacts a report following CIEEM guidance on Biodiversity Net Gain. For smaller projects, biodiversity assessment is based on the calculation of options adopted from an **Ecology Calculator**.

Other green certifications such as **LEED** and **BREEAM** can be useful tools to ensure biodiversity is taken into account when developing commercial buildings.

TOOLS FOCUSING EXCLUSIVELY ON ENHANCING BIODIVERSITY

Biodiversity Net Gain (BNG): Good Practice Principles for Development, A Practical Guide

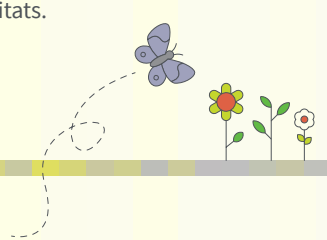
This guide offers practical advice to achieve BNG in land and freshwater environment. It is based on the UK's good practice principles for BNG and applies to all types and scales of development, at all stages in their life cycle of development. It is relevant to developers and all other stakeholders wishing to promote, facilitate and deliver BNG.

SDCC Green Space Factor

This Green Space Factor used by South Dublin County Council (SDCC) is a measurement that describes the quantity and quality of landscaping and green infrastructures (GI) across a defined spatial area. It comprises a ratio that compares the amount of green space to the amount of impermeable 'grey' space in a subject site. As a planning tool, this ratio can be used to assess both the existing green cover within a site and the impact of new development, based on the quantity and quality of new green space provided.

The Biodiversity Metric

Biodiversity Metric 4.0 is a biodiversity accounting tool developed by Natural England (UK) that can be used for the purposes of calculating biodiversity net gain. It can be used or specified by any development project, consenting body or landowner that needs to calculate biodiversity losses and gains for terrestrial and/or intertidal habitats.



Resources:

- Biodiversity & the Built Environment - New builds and major renovation (webinar)
- Designing for ecological enhancement (webinar)
- Design for Biodiversity - A Technical Guide for New and Existing Buildings (2019)
- How-to-guides of the All-Ireland Pollinator Plan
- Wildlife in Buildings - Linking our built and natural heritage
- Saving Swift - Guidance document on how to take actions for swifts in existing buildings

Raw Materials

Raw materials extraction and the production of construction products have a very significant impact on biodiversity, resulting from land-use changes, occupation of land, manufacturing and transport. Ideally, this impact should be captured through a comprehensive life-cycle assessment (LCA), but to date, this methodology has difficulty in accommodating the temporal and special aspects of biodiversity. Actions can still be taken to address embedded biodiversity loss (to use an analogy with embodied carbon emissions):

- Construction product manufacturers should develop strategies to protect and enhance biodiversity.
- Designers should specify re-used and biobased materials to reduce impact on biodiversity. When specifying biobased materials, one should check these are produced in an eco-friendly way - E.g., only chain of custody certified timber (FSC/PEFC) should be specified.

Resources:

- Biodiversity & the Built Environment - Building Materials and Construction and Demolition Waste (webinar)
- UNEP - Global Resources Outlook 2019

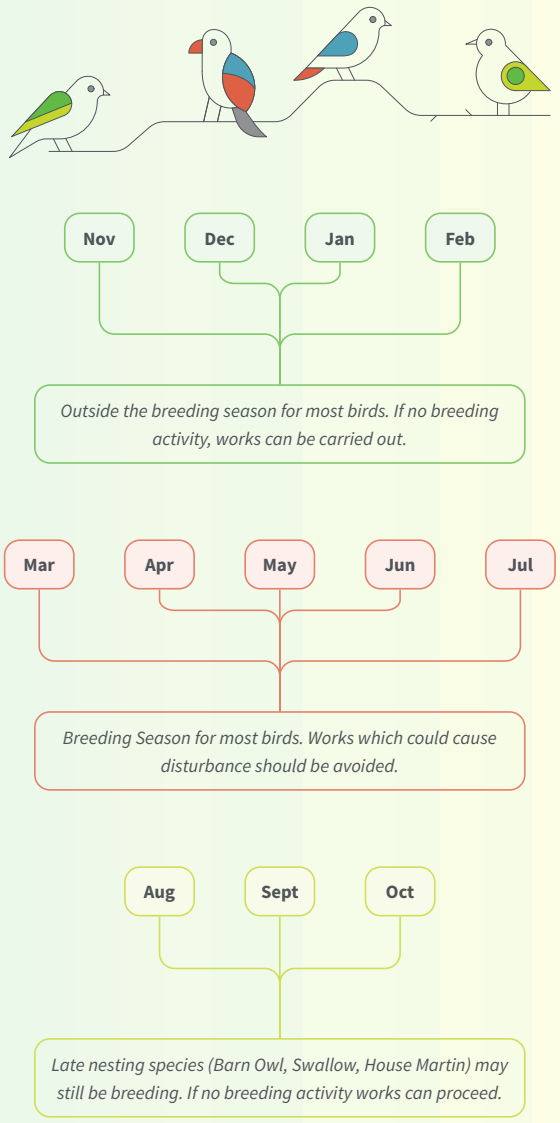


Fig. 8: Breeding birds and Construction Sites
(Credit: IGBC 2023 | Adapted from BirdWatch Ireland)

Construction Phase

There are many important steps to take to protect biodiversity during the construction/renovation phase. This requires planning and includes protecting existing hedgerows, trees, and wildlife, as well as minimising soil compaction as this can reduce water drainage and plant growth. One should also be mindful of unintentional introduction and spread of invasive species, as soil, materials, and equipment are moved.

Further information on the construction phase can also be found in the key considerations for planning changes to a building section of this document.

Delivery & Operational Phases

A huge challenge when it comes to protecting and enhancing biodiversity in the built environment is that developers and designers may feel they have little control on the use phase. To ensure the project has a long-lasting positive impact, the **design must be mindful of maintenance from the outset**, and **involve extensive stakeholders engagement**. Users and organisations responsible for maintenance must engage with the process as early as possible, and gain a good understanding of the project, and of the importance of helping biodiversity to strive.

Actions should be taken to raise awareness, educate, and increase acceptability. For instance, information signs may be used to explain why an area is not mowed. Management techniques, such as differentiated greenspace planning and management, whereby the building perimeter and entrance points are highly maintained, while lighter touch maintenance and natural succession (that is, to naturally grow and regenerate) is used for site periphery - see Fig. 6, can also contribute to an increase in acceptability. Finally, the use of pesticides should be avoided and replace by less frequent manual or mechanical weed control where necessary.

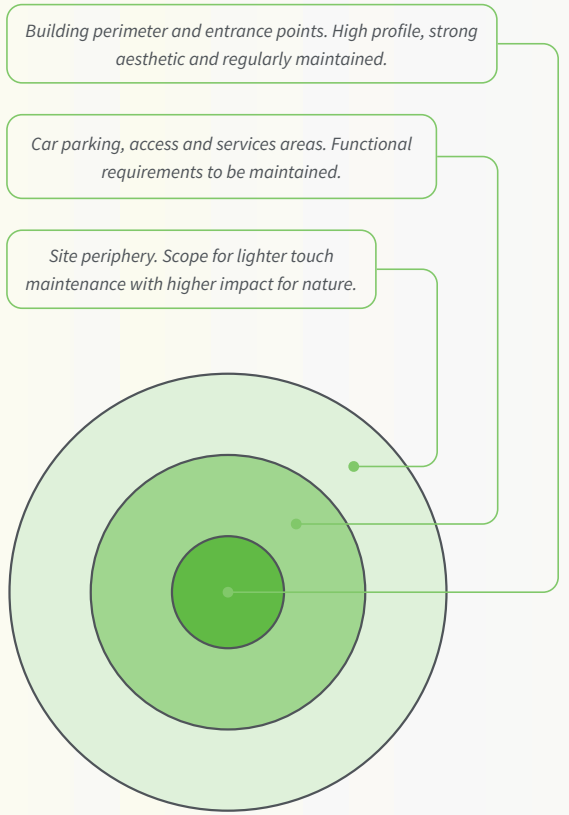


Fig. 9: Differentiated Greenspace Maintenance
(Credit: SAP Landscapes)

Resources:

- Biodiversity & the Built Environment - Buildings in Use (webinar)
- The resource section of the All-Ireland's Pollinator Plan website include many useful How-to-guides, from actions to help pollinators for businesses, to actions you can take in your own garden.

YOUR BIODIVERSITY CHECK-LIST | 10 THINGS TO DO FOR A BETTER BUILT-ENVIRONMENT

LEARN MORE

Educate and upskill to gain a better understanding of how you can embed biodiversity in your work and projects. You can start by watching our webinars on "biodiversity & the built environment" and registering for our course mail on Nature & Biodiversity.

RAISE AWARENESS

Raise awareness among your colleagues, supervisors, suppliers, clients, etc. about the importance of acting for biodiversity and actions that may be taken.

OPTIMISE

Optimise the use of our existing building stock and infrastructure. Habitats destruction and fragmentation is the main source of biodiversity loss.

ENHANCE

Enhance biodiversity onsite. E.g., Integrate your building into existing wildlife corridors, use nature-based solutions, and target biodiversity net-gain for all new projects.

ADVOCATE

Advocate for biodiversity enhancement across your projects and activities.

GET SUPPORT

Contact experts such as ecologists and organisations working to protect and enhance biodiversity as early as possible. The earlier you get advice, the more you can do for biodiversity.

EMBED

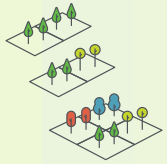
Develop a strategy to ensure protecting and enhancing biodiversity is at the heart of all your projects and activities.

REDUCE

Reduce the negative impacts of your projects/ activities across the whole life cycle. E.g., through a greater reuse of materials and protection of existing habitats onsite.

ENGAGE

Engage with the local community and users as early as possible to understand their needs, inform them of the objectives of the project and enhance acceptability.



EXPLORE TOOLS

Explore tools to enhance biodiversity. E.g., Green Space Factor and Biodiversity Metric.

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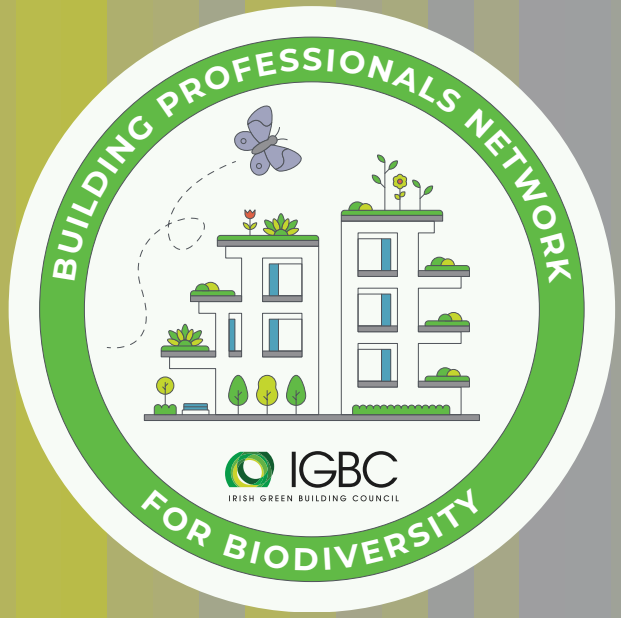

IGBC's Biodiversity & the Built Environment Community of Practice

The IGBC Community of Practice (CoP) on Biodiversity & the Built Environment is a **networking group where IGBC members come together to collaborate, innovate, listen to peers and build their knowledge**.

The primary objectives of this IGBC CoP are:

- To share and promote discussion on trends in Biodiversity & the Built Environment;
- To share information on what is working well and what are the challenges;
- To contribute to the development of IGBC's submissions (where relevant);
- To enable networking.

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