IGBC
IRISH GREEN BUILDING COUNCIL

BIO-NEIGHBOUR

Towards greener, more biodiverse neighbourhoods

D1.1 Main challenges to incorporating and maintaining new nature-led residential developments at scale

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IGBC
IRISH GREEN BUILDING COUNCIL

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Disclaimer

The Housing Agency's purpose is to provide expertise and solutions to help deliver sustainable communities throughout Ireland. A strategic objective is to support stakeholders and policy makers by providing innovative thinking through evidence-based housing insights and data. In this vein, the Research Support Programme funds research projects which respond to key topical issues in housing and have the potential to impact on housing policy and practice. The views expressed in this report are those of the author and do not necessarily represent those of The Housing Agency.

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Summary

Construction and the built environment are pivotal in **mitigating biodiversity loss.** Our industry contributes to habitat destruction, pollution, resource exploitation, and climate change, both on-site (e.g., site clearance) and off-site (e.g., material extraction). This means, our sector also holds the power to **reverse damage by embedding nature into design and development**.

Ireland faces a unique **challenge** - and **opportunity**. With a growing population and a target to build 50,000 new homes per year by 2040, and associated infrastructure[1], there is a real risk of **accelerating biodiversity loss** - unless nature is integrated into development from the start. The scale of new developments needed also presents the opportunity to **"get it right" by embedding biodiversity at scale**.

This report, part of the **BIO-NEIGHBOUR project**, examines **barriers and offers preliminary recommendations** to ensure **nature-led residential developments become the new norm in Ireland.**

> ***"Nature-led residential developments mean the overall ecological impact of a project, including land use, construction, supply chains, and occupation, results in a demonstrable enhancement of biodiversity and supports long-term ecological resilience, accounting for both direct site-level impacts and indirect embodied ecological impacts.***
>
> *This should be achieved by recognising existing site conditions, implementing the mitigation hierarchy (avoid, minimise, restore, compensate), prioritising like-for-like nature restoration where possible, enhancing ecological connectivity, and securing long-term management and monitoring".*
>
> Please note this is a working definition that will be further refined throughout the duration of the project.

Because there is limited data on nature-led residential developments in Ireland, nature-based solutions (NbS) and green infrastructure (GI) are used as proxies for the analysis[2].

Findings indicate that the **integration** of these solutions in residential developments is **limited but growing**, as **awareness and interest are increasing**. Commonly used NbS include pollinator-friendly actions, rainwater gardens, and swales, but often as an **isolated** or **one-off solution**. Current drivers of implementation are regulatory compliance, climate adaptation, and in the private sector, consumer demand.

[1] Government of Ireland (2025). 'Project Ireland 2040 – National Planning Framework (NPF) First Revision'. Available at: https://www.npf.ie/

[2] See Appendix for more information on the methodology

However, **barriers** remain, including:

- **Regulation and governance gaps**: No binding regulations, poor inter-strategy coordination, misaligned regulations, weak enforcement, and limited political will.
- **Knowledge and skills gaps:** Lack of general sector-wide knowledge and understanding of biodiversity, overall benefits and impacts, including embodied ecological impacts (EEI)[3] which are often ignored, shortages in ecological expertise, insufficient training, lack of practical know-how, and weak ecologist influence in the planning process.
- **Financial and economic limitations:** Lack of incentives, funding gaps for public realm and urban-wide solutions, and uncertainty about returns on investment (ROI).
- **Maintenance challenges:** Lack of legal maintenance requirements and budget for long-term upkeep, handover gaps (e.g., from developer to local authority), and no compliance checks.
- **Institutional and coordination challenges:** Siloed teams, late ecologist involvement, and poor cross-sector collaboration.

While the next phase of the project will explore targeted solutions, preliminary findings suggest potential interventions, including:

- **Regulation and governance:** Introduce binding national policies (e.g., Biodiversity Net Gain - BNG - legislation), align strategies, standardise metrics across the board, simplify guidance, mandate early ecologist engagement, and strengthen enforcement for consistent implementation.
- **Knowledge and skills:** Expand training programmes and general understanding across the board, create an Irish biodiversity knowledge hub, incentivise upskilling, and collaborate with key educational and construction professional bodies to address expertise shortages.
- **Financial and economic:** Introduce incentives (tax relief, grants), explore new funding mechanisms (e.g., ecological bonds), and provide ROI evidence (e.g., case studies, and natural capital accounting).
- **Maintenance and long-term planning:** Mandate upfront maintenance budgets and assign clear ownership (developers, councils, or communities) for ongoing maintenance.
- **Institutional and governance:** Integrate ecologists early and foster interdepartmental and cross-disciplinary collaboration in all projects.

[3] EEI refers to ecological impacts that happen off-site, via upstream or downstream activities, such as habitat loss or environmental damage caused by material extraction/manufacturing.

Introduction

Biodiversity loss is one of the world's most pressing crises. Since 1970, global wildlife populations have declined by an average 73%[4]. In Ireland, 85% of European Union (EU) protected habitats are in an unfavourable state, with nearly half showing continued decline, while 30% of protected species are in poor condition[5]. These trends highlight the **urgent need for action**.

Construction and the built environment are deeply intertwined with biodiversity. The main threats to nature, such as land-use change, pollution, resource exploitation, invasive species and climate change[6] - are all closely linked to the industry. However, the sector also holds significant potential to help address biodiversity loss[7].

Ireland's population is expected to grow by 20% by 2040 (compared to 2022 levels), driving a need to build 50,000 new homes annually, along with associated infrastructure[8]. Without a shift in approach, **development pressures risk accelerating biodiversity decline**. While residential developments are already a major stressor on Ireland's nature[9], the scale of new developments needed also presents the opportunity to **"get it right" by embedding biodiversity at scale**.

A well-designed built environment that takes a positive approach to protecting and enhancing biodiversity can contribute to nature restoration and provide many benefits to society, from preventing flooding and overheating risks, to improving people's health and wellbeing (see Figure 1).

[4] World Wildlife Fund (WWF) (2024). 'Living Planet Report 2024: A system in Peril'. WWF, Gland, Switzerland. Available at: https://www.worldwildlife.org/publications/2024-living-planet-report#:~:text=WWF's%202024%20Living%20Planet%20Report,dual%20climate%20and%20nature%20crises

[5] Government of Ireland (2024). 'Ireland's 4th National Biodiversity Action Plan 2023-2030'. Available at: https://www.gov.ie/en/department-of-housing-local-government-and-heritage/publications/irelands-4th-national-biodiversity-action-plan-20232030/

[6] Environmental Protection Agency (EPA) (2024). 'Ireland's State of the Environment Report'. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/state-of-the-environment/irelands-state-of-the-environment-report-2024.php

[7] Opoku, A. (2019). 'Biodiversity and the built environment: Implications for the Sustainable Development Goals (SDGs)', Resources, Conservation and Recycling, 141, pp. 1–7. Available at: https://doi.org/10.1016/j.resconrec.2018.10.011.

[8] Government of Ireland (2025). 'Project Ireland 2040 – National Planning Framework (NPF) First Revision'. Available at: https://www.npf.ie/

[9] Government of Ireland (2024). 'Ireland's 4th National Biodiversity Action Plan 2023-2030'.

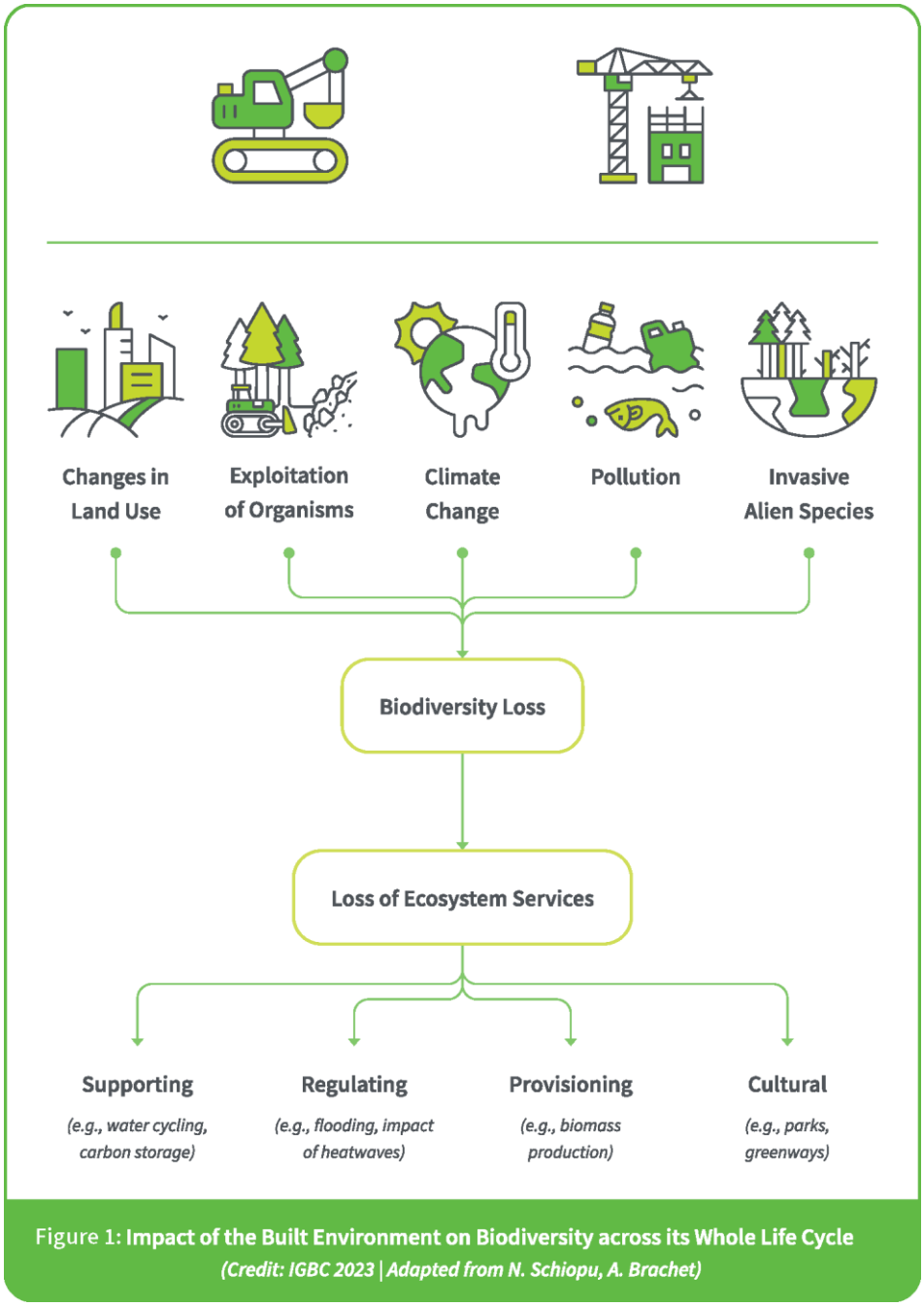

Figure 1: **Impact of the Built Environment on Biodiversity across its Whole Life Cycle**
(Credit: IGBC 2023 | Adapted from N. Schiopu, A. Brachet)

In response to this challenge, Ireland and the EU have introduced policies, guidance, and tools that support nature-led residential developments (see Box 1).

Policies & Legislation

- The **EU Nature Restoration Regulation** requires member states to restore at least 20% of degraded land and sea by 2030, with full restoration by 2050, and specifically for urban ecosystems, no net loss of green urban space and tree cover by 2030, and a steady increase in their total area from 2030 (Art. 8) (EU, 2024).
- The **Corporate Sustainability Reporting Directive** (CSRD) mandates that companies measure and report biodiversity impacts, encouraging biodiversity net gain in urban developments, and a better consideration of embodied ecological impact (EU, 2023).
- The **EU Biodiversity Strategy for 2030** aims to brings nature back to the cities by promoting healthy ecosystems and urban nature restoration, greening urban areas, and the integration of green infrastructure and nature-based solutions in public spaces, infrastructure, buildings and their surroundings (EC, 2020).
- **Ireland's 4th National Biodiversity Plan** sets legally binding targets for ecosystem restoration and conservation for 2023-2030. It highlights the role of the planning system in safeguarding biodiversity by ensuring that new development is sustainable and does not have a negative impact on the environment (Government of Ireland, 2024).

Guidance

- **Landscaping and Biodiversity Guide for New Developments**, which provides recommendations on how to design and implement spaces that protect and enhance biodiversity (Clúid Housing, 2023).
- **All-Ireland Pollinator Plan resources**, including guidelines and planting lists, provide everything needed to take action for pollinators (NBDC, n.d.).

Tools

- **Green space factor (GSF):** A metric developed by South Dublin County Council (SDCC) used to quantify and ensure the provision of green infrastructure in new developments. It can be used to assess the existing green cover within a site and the impact of new development, based on the quantity and quality of new green space provided (SDCC, 2022).
- **DEFRA Biodiversity Metric:** A standardised tool developed by the United Kingdom (UK) Department for Environment, Food & Rural Affairs (DEFRA) to measure biodiversity in development. It uses 'biodiversity units' to compare the ecological value of habitats before and after development, supporting BNG (UK Government, 2024).

Box 1. Key policies, guidances and tools related to biodiversity and the built environment

Despite these efforts, the mainstreaming of nature-led developments has been slow[10]. The BIO-NEIGHBOUR project aims to ensure nature-led residential developments, including social and affordable housing, private developments, houses and apartments, and their associated infrastructure[11] - become the new norm in Ireland.

Funded by The Housing Agency's Research Support Programme, BIO-NEIGHBOUR is a joint initiative between the Irish Green Building Council (IGBC) and Trinity College Dublin (TCD). It is being developed in four phases:

1. Understanding the context and barriers to implementation.
2. Identifying potential best practices to scale up the use of nature-led residential developments.
3. Testing best practices to validate their applicability.
4. Developing practical and implementable recommendations.

A working definition of **'nature-led residential development'** is being developed to guide future practice (see Box 2). Because there is limited data on nature-led residential developments, nature-based solutions and green insfrastructure are used as proxies for the analysis.

> ***"Nature-led residential developments means the overall ecological impact of a project, including land use, construction, supply chains, and occupation, results in a demonstrable enhancement of biodiversity and supports long-term ecological resilience, accounting for both direct site-level impacts and indirect embodied ecological impacts.***
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> *This should be achieved by recognising existing site conditions, implementing the mitigation hierarchy (avoid, minimise, restore, compensate), prioritising like-for-like nature restoration where possible, enhancing ecological connectivity, and securing long-term management and monitoring".*

Box 2. Definition of 'nature-led residential development'.

This report presents the findings from phase 1, which explores:

1. State of the art on the integration of NbS and GI into residential developments in the Irish context, including recent progress, commonly used NbS, and current drivers supporting their implementation.
2. Barriers to scaling up the use of nature-led residential developments.
3. Potential recommendations to support broader adoption and next steps for the project.

[10] Collier, M.J. et al. (2023). 'An integrated process for planning, delivery, and stewardship of urban nature-based solutions: The Connecting Nature Framework', Nature-Based Solutions, volume 3, 100060. Available at: https://doi.org/10.1016/j.nbsj.2023.100060.

[11] From this point forward, the term 'residential developments, including social and affordable housing, private developments, houses and apartments, and associated infrastructure' will only be referred to as 'residential development'.

1 State of Art

1.1 Progress Over the Past 5-10 Years

Understanding the challenges and barriers to integrating NbS and GI in new residential developments requires first exploring how these solutions are currently perceived within the Irish industry. This section presents the state of the art, as identified through stakeholder consultation.

Findings show that **progress has been made over the past 5 to 10 years** in integrating NbS and GI into residential developments (see Chart 1), as these approaches **are gradually gaining traction** in the industry. This perceived increase is largely **driven by a growing awareness of biodiversity and its benefits, and more widespread discussion of the topic across the sector**.

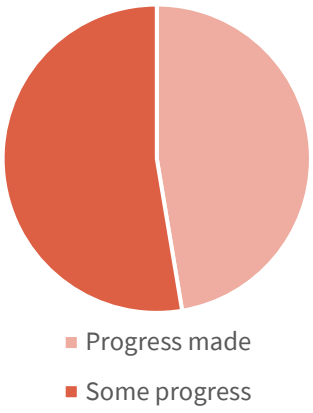

Chart 1: Perceived progress in integrating NbS and GI into residential developments over the past 5 to 10 years. Total sample: 18 interviewees.

The use of NbS and GI is beginning to be seen as an **emerging competitive advantage**, both in terms of adding value to developments and as a specialised service offering for consultancies. The biodiversity agenda is also being addressed by a broader context, such as policies on climate adaptation, **the anticipation of future regulatory changes,** and the recognition of opportunities to lead in a shifting market.

However, despite rising interest, **implementation is perceived to remain low** (see Chart 2), constrained by weak enforcement, poor and inconsistent quality of execution, limited large-scale uptake, and a tendency to prioritise aesthetics over ecological value.

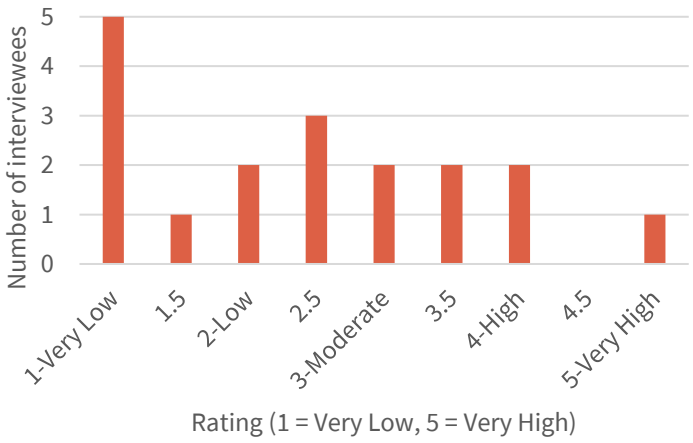

Chart 2: Perceived level of integration of NbS and GI into residential developments (1–5 scale). Total sample: 18 interviewees.

1.2 Current Drivers

The integration of NbS and GI into residential developments is influenced by a combination of policy, organisational, and market and social factors. Key drivers include:

- **Policy Factors**
    - Compliance with existing policies and anticipation of upcoming regulations, such as Biodiversity Net Gain[12].
    - Broader existing policies, particularly those focused on climate adaptation, often act as indirect drivers for biodiversity integration.
    - Introduction of concepts such as nature-based solutions (NbS), green infrastructure (GI), sustainable urban drainage system (SuDS), and blue-green infrastructure (BGI) into the National Planning Framework and local development plans.
    - Inclusion of placemaking strategies in local development plans that emphasise the link between biodiversity, the environment, and human health and wellbeing (e.g., South Dublin County Development Plan 2022-2028 - Chapter 5: Quality Design and Healthy Placemaking).
- **Organisational Factors**
    - Organisation size, sustainability commitments, and project scale can influence the adoption of nature-led residential developments. Larger organisations, especially those with a sustainability strategy, are more likely to implement biodiversity-positive actions.
    - Involvement of ecologists, landscapers, and arborists in planning and design processes.
- **Market and Social Factors**
    - Growing demand from investors, buyers, and communities for greener developments.
    - Preference for solutions that provide immediate functional benefits, such as climate adaptation (e.g., flood mitigation), which may indirectly support biodiversity.
    - Social norms, peer pressure, environmental awareness, and aspirational eco-friendly lifestyles.

Even though Ireland does not currently have a specific regulation (e.g., similar to the English Biodiversity Net Gain regulation) or a standardised national approach, some tools are already being used in both the public and private sectors. However, their application is limited and inconsistent. These include (see Box 1 for more details):

[12] CIEEM Ireland Policy Group (2024). 'Briefing Paper – Biodiversity Net Gain in Ireland'. Available at: https://cieem.net/wp-content/uploads/2024/08/BE-Briefing-Paper-Aug-2024.pdf

- **Green Space Factor**

  Used by: South Dublin County Council.

  Limitation: Not standardised or adopted across all Local Authorities (LAs).

- **DEFRA Biodiversity Metric**

  Used by: Some large developers and private consultancies.

  Limitation: Not tailored to the Irish context (e.g., habitats).

1.3 Current Limitations

While awareness and interest are increasing, the integration of NbS and GI into residential developments is perceived to remain limited due to a range of challenges, including:

- **Policy Gaps**
  - Existing policies frequently fail to translate into on-the-ground implementation.
  - Developers often comply only with minimum legal requirements, having limited incentives to exceed them.
  - No formal requirement or guidance on accounting for supply chain impacts (i.e., Embodied Ecological Impact - EEI) in developments.
- **Design and Implementation Barriers**
  - Standard designs are followed, often without alignment to broader policies or biodiversity goals.
  - Solutions are often treated as superficial add-ons, afterthoughts, or 'tick the box' exercises, and implemented as one-off or isolated measures.
  - Real or perceived conflicts between high-density housing targets and spatial requirements for nature-based solutions.
- **Knowledge and Expertise Shortfalls**
  - Lack of clarity on how to properly execute nature-based solutions due to limited experience and/or resources.
  - Limited consideration of long-term maintenance implications.
  - Lack of awareness and consideration of supply chain impacts (i.e., EEI) in planning and decision-making.
  - Approaches to habitat creation are new, and their long-term impact is still uncertain.
- **Economic and Financial Barriers**
  - Internal resistance within organisations where biodiversity is seen as a cost burden.

- In the public sector, biodiversity is still often seen as a luxury, not a priority.

1.4 Commonly Used NbS

Findings indicate that the most commonly used nature-based solutions in new residential developments are pollinator-friendly actions and climate resilience measures (e.g., SuDS such as rainwater gardens and swales) (see Chart 3). Their adoption may be influenced by initiatives like the All-Ireland Pollinator Plan 2021-2025 and SuDS-related policies[13], which are generally more stringent and better enforced than those related to biodiversity. Green roofs were noted to be more commonly used in urban, non-residential developments, but are not as widely used in residential contexts.

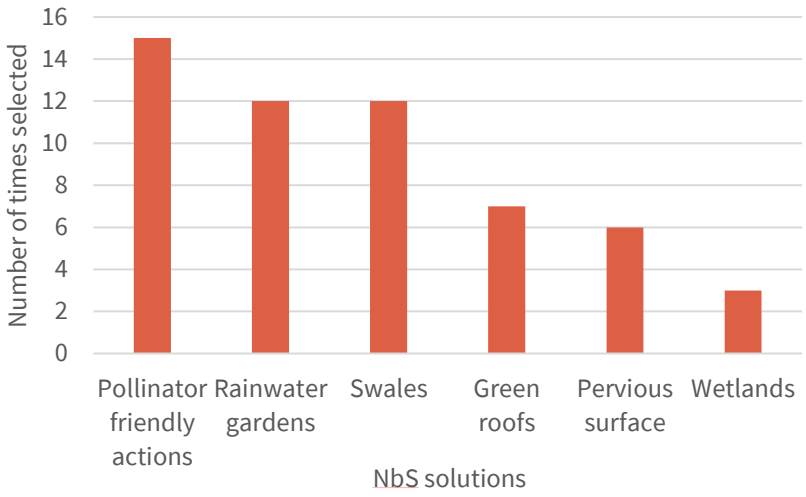

Chart 3: NbS commonly used in residential developments. Total sample: 18 interviewees.

Other nature-based solutions being used include:

- **Water Management and Drainage Solutions**
  - Pervious surfaces
  - Blue-green infrastructure
  - Wetlands
  - Dried attenuation ponds
- **Urban Greening and Habitat Protection**
  - Pocket forest (small-scale native tree planting, often called 'biodiversity bombs')
  - Street trees (often an overlooked feature) and tree pits

[13] For example, the Design Manual for Urban Roads and Streets (DMURS) Advice Note 5 – Road and Street Drainage using Nature-based Solutions, which provides guidance for designers on how to incorporate nature-based solutions into road and street drainage design. As of 2023, applying DMURS guidance became mandatory when providing new or when modifying existing urban roads and streets. Its use is required by all roads authorities and applies to all roads and streets in urban areas (NGS Circular 1 of 2023 - DMURS Update July 2023).

- Bat and bird boxes, and lighting control to protect bats
- Bio-retention strategies (e.g., retention of existing hedgerows, streams, restoration of river process, and culverted streams)

- **Ecological Connectivity**
  - Boundaries that support wildlife movement
  - Connectivity to external ecological corridors (e.g., hedgerows)
  - 'Elephant trails' (permeable footpaths)

1.4.1 Common Limitations of NbS Implemented

Despite their growing adoption, nature-based solutions risk falling short of achieving meaningful biodiversity integration in new residential developments at scale. Key limitations include:

- **Split focus:** Biodiversity is not always prioritised or meaningfully considered, as solutions (i.e., NbS, SuDS, GI) are often designed to serve multiple goals (e.g., flood control).
- **Fragmented implementation:** Piecemeal adoption instead of coordinated, large-scale implementation.
- **Aesthetic prioritisation:** A focus on visually appealing, selective planting that may even support some pollinators, but does not fully support broader biodiversity needs or complete species life cycles (e.g., adding butterfly-friendly plants but excluding nettles, which some butterfly species need to complete their reproduction cycle).
- **Inadequate habitat substitution:** Replacing high-value habitats (e.g., ancient hedgerows) with lower-value alternatives, not following an adequate approach for biodiversity gains, such as the Biodiversity Gain Hierarchy or similar best-practices guidelines.[14]
- **Poor execution:** Inconsistent or poor execution, which undermines intended outcomes.

[14] The Biodiversity Gain Hierarchy is a step-by-step guide that prioritises actions to maximise positive biodiversity outcomes during and after development projects (UK Government, 2024b). It complements the Mitigation Hierarchy, a framework designed to manage and reduce the negative biodiversity impacts of development projects by avoiding, minimising, restoring and compensating for biodiversity losses (CIEEM 2024).

2 Barriers

2.1 Barriers Ranked by Importance

This section outlines the main barriers to scaling up the implementation of nature-led residential developments in Ireland, as identified through research and stakeholder consultation. The barriers are ranked by perceived importance. Four key barriers emerged as the most pressing. If effectively addressed, they have the potential to resolve or mitigate many of the remaining challenges.

2.1.1 Main Barriers

Regulation & Governance Barriers

Systemic policy, legal, and political challenges

- Lack of binding policies (e.g., BNG legislation) and standardised national approach used by all local authorities, leading to inconsistent implementation and varying practices across LAs.
- Poor coordination between national strategies, including land-use, transport, nature restoration, leading to fragmented approaches (e.g., land-use strategy may promote expansion, while a transport strategy supports compact cities).
- Real or perceived competing priorities between urban development and environmental goals (e.g., housing density targets vs space required for NbS).
- Misalignment between building regulations and planning guidelines, creating loopholes or contradictions (e.g., planning guidelines might promote green roofs, but the building code might not allow the structural load).
- Inconsistent policy interpretation, from EU-level strategies (e.g., EU Nature Restoration Law), to national and local levels (e.g., Ireland's 4th National Biodiversity Action Plan, as well as local authority development plans and biodiversity action plans).
- Weak enforcement of ecological planning conditions, leading to inconsistent implementation and unmet ecological commitments.
- No legal requirement to consult ecologists early in planning and design stages.
- No legal requirement to account for biodiversity impacts across the supply chain (i.e., EEI).
- Weak political will and limited senior management drive, reducing buy-in from stakeholders at all levels.
- Local authorities are overstretched, limiting their ability to act as regulatory bodies or provide consistent support.

Knowledge & Skills Barriers

Gaps in expertise that limit effective implementation

- National shortage of specialised professionals in ecology and botany.
- Ecology, botany, and horticultural studies are not well promoted or supported.
- Limited resources and lack of the right skill set within public and private organisations.
- Insufficient knowledge of biodiversity across the industry (e.g., overall benefits/impacts, how to design, construct, and maintain NbS and GI in practice).
- Lack of practical education and industry training on delivering biodiversity in residential developments.
- Limited incentives for upskilling.
- Limited data and evidence on the effectiveness of NbS and GI, hindering decision-making and business cases promoting their use.
- Limited influence from ecologists in the design development process.
- Ecological inputs are sometimes perceived to be too qualitative by other industry stakeholders (e.g., engineers and accountants), weakening their value in decision-making processes.

Financial & Economic Barriers

A lack of funding and market mechanisms undermines implementation and long-term viability, risking limited adoption

- Difficulty proving return on investment (ROI) of NbS and GI.
- Lack of funding and financial incentives.
- Inflexible financial mechanisms. For example, existing funding streams, such as those from the Department of Housing, Local Government and Heritage (DHLGH) for social housing, tend to be too inflexible, as they are typically tied to defined purposes with standard components and designs, limiting innovative or site-specific NbS and GI. They may not fully cover wider public realm or green/blue infrastructure, making it hard to justify integrated, area-wide solutions. This results in piecemeal support (e.g., €30K for a €700K intervention), highlighting gaps in both funding and urban-scale planning.
- Limited understanding of available incentives and how to access them.
- Lack of financial support for long-term maintenance and monitoring.
- Lack of an offset market or other mechanisms to attract private investment.

Maintenance & Long-term Planning Barriers

The lack of long-term planning and stewardship weakens the durability and effectiveness of NbS and GI

- No legal requirement or allocated budget for long-term maintenance.

- Nature-based solutions are often cut during handover from developers to local authorities, who may perceive them as too costly or difficult to maintain, making them vulnerable to removal or neglect.
- Lack of accountability for post-construction maintenance.
- Lack of compliance checks after construction completion to ensure effective performance of NbS and GI, due to limited resources.

2.1.1 Additional Barriers

Institutional & Coordination Barriers

Operational challenges, such as siloed work and poor collaboration hinder early integration and reduce overall efficiency

- Siloed working within organisations (e.g., design vs. environmental teams).
- Poor collaboration between professions (e.g., architects vs. ecologists).
- Weak cross-sector coordination, leading to duplicated efforts or conflicting priorities among stakeholders.
- Poor and late integration of ecologists in the design/development process.
- Inconsistent implementation of existing tools (e.g., GSF).
- Duplication of efforts across local authorities, each developing independent biodiversity action plans and tools without shared direction.

Social & Cultural Barriers

Public and industry preferences (e.g., 'for neat landscapes') can override biodiversity efforts

- Preference for neat aesthetics over biodiverse landscapes or 'untidy' green spaces.
- Limited public interest in biodiversity, reducing community-driven or voluntary action.
- Cultural resistance in public and private sectors, where priorities favour speed, traditional 'grey' infrastructure, or perceived 'urgent' needs (e.g., roads over nature), often resulting in superficial or limited use of NbS and GI.

Awareness & Perception Barriers

Limited understanding and awareness of biodiversity can slow down adoption

- Limited understanding of the overall benefits (e.g., ecological, financial, and social) of biodiversity across the industry and the public.
- Preference for solutions that provide immediate benefits, whereas the benefits of protecting and enhancing biodiversity in a project are evident over the long-term.
- Perception that these solutions are costly and difficult to manage, maintain, or monitor.
- Belief that urban areas 'have no space' for these interventions.
- Perception among some developers that rigid ecological perspectives conflict with, or can undermine housing and development needs.

Technical Barriers

A lack of standardised tools tailored to the Irish context creates practical obstacles to implementation

- Lack of standardised and comprehensive resources tailored to Ireland's specific climate and habitats (e.g., Ireland-equivalent of the English BNG Hub).
- Practical challenges in balancing technical engineering requirements with delivering real biodiversity benefits, as the two may conflict in practice (e.g., a retention pond might be designed with concrete lining and uniform slopes to ensure durability and make it easier to maintain, but natural, irregular edges with native planting may better support biodiversity, and improve health and safety).

2.2 Barriers Across the Development Process

While Section 2.1 identifies barriers by type, their impact varies across the development process. Table 1 identifies the key procedural barriers across the development process, highlighting where interventions may be most urgent.

Table 1: Key barriers across the development process

	Policy-making	Planning / Design	Implementation	Post-Construction
Regulation & Governance	-No binding policies and standardised approach across local authorities -Misalignment between national strategies and regulations, development plans and planning guidelines	-Ecologists are often involved too late as there is no legal planning requirement for early consultation -Inconsistent interpretation of existing policies -Competing priorities (e.g, housing density targets vs green space)	-Weak enforcement	-No compliance checks -No clear responsibility for monitoring and maintenance
Financial & Economic	-Funding gaps, especially for public realm and urban-wide solutions -No offset market	-Challenges in proving ROI to make a strong business case	-Budget constraints, which often reduce/cut biodiversity features, especially as many of them are implemented at	-No long-term budgets

			the end of a project	
Knowledge & Skills	-Ecology is not part of mainstream construction studies -Not enough support of ecology, botany and horticultural studies	-Lack of involvement of ecologists at early stages of the process -Poor design and early-stage oversights	-Contractor skills gap, including prioritisation of speed over quality and lack of training in ecology and NbS installation	-Limited skilled resources to undertake maintenance (e.g., contractors and residents lack ecological maintenance knowledge; LAs under-resourced)
*Maintenance & Long-Term	-No legal requirement for long-term maintenance	-No proper maintenance planning, including budget	-Poor handover protocols	-Lack of monitoring / auditing

*Note: Maintenance challenges often start earlier (e.g., lack of proper planning and budget) but become evident in the post construction stage.

2.3 Opportunities and Challenges by Residential and Site Type

Barriers to nature-led residential developments becoming the new norm solutions are perceived to be similar across different types of development. However, each residential development and site type presents advantages and disadvantages that may influence the scale of implementation (see Table 2).

Table 2: Integration of NbS and GI across residential and site types: advantages and disadvantages

Residential / site type	Advantages	Disadvantages
Social / affordable housing	-Subject to stricter regulations -Greater accountability regarding control and long-term maintenance -Ownership of land for social housing by LAs or AHBs enables easier and broader integration, including public realm	-Limited budgets and/or inflexible -Long-term maintenance challenges (e.g., capacity) -Can be perceived as a luxury -Can face internal resistance to their implementation due to competing priorities
Private developments	-Market demand for sustainability initiatives, including biodiversity -In the absence of legislation, often rely on contractor initiatives (e.g., larger developers often invest in biodiversity for their Corporate Social Responsibility - CSR) -Can have more flexible budgets	-Profit-driven cuts -Lack of enforcement -Maintenance uncertainty (the developer leaves once they are built and sold) -Limited to their site boundaries, making it harder to implement solutions across multiple properties and neighbourhoods

Apartments	-More feasible than low-rise housing due to shared green spaces	-Space limitations, reliance on roof gardens and street trees -Shared spaces could complicate maintenance
Brownfield site	-Perceived as having a lower ecological baseline, making it easier to achieve biodiversity gains	-May be constrained by limited space and strict density regulations
Greenfield site	-Offer more spatial flexibility	-Perceived to be harder to compensate for lost habitats -Tension between maximising number of units or density and preserving or enhancing the site's existing biodiversity

3 Potential Recommendations - Preliminary Findings

While detailed actions will be explored in the next phase of the project, this section presents preliminary potential recommendations ranked by perceived importance, as identified through research and stakeholder consultation conducted as part of this work package.

Regulation & Governance

- Introducing consistent national policies (e.g., BNG legislation), considering supply chain impacts on biodiversity, and encouraging large-scale and connected interventions.
- Aligning national strategies, including land-use, transport, and nature restoration.
- Providing standardised frameworks and metrics (e.g., BNG scoring, GSF) to be used across the board, acknowledging that even imperfect metrics can drive focus.
- Simplifying processes and providing clear guidance on integrating biodiversity tailored to both small and large developers.
- Making biodiversity considerations, early consultation with ecologists, and maintenance plans mandatory planning requirements.
- Aligning policies, building regulations and planning guidelines (e.g., update open-space standards to prioritise ecological function over small 'pocket parks'[15]).
- Improving consistency by clarifying the interpretation of policies and frameworks, and by strengthening enforcement mechanisms (e.g., through audits, penalties, or compliance checks).

Knowledge & Skills

- Developing targeted training courses to build general biodiversity knowledge within the industry.
- Promoting training courses in ecology/botany and advocating for their inclusion in main construction studies, as already done by Trinity College Dublin (TCD) as part of their business degrees[16].
- Developing a learning hub to disseminate knowledge, and share guidance documents and best practices.
- Introducing and making mandatory a 'sustainability pass' or micro-credentials in biodiversity and the built environment to further incentivise upskilling (similar to the 'safe pass'[17]).
- Creating comprehensive resources tailored to Ireland's specific climate and habitats (e.g., Ireland-equivalent of the English BNG Hub).

[15] 'Pocket parks' are small (less than 0.2 hectares) public green spaces, typically located in urban areas created to provide facilities for smaller children and other social functions (FCC, 2022).

[16] For example: the TCD Global Business (Bachelor in Business Studies) programme includes modules on ecological limits and offers other like 'Climate Change' and 'Natural Capital Accounting', which address environmental and ecological considerations within a business context (TCD, n.d.).

[17] 'Safe pass' is a short mandatory safety awareness training programme that construction workers must complete to work on construction sites (HSA, no date).

- Map actual/potential ecological corridors across all local authorities (similar to 'Mapping a Carlow Town Pollinator Foraging Network'[18]).
- Liaising with key educational stakeholders (e.g., Sustainability Supply Chain School, Irish Department of Education and Youth, Skillnet Ireland) and construction professional bodies (e.g., Engineers Ireland and the Royal Institute of the Architects of Ireland - RIAI) to identify relevant training, develop new programmes, and promote the uptake of relevant careers and initiatives to address the shortage of resources.

Financial Support

- Introducing financial incentives (e.g., tax relief, grants, and 'ecological bonds'[19]).
- Introducing new schemes for large-scale interventions.
- Curating studies showing proven ROI of nature-led solutions.
- Providing templates for developers to calculate ROI.
- Acknowledging the value of nature and its role in the economy (e.g., nature capital accounting such as Nature+Energy[20] for new residential developments).
- Exploring new funding mechanisms (e.g., capital funding programmes) and the possibility of establishing a natural market to drive private investment.

Maintenance & Long-Term Planning Solutions

- Ensuring upfront maintenance planning and long-term budgeting.
- Establishing clear roles/responsibilities for maintenance (e.g., assigning ownership to developers, councils, or community groups).
- Investing in specialist teams to ensure consistent monitoring, on-site checks, and enforcement of ecological features.

Institutional & Collaboration

- Ensuring early ecologist engagement in design and planning.
- Promoting interaction among key actors across the development process, including ecologists, landscape architects, arborists, architects, engineers, developers, and planners.
- Fostering cross-disciplinary collaboration with shared goals between departments and organisations.
- Creating inter-agency task forces to reduce duplication.

[18] Mapping a Carlow Town Pollinator Foraging Network is a tool designed to support pollinator in urban areas. It was created to align with the approach of the County Carlow Green Infrastructure Strategy, which is based on the policy: '*No pollinator in County Carlow's towns and villages will have to travel more than 200metres in order to find a food source (green space of a minimum size, that is managed for biodiversity).*'

[19] 'Ecological bonds' are a proposed idea based on 'tree bonds'. 'Tree bonds' are financial securities used to protect trees during land development or construction activities, ensuring that they remain healthy and undamaged throughout and after the development process (ACT Government, no date). In this case, 'ecological bonds' could be used to protect biodiversity.

[20] Nature+Energy aims to create new ways to account for the value of nature in wind farms by developing solutions for quantifying and sustainably managing natural capital. An environmental monitoring system will facilitate the enhancement of biodiversity and help mitigate the effects of wind farms on key species.

Raising Awareness

- Promoting understanding of the ecological, financial, and social benefits of nature-led residential developments, encouraging stakeholders to go beyond compliance and helping drive consumer demand.
- Creating better-targeted messaging to counter misconceived ideas that this approach is costly and difficult to manage, while highlighting long-term benefits.

Glossary

Green Infrastrure (GI) is a strategically planned network of natural and semi-natural areas with other features, designed and managed to deliver a wide range of ecosystem services and enhance biodiversity[21].

Blue-green Infrastructure (BGI) is a strategically planned network of natural and semi-natural elements that provide environmental, social, and economic benefits. By integrating elements from blue infrastructure (e.g., water bodies) with green infrastructure (e.g., green roofs and urban forests), BGI supports stormwater management, improves air and water quality, enhances biodiversity, and offers recreational and well-being opportunities for communities [22].

Nature-based solutions (NbS) are solutions inspired and supported by nature, which are cost-effective, and simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions can bring more, and more diverse, nature and natural features and processes into cities, landscapes and streetscapes, through locally adapted, resource-efficient and systemic interventions[23]

Sustainable Urban Drainage System (SuDS) are methods that use nature to replicate natural processes of drainage, providing a solution that is more sustainable, and not based on hard engineering[24].

[21] EC (n.d.). Green Infrastructure. Available at: https://environment.ec.europa.eu/topics/nature-and-biodiversity/green-infrastructure

[22] Interreg Europe (2024). Green and blue infrastructure. Available at: https://www.interregeurope.eu/policy-solutions/policy-briefs

[23] LAWPRO (2024). Implementation of Urban Nature-based Solutions Guidance. Available at: https://lawaters.ie/publications/

[24] LAWPRO (2024). Implementation of Urban Nature-based Solutions Guidance. Available at: https://lawaters.ie/publications/

Appendix

Methodology

The first phase of the project was developed using a multi-method qualitative approach to cross-verify findings, combining:

(1) a literature review to identify common barriers and solutions,

(2) semi-structured interviews to explore practical, on-the-ground barriers and enablers in the Irish context, and

(3) a focus group to validate preliminary findings and prioritise key barriers and potential solutions.

Figure 2 provides details of each of the three activities. The results from all activities were synthesised to highlight the most critical challenges and strategies for scaling up the implementation of nature-led solutions in new residential developments.

Figure 2: Methodology – Phase 1

Stakeholder Participation by Type and Activity

Chart 4 illustrates the number of participants from each stakeholder group who contributed to Phase 1 of the project through semi-structured interviews and a focus group. A total of 21 interviewees and 13 focus group participants were engaged across a variety of organisations, including local and central government, NGOs, AHBs, building designers, private developers, ecologists, and consultants.

The analysis aimed for diversity in terms of organisation type, size, and geographic location. However, there were limitations, and it is the project team's ambition to engage with more smaller developers and organisations based outside of Dublin as part of the next phases of the project.

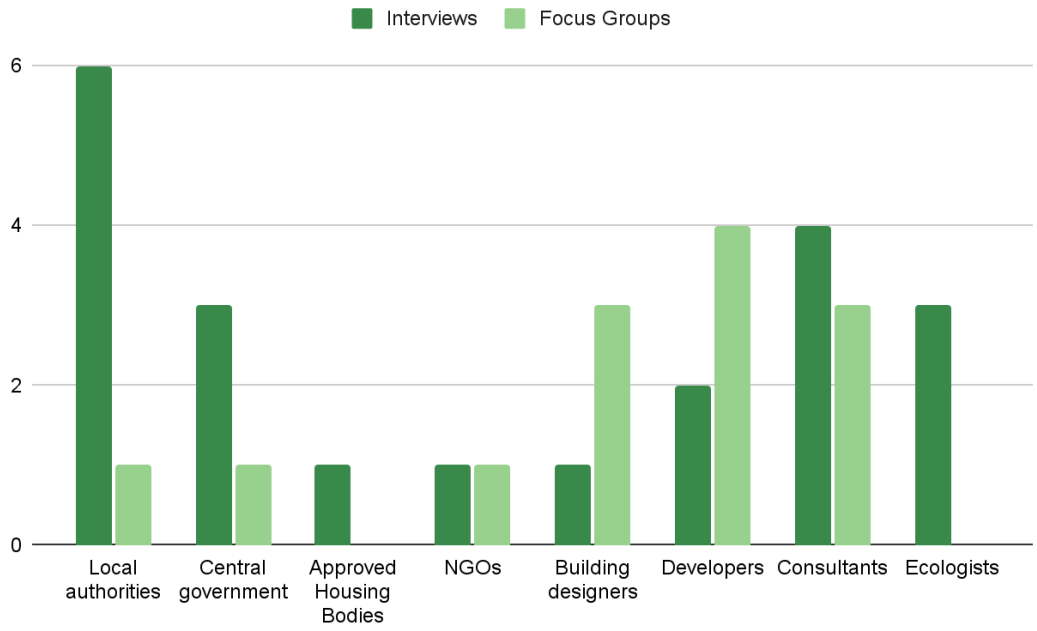

Chart 4: Stakeholder Participation by type and activity

Acronyms

AHBs: Approved Housing Bodies

BGI: Blue-Green Infrastructure

BNG: Biodiversity Net Gain

CIEEM: Chartered Institute of Ecology and Environmental Management

CSR: Corporate Social Responsibility

CSRD: Corporate Sustainability Reporting Directive

DEFRA: Department for Environment, Food & Rural Affairs, UK

DHLGH: Department of Housing, Local Government and Heritage

DMURS: Design Manual for Urban Roads and Streets

EEI: Embodied Ecological Impacts

EU: European Union

EC: European Commision

GI: Green Infrastructure

GSF: Green Space Factor

IGBC: Irish Green Building Council

LAs: Local Authorities

LAWPRO: Local Authority Waters Programme

NbS: Nature-Based Solutions

NBDC: National Biodiversity Data Centre

NGO: Non-Governmental Organisations

ROI: Return On Investment

SDCC: South Dublin County Council

SuDS: Sustainable Urban Drainage System

TCD: Trinity College Dublin

UK: United Kingdom

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