IGBC
IRISH GREEN BUILDING COUNCIL

BIO-NEIGHBOUR

Towards greener, more biodiverse neighbourhoods

D2.1: Best practice for incorporating and maintaining new nature-led residential developments at scale

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IRISH GREEN BUILDING COUNCIL

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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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Introduction

This report presents the findings of D2.1 of Work Package 2 (WP2) of the BIO-NEIGHBOUR project, which investigates how biodiversity can be more effectively integrated into new residential developments in Ireland. WP2 builds on the outputs of Work Package 1 (WP1), which documented the current state of practice and identified typical constraints, including four key barriers: **Policy, Finance, Knowledge, and Long-Term Management.**

The objective of WP2 is to explore potential solutions to these constraints, drawing on both national and international examples of best practice. The research combined a desk-based review of relevant policies, guidance, and case studies with a series of semi-structured interviews involving various stakeholders in the development process, including those from the fields of planning, ecology, engineering, architecture, and construction.

Through these interviews, a number of recurring themes and practical insights emerged in relation to the opportunities and limitations of current approaches. The report is structured around six themes, which capture the influencing factors in how biodiversity is shaped across the lifecycle of residential projects:

- Policy – planning and zoning
- Policy – design and delivery
- Long-term management
- Knowledge
- Finance
- Perceptions and people

Each thematic section sets out the context for the issues as they were explored in the interviews. Candidates typically outlined the current processes and scenarios to frame areas where they felt better practices could be introduced before moving on to describe the solutions and best practice examples. This report also follows that structure.

Rather than proposing a single fixed model, the report identifies a series of mechanisms, decision-making structures, and practical measures that could support better outcomes for biodiversity in residential developments. Many of these are already being applied internationally or in parts of Ireland and could be further developed or adapted to improve outcomes.

This report recognises the complexity of the housing and planning system, as well as the urgent need to deliver new homes. However, its findings suggest that considering biodiversity as a secondary concern or constraint does not achieve the best outcomes. With

appropriate planning, design, and governance, it is possible to deliver development that is both ecologically meaningful and socially beneficial.

1 Methodology

The research employed a mixed-methods approach, combining a targeted desktop review with qualitative data gathered through semi-structured interviews.

The desktop review focused on planning policy, biodiversity guidance, and examples of good practice relating to the integration of biodiversity measures and nature-based solutions in residential developments. It explored national and international case studies, and targeted policy mechanisms including biodiversity metrics and green-blue infrastructure strategies.

The semi-structured interview study consisted of twenty-two interviews designed to capture stakeholder insights from professionals across planning, design, ecological consultancy, local government, engineering, development, and construction. Participants were selected to ensure a broad range of expertise and perspectives, spanning both public and private sectors, and representing stakeholders based within Dublin as well as, where possible, other regions. Interviews followed a flexible question structure which ensured key themes were captured while allowing scope to explore each candidate's unique expertise and insights. Participants reflected on the barriers identified in Work Package 1 and shared ideas and examples of best practice or system-level changes to improve outcomes for biodiversity.

All interviews were transcribed, analysed, and the findings grouped to extract common themes which were identified as recurring throughout the dataset. These themes are used to structure the findings presented in this report. Where direct quotations are included, they are reproduced exactly as recorded. In accordance with ethical research practice, candidates' identity is protected and unique or identifying factors have been omitted.

1.1 Interview Candidates

In selecting interview participants, ecologists were identified as key stakeholders given their expertise in designing and evaluating measures that deliver tangible biodiversity benefits in residential developments. To ensure a broad range of perspectives, additional participants were drawn from other relevant sectors. This approach was intended to capture insights reflecting the full spectrum of interests and experiences, with particular emphasis on how meaningful impact can be achieved in practice. A breakdown of interview participants is provided in the charts below, both by expertise and by sector. While a high number of ecologists took part, they represent several different sectors.

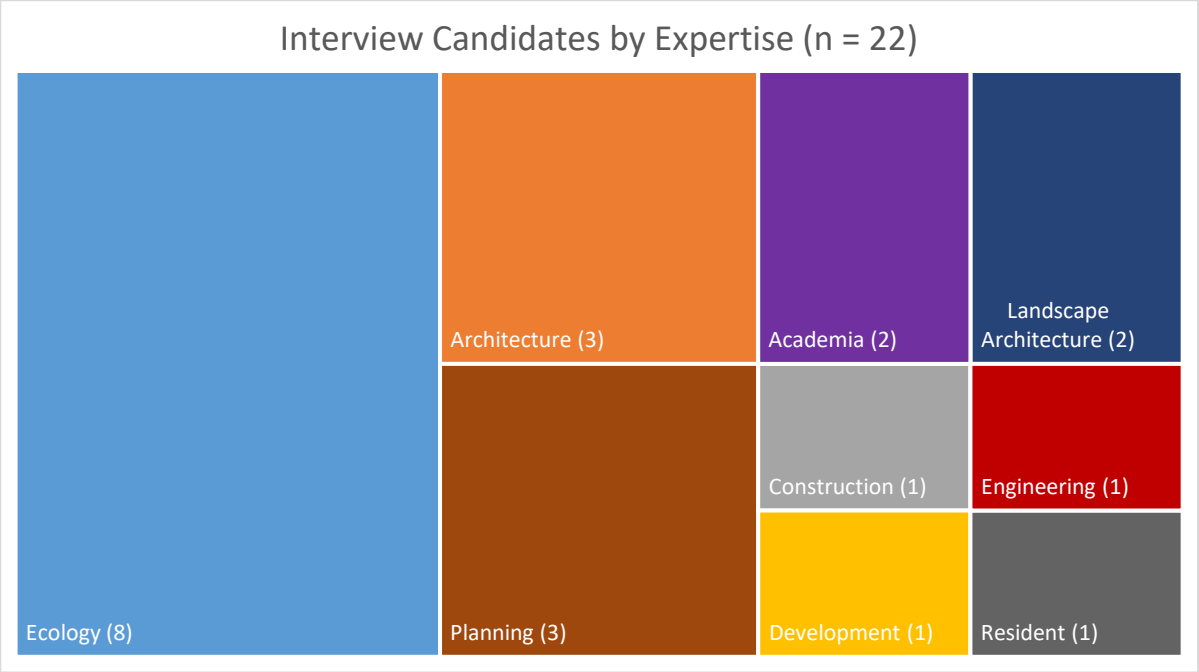

Figure 1: Breakdown of the interview candidates by Expertise

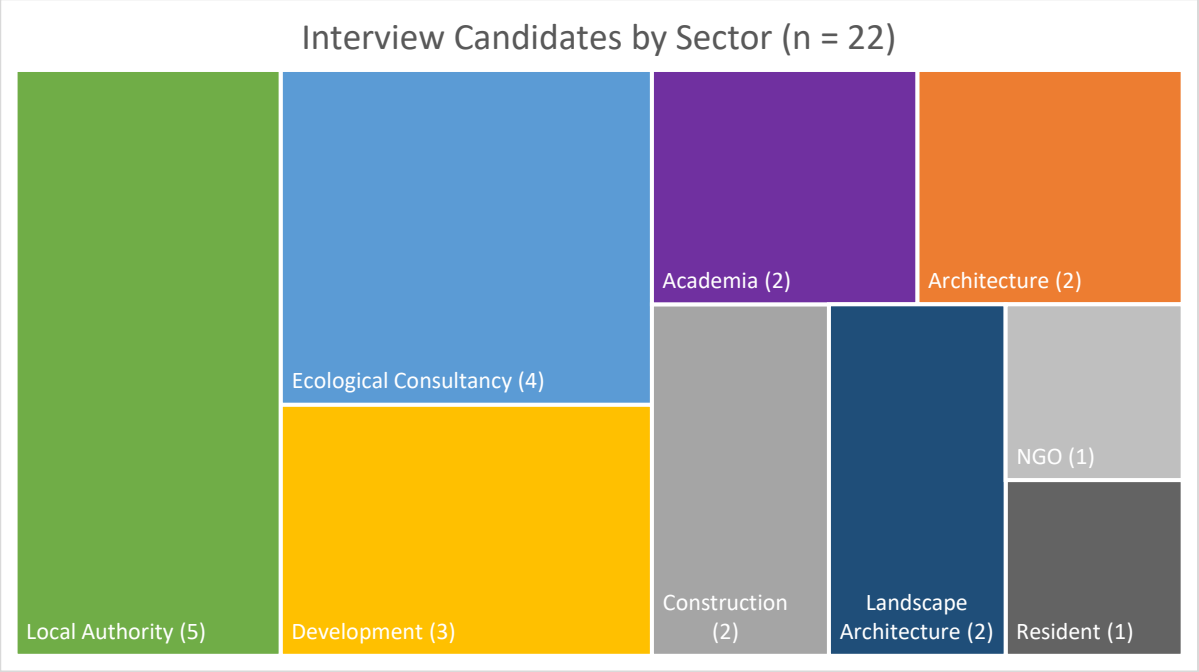

Figure 2: Breakdown of interview candidates by Sector

2 Findings

The interviews revealed a strong awareness and professional commitment to improving biodiversity outcomes in new residential developments. While this is not unexpected given that many participants were ecologists or sustainability professionals, there was broad consensus that attitudes among wider stakeholders and project teams have shifted significantly in recent years. Biodiversity is now generally recognised as a necessary and important consideration at all stages of development.

Many interviewees were actively seeking to integrate nature-based approaches, yet reported encountering institutional, procedural, and systemic barriers. A recurring theme was the need to consider biodiversity strategically at the landscape scale and to embed ecological considerations from the earliest stages of planning. The findings emphasise that biodiversity should not be treated as a discrete issue, but as one shaped by land-use decisions, governance structures, and long-term management responsibilities.

Several recurring challenges were identified across different stages of the development process. These included the absence of strategic ecological planning at the zoning stage, the late involvement of ecological expertise in design, competing spatial demands within sites, and insufficient mechanisms for the long-term management of biodiversity features.

Participants also highlighted difficulties in demonstrating the value and co-benefits of biodiversity measures within the constraints of commercial viability and planning compliance. These findings align closely with the outcomes of WP1, indicating consistency across stakeholder perspectives.

Despite these barriers, participants identified a range of opportunities. These included enhanced cross-disciplinary collaboration, the application of the mitigation hierarchy from the outset, and the use of policy tools that more explicitly link biodiversity measures with planning compliance, particularly in urban contexts. Several interviewees stressed that meaningful change would depend not only on new policies or funding streams, but also on building a shared understanding of what nature-inclusive development entails in practice.

The findings reflect a wide range of perspectives, and at times, stakeholder viewpoints may appear contradictory. This is not a limitation of the research but rather a reflection of the different roles, responsibilities, and lived experiences of those involved. Divergences in opinion should be understood as valuable opportunities to explore practical challenges, encourage constructive dialogue, and build a more comprehensive understanding of how biodiversity is integrated into residential developments.

The following sections explore each of the six core themes in detail:

- Policy – planning and zoning
- Policy – design and delivery
- Long-term management
- Knowledge
- Finance
- Perceptions and people

2.1 Policy – Planning and Zoning

Zoning and development plan policy was consistently described by interview participants as a key factor shaping biodiversity outcomes in housing developments. Many felt that ecological considerations are rarely addressed at the point where they could have the most impact - during zoning and early land-use planning. Instead, biodiversity is often approached reactively, once land is already designated for development. One interviewee noted that *"there's no point coming to an ecologically rich four or five fields, tearing them apart, scraping up the soil and then putting in a rooftop garden. That's absolute nonsense."* Another participant outlined a preferred approach whereby *"at county development plan zoning stage, [we need to] strategically look at land banks, habitat connectivity, rivers, hedgerows, grasslands, all of that. And [say], okay, let us zone land for development while taking account of these areas."*

Several participants pointed out that the current zoning process tends to prioritise housing targets over ecological value and can lack consideration towards existing habitats or landscape-scale connectivity. This was attributed in part to a lack of strategic oversight and the erosion of local authority capacity over recent decades. One interviewee reflected, *"we made an error in stripping away so much of the capacity in local authorities,"* while another observed that, *"the current system where Local Authorities have been stripped out of the capacity to have oversight of any of this. It's developer-led and scattered, [which] limits the scope for joined-up thinking."*

A recurring concern was that the housing crisis and political pressure to deliver units have impacted the ability of planning authorities to make balanced decisions. As one participant put it, there is now *"almighty pressure to just build houses,"* which makes it more difficult to challenge inappropriate locations or designs on biodiversity grounds. Others added that biodiversity measures can be competing against new homes for space within sites. A recurring observation among multiple candidates was that the policy requirements for housing density are in direct conflict with the needs of biodiversity, and that it is not possible to allocate adequate, appropriate, and meaningful space for nature in a development while also complying with the housing development guidelines for planning. However, other participants challenged the narrative that density and biodiversity are incompatible. They argued that the real constraint lies in site design choices such as extensive surface car parking, and unit typologies rather than compact housing itself. One participant explained that reducing density in well-located sites may only displace units to greenfield areas of higher ecological value. Medium-density models were noted as examples of how compact housing can coexist with well-designed open space, SuDS, and ecological corridors. These models were described as more climate resilient, socially cohesive, and ecologically functional than current high-coverage, low density approaches.

It was noted that the public open space requirement can perform a dual function for biodiversity to some extent, however, these compromises, although well intentioned, may not have the best outcome for the end resident or for nature.

Hedgerows were used as an example where an existing ecological feature is retained in a development and results in a significant impact on the efficiency of the development layout. The true ecological benefit of this action was queried as interviewees stressed the importance of understanding the *"practical implications of development".* It was noted that following completion, the feature can become isolated, fragmented, and its context greatly altered as a result of the development such that it no longer functions as an ecological feature. Participants described hedgerows as *"the veins and capillaries of the landscape"* and emphasised their multiple roles in water retention, flood management, and ecological connectivity especially when integrated into a wider ecological network. Participants pointed to the UK's stronger hedgerow protection policies as a model that Ireland could emulate. Participants noted that ecologically functional space needs to be considered separate to amenity space, away from the impacts of human activity, disturbance, and artificial lighting.

The absence of coordinated ecological planning across local authority boundaries was also raised as a structural issue. Interviewees stressed that ecological networks and river catchments rarely align with administrative boundaries, yet policies are often applied inconsistently. As one respondent stated, *"you have to have the same policies overlapping between counties."* Local Area Plans (LAPs) were cited as particularly valuable where they clearly map ecological features and set retention objectives, but the consistency of this approach across Ireland is limited.

A further concern was that Ireland's current planning legislation often only requires ecological assessment at the level of Environmental Impact Assessment or Appropriate Assessment. As several participants noted, *"most developments slip through this net,"* leaving biodiversity unaddressed in many projects, particularly those of smaller scale. Pre-clearance of sites before planning applications was also raised as a widespread problem, with landowners or developers removing trees and hedgerows to avoid later constraints. This impacts the ecological assessment by giving a false negative impression of the baseline biodiversity value of the site. Interviewees suggested that planning authorities could use historic satellite imagery to identify such cases and require reinstatement of ecological features if they have been strategically removed.

There was broad agreement that a more strategic and evidence-based approach to zoning is required. This would mean integrating ecological mapping, habitat data, and connectivity analyses into county development plans to a greater degree before land is allocated for housing and zoned. It would also involve recognising the value of non-

designated sites, such as locally important biodiversity sites (LIBS), mature hedgerows and species-rich grasslands, which often fall outside current protection frameworks. As one participant summarised, *"before the land is zoned, it needs to be thought of structurally".* Many interviewees advocated for improving biodiversity to a greater degree *"at a spatial scale",* rather than piecemeal efforts on a site-by-site basis. While local authorities do have ecological network and green infrastructure strategies, as well as objectives for biodiversity, the overall feedback from participants was that these elements need to be strengthened to support consultants in ensuring high-quality measures are embedded in developments. One participant stated *"where policy is weak, we're stuffed. We've nothing. We've no carrot or stick … we can't do our job properly unless there is guidance there forcing us to tell a client that you can't do something. A client will max out their site with a number of units as dense as they can."*

Suggested Measures

- Integrate ecological spatial data and habitat connectivity mapping into county development plans and local area plans prior to zoning decisions.
- Establish a mechanism for identifying, recognising, and zoning locally important biodiversity sites (LIBS), particularly in peri-urban and rural fringe locations.
- Restore capacity within local authorities through greater resourcing of in-house planners and ecologists and the integration of regional shared services.
- Promote consistency in biodiversity policies and mapping approaches across county boundaries, particularly in urban, peri-urban, and commuter belt areas.
- Explore planning approaches that support an overall, landscape scale balance: allowing some sites to prioritise compact development and amenity spaces, while others are set aside for meaningful ecological protection and enhancement.
- Apply statutory development plan objectives for riparian buffer zones, hedgerows, and green infrastructure, supported by GIS-based planning tools (modelled on the UK's Magic Map).
- Prevent pre-clearance of sites by requiring planning authorities to check historic aerial imagery and reinstate features removed strategically prior to application (e.g., 5 years).
- Consider a consistency of biodiversity objectives in national policy which facilitate tiered coordinated actions spanning national, regional, county and local area plans.
- Mandate use of metrics similar to BNG or the Green Space Factor across housing developments and embed NbS requirements in public housing and regeneration funding streams to normalise best practice.

Relevant References

France 'Zone N': Under the French *Code de l'urbanisme* (Article R.151-24), the *Plan Local d'Urbanisme* (PLU) designates certain areas within a municipality as Zone N (*zone naturelle et forestière*). These zones cover both developed and undeveloped areas that require protection due to their ecological, historical, or aesthetic value, the presence of forestry operations, their function as natural or semi-natural spaces, or their role in natural hazard mitigation, such as flood risk management. Construction within Zone N is generally prohibited, with limited exceptions permitted for buildings or facilities strictly necessary for agricultural or forestry use, or for modest extensions to existing dwellings that do not compromise the ecological or landscape integrity of the area. Such developments are subject to regulatory review to ensure compatibility with conservation objectives. The Zone N designation forms part of the PLU's statutory zoning framework and is implemented through local land use plans and zoning maps, in accordance with national planning law.

Germany 'Biotope Areas': Under Germany's Federal Nature Conservation Act, there is a legal requirement to establish a national ecological network (Biotopverbund) that covers at least 10 % of the land area of each federal state. This biotope network must support long-term conservation of wild fauna and flora populations, their habitats, and ecological interactions. It must improve connectivity with the European Natura 2000 protected-area network, and is structured from core conservation areas, connecting habitats, and corridor elements such as riparian zones, hedges, and stepping-stone biotopes on agricultural land. This 10 % coverage obligation is embedded in national biodiversity planning, including the National Biodiversity Strategy, and is integral to the design of Germany's green infrastructure policy. It mandates that state and regional landscape planning must contribute toward achieving this biotope coverage target through local conservation measures and spatial planning instruments.

Netherlands 'National Ecological Network': Under Dutch biodiversity policy, the National Ecological Network (NEN) is a legally mandated ecological framework comprising both existing natural and semi-natural areas as well as designated restoration zones. Its primary purpose is to improve spatial connectivity between nature reserves and with adjacent agricultural land, and to integrate with the EU Natura 2000 network to safeguard habitats of species protected under the Habitats and Birds Directives. It was established in 1990 and since the early 2000s, responsibility for its planning, implementation, and monitoring has been transferred from the national government to the individual provinces. Each province is now responsible for managing the parts of the network within its territory. A key

regulatory principle based on the national spatial planning policy ("Nota Ruimte") is the "no, unless" regime which means that new development within NEN boundaries is prohibited unless it serves an overarching public interest and no alternative exists. The NEN is expected to be substantially completed by 2027, with continuous expansion and ecological restoration continuing alongside policy measures promoting agri-environmental stewardship on farmland.

2.2 Policy – Design and Delivery

Several participants described the design and delivery phase as the point at which many of the shortcomings of biodiversity integration become most visible. While ecological ambitions may be referenced in policy documents or project briefs, these are often undermined by late-stage decisions, poor coordination, or the constraints of site engineering and housing unit output. Biodiversity measures, if included, can become 'tick-box' additions or superficial enhancements rather than integral components of the design and development.

A central theme across the interviews was the need for ecological input from the very beginning of the design process. Participants noted that the ecologist needs to be at the table from start, and ideally pre-land acquisition stage. Others echoed this sentiment, pointing out that ecological advice tends to be more effective when incorporated upstream, at site selection and master planning stage, rather than as a mitigation exercise at a later stage. Interviewees also highlighted the value of multidisciplinary working at this stage, with ecologists, planners, landscape architects, drainage engineers, and project managers collaborating to interrogate designs and raise standards over time, rather than working in silos.

The importance of compliance and a systemic lack of enforcement were also highlighted during the interviews. Respondents described projects where hedgerows or mature vegetation were identified for retention in planning but were nonetheless cleared before construction for convenience. One participant commented, *"you often see all the hedges and trees removed for construction because it is easier,"* adding that Ireland lacks strong legislation and applied enforcement to prevent this. While tools such as BS5837 (the British Standard for trees in relation to design, demolition, and construction) are occasionally cited, they are rarely enforced in the Irish context. Others noted that supplementary planning guidance, where it exists, can make enforcement clearer, for example, specifying

buffer widths or tree replacement ratios, but in many areas these standards are absent or inconsistently applied.

The lack of alignment between policy ambitions and practical delivery was also a concern. While high-level commitments to biodiversity or climate resilience may appear in policy documents, these sometimes-arbitrary targets such as 'no net loss' or 'biodiversity net gain' do not always represent the reality on site. As one ecologist put it, *"I refuse to describe any of this as biodiversity net gain, because it isn't. What we are doing is maximising the long-term biodiversity and landscape value of zoned land which is being developed."* Several other ecologists echoed this sentiment stating that in most cases they feel it is not possible to deliver a residential project on a greenfield site without biodiversity loss. Metric tools such as BNG and the Urban Greening Factor were mentioned by a number of participants as being suitable for urban or brownfield sites but for peri-urban or rural sites they could become an over-simplification and detract from creating tangible biodiversity enhancement that works at landscape scale. It was noted that the BNG metric tool is subjective and can give a false impression of gain if not implemented correctly. It encourages the integration of small areas of high value habitat typologies to bring up the score, however this may not be the best solution from a broader landscape biodiversity value and habitat complexity standpoint. Other participants stressed that the effectiveness of such tools depends on clear guidance and consistent application.

As noted earlier, there was a broad consensus that site boundaries and spatial standards often constrain what is possible. In compact developments, the range of competing interests from parking and drainage to amenity provision leaves little space for biodiversity unless it has been prioritised from the outset. Some participants argued that focusing solely on what can be achieved within the red-line boundary is inadequate. As one interviewee put it, *"we have all of these sites, and we want to improve biodiversity. Well, we can't do that if we try and do a tiny bit on every site, but we can if we focus on areas where it's possible. And then in the areas where it's not possible, we maximise the new landscape design with blue and green roofs, with climate adaptive planting, and connections to the external world."* This underscores the need to reframe policy so that biodiversity is addressed not only at the individual site level, but also across a broader development, landholding, or county, with flexible spatial responses. Several interviewees referenced the mitigation hierarchy as a useful conceptual tool, avoiding impact first, then minimising and restoring, with compensation only as a last resort. Participants also recommended a *"water-first"* approach, where SuDS design is considered early and layered with ecological corridors and active travel strategies to inform master planning layouts and create multifunctional spaces and efficiencies in land use.

From a practical site-level design perspective, participants offered a range of best practice recommendations for integrating biodiversity measures into new residential developments. Central to these suggestions was the emphasis on high-quality design and the efficient use of land through multi-functional, or "stacked," spatial planning. Retaining existing ecological features such as hedgerows, mature trees, and wetland areas was strongly encouraged, along with providing adequate buffer zones to protect their integrity. Participants advocated for positioning amenity spaces adjacent to but not within these ecological areas, enabling co-benefits for people and nature without compromising habitat value.

Tree planting along all roadways was identified as a valuable measure supporting both biodiversity and climate resilience. Participants also highlighted the importance of designing with intention, for target species, noting that even small-scale features such as sandbanks, can provide high ecological value when used by multiple species, such as ground-nesting birds and solitary bees.

Integrating artificial habitat features into the landscape or the built environment (e.g., nest boxes, roost cavities) was recognised as beneficial when implemented thoughtfully. However, the creation of natural, self-sustaining habitats that species can occupy autonomously remains a more meaningful and resilient strategy. Participants cautioned that artificial features are not true biodiversity mitigation unless they are occupied and regularly used by target species, and their effectiveness can vary considerably. Swift boxes, for example, were cited as quite a successful intervention within the building fabric. UK examples were also referenced, where major housebuilders have adopted internal biodiversity standards (e.g. mandatory bee bricks in all new homes), demonstrating how organisational policies can normalise ecological features as standard practice.

Several participants proposed that public buildings and publicly managed land such as schools and community centres should serve as exemplars for biodiversity integration, incorporating broadscale best practice measures into the site as well as features such as nest bricks or bat roosts directly into the building fabric. This approach was seen as a means to overcome potential resistance or uncertainty from private homeowners and developers, providing a visible 'show and tell' demonstration of ecological functionality within the built environment.

While additional biodiversity-friendly measures such as hedgehog passes in fencing or native tree planting in private gardens were welcomed, concerns were raised about the risk of unintentional greenwashing. It was noted that without enforcement or long-term management plans, these features may not be retained or maintained by homeowners once developments are occupied, undermining their intended ecological value. Participants therefore stressed the importance of using public land and state-funded

housing and regeneration projects, where outputs can be measured and lessons shared across the sector.

Overall, participants emphasised that successful biodiversity integration in housing developments depends not only on the inclusion of habitat features, but on thoughtful design, long-term functionality, and meaningful implementation across both public and private realms.

Suggested Measures

- Require the mitigation hierarchy to be applied from the outset of project development, beginning at site acquisition and concept design stage.
- Ensure ecologists are embedded as core members of multidisciplinary teams, with input during feasibility, layout planning, and construction design.
- Provide policy mechanisms that allow biodiversity objectives to be met across a portfolio of sites, rather than being constrained by the limitations of individual parcels.
- Adopt measurable tools such as Urban Greening Factors or Biodiversity Metrics to ensure biodiversity is not overlooked during the design approval process, particularly in urban and brownfield sites. Consider a more qualitative approach in peri-urban and rural areas.
- Support design policies that enable multifunctional land use e.g. combining flood management, access, recreation, and biodiversity within shared spaces, while being mindful to retain buffer zones to ecological features.
- Integrate artificial habitat features and design solutions into developments and the building fabric but ensure that these are managed and monitored long term for meaningful biodiversity outcomes.
- Embed “water-first” SuDS design into masterplanning, linking drainage to ecological corridors and active travel routes.
- Use state-funded housing and regeneration projects as exemplars of best practice, setting standards for the private sector.
- Provide consistent national guidance on boundary treatments, buffers, and biodiversity standards, backed by enforcement capacity within local authorities.

Relevant References

Berlin 'Biotope Area Factor' (BAF): The Biotope Area Factor (BAF), is a legally enforced ecological indicator within Berlin's Landscape Programme. It requires that new building developments retain a minimum proportion of ecologically effective surface area (such as green roofs, courtyards, permeable paving, and vegetated façades) relative to the total site area. It mandates clear but flexible green-space targets, allowing developers, architects, and urban designers to select between different green infrastructure options (e.g., extensive roof greening weighted at 0.5 per m^2, green walls weighted at 0.5–0.7, vegetation connected to soil at 1.0). The target values vary by land use: for example, a BAF of 0.6 is required for residential plots, while 0.3 applies to commercial and administrative use. The underlying objectives of the BAF include enhancing urban microclimate regulation, improving stormwater infiltration and runoff control, supporting urban biodiversity, and enhancing overall residential environmental quality. Although binding BAF requirements currently apply only within around 5 % of the city covered by specific landscape plans, the instrument is widely used as a voluntary guideline beyond these areas and has influenced green planning in at least 15 districts to date.

London 'Urban Greening Factor' (UGF): The Urban Greening Factor (UGF) is a planning tool, intended to ensure that major new development proposals integrate substantial urban greening from the earliest stages of design. It requires developers and design teams to calculate a weighted greening score based on surface-cover types such as trees in natural soil, green roofs, green walls, SuDS features, planted areas, and paved surfaces. Each type is assigned a factor between 0 (impermeable surface) and 1 (semi-natural vegetation or water); and these are considered together to provide an overall score. The UGF encourages high-quality, multifunctional green infrastructure that contributes to climate resilience, biodiversity, water management, and amenity value. It is designed to be flexible, allowing developers to choose suitable green elements, as long as the total meets or exceeds the required UGF threshold.

Utrecht 'Green City Accord': The City of Utrecht, has committed to adding 75 m^2 of green space per household, aiming for a minimum of 40% green coverage in every neighbourhood. These quantitative targets are designed to maintain and enhance access

to greenery even as the city densifies and grows significantly by 2040. In addition, Utrecht's planning policy integrates species-appropriate design principles, ensuring green infrastructure delivers ecological functionality for urban wildlife such as pollinators, birds, bats, amphibians, and other key groups identified in the city's biodiversity indicators, thus supporting both human health and habitat needs. The policy is embedded in city-wide spatial planning (RSU 2040), which includes a commitment to create 440 hectares of new green space and plant 60,000 additional trees, and requires that all urban development respects the 75 m^2 and 40% thresholds.

England 'Green Infrastructure Framework': The Green Infrastructure Framework, established under the UK Government's 25 Year Environment Plan, is led by Natural England and provides a national reference for local planners, developers, parks and greenspace managers, and communities. It defines what good green infrastructure looks like by presenting core principles, standards, a design guide, and case studies to support high-quality GI planning and delivery across England. The framework sets an aspirational target of achieving approximately 40 % green cover in urban residential areas, meaning green or blue spaces, street trees, green roofs, SuDS features, and connected vegetation should comprise around 40 % of surface area in new major developments. It also introduces a mapping tool to help assess existing GI provision relative to local demographic, health, and environmental data, supporting equity-based targeting and prioritisation of under-provisioned areas. The GIF is integrated into planning policy via the National Planning Policy Framework (NPPF) and the Biodiversity Net Gain requirement under the Environment Act 2021. It contains five headline standards: Accessible Greenspace, Urban Tree Canopy, Urban Nature Recovery, Urban Greening Factor, and GI Strategy, which serve as both metrics and design intent to deliver multiple benefits for biodiversity, public health, climate resilience, and social equity.

2.3 Long-Term Management

Interview participants emphasised that long-term management is one of the most overlooked aspects of biodiversity integration in housing developments. While planning applications may include landscaping schemes or ecological enhancement measures, there is often a lack of clarity and accountability regarding how these features will be maintained, monitored, and adapted over time, particularly in the years following initial implementation. Without appropriate resourcing, governance, or oversight, responsibility for these features may be transferred in ways that lead to neglect or inappropriate management. As a result, biodiversity value can steadily decline. Participants noted that this deterioration often goes unnoticed, as there is an assumption that developments and their associated management practices, remain consistent with what was approved during the planning process. In reality, the site conditions five, ten, or fifteen years post-completion can differ significantly from the designs and reports which were originally

submitted, and they often fall short of their intended ecological function. Ecologists noted they may be involved in the short-term post-completion, up to one year, but typically they are not involved on a site after that.

In illustrating this point, several participants pointed to structural weaknesses in how responsibilities are defined and enforced. In many cases, features such as retained hedgerows, constructed wetlands, or green infrastructure are included in planning conditions but fall into uncertainty once the development is completed. One participant observed, *"after construction, say if they have retained vegetation, landscaping is wildlife friendly, retained water, bat boxes, bird boxes, sandbanks… we need to ensure that it is maintained, and that comes over to the council for enforcement or monitoring."* However, weak enforcement frameworks and unclear ownership often result in these features being neglected or removed. This uncertainty is compounded in cases where management responsibilities shift from developers to local authorities, residents' associations, or private management companies. As one interviewee noted, *"the ownership may change… go to the local authority or may go to a pension fund. Who has ownership over the decisions at that stage?"* The absence of defined funding mechanisms or maintenance plans can undermine even well-intentioned designs, and they are dependent on the capacity of the management body itself. In terms of long-term monitoring through local authorities, it was noted that many local authority biodiversity officers are on short-term contracts and already under *"huge pressure"* with insufficient resources.

Within housing developments, the ownership and responsibility for management of communal space typically falls to one of three parties: the local authority, the residents, or a private management company. Often, within the same development, ownership and responsibility will fall across a combination of these parties, and all parties may also employ private subcontractors to carry out maintenance. It is a complex system, and this is not always considered in management plans or enforcement frameworks. Participants warned that where private management companies are involved, biodiversity features can be deprioritised if they are perceived as risks or as additional maintenance costs to residents, reinforcing the need for binding frameworks rather than voluntary practice.

Some participants highlighted the benefits of formalised maintenance frameworks but were cautious about the practical application of these. Referencing UK examples, one noted the value of *"a clear management plan and a clear review period of 5, 10, 15, 30 years."* However, a legal framework assigning responsibility and an active enforcement structure was noted as being critical to success. Once the developer hands over the project, they relinquish their legal interest in the land, therefore the responsibility and liability for management must transfer formally to another party. Furthermore, an independent body, such as the local authority, must have the power to inspect and enforce compliance. One participant also suggested that a national portfolio of monitored Irish projects should be

developed to track performance and resourcing needs over time, enabling practitioners to learn from real maintenance costs and outcomes rather than assumptions.

Interviewees repeatedly highlighted a lack of coordination between different departments within local authorities. While planning, parks, and biodiversity teams were generally promoting the use of nature-based solutions (NbS), challenges often emerged during the handover and long-term management of these features. Responsibility for maintaining green infrastructure can vary between local authorities, commonly falling to parks divisions, but in some cases to roads or other operational teams. This can lead to inconsistencies in oversight and delivery. It was emphasised that these management teams require adequate resources, finance, training, and support to effectively maintain NbS features. Managing such infrastructure often represents a shift from traditional practices, requiring new knowledge, specialist equipment, and in some cases, greater time inputs. One participant illustrated this with the example of drainage. They described how traditional systems might rely on a single, centralised attenuation tank, whereas NbS approaches often involve a network of smaller interventions such as swales, bioretention areas, or tree pits, which collectively demand more dispersed and intensive maintenance. This increase in complexity and workload must be anticipated and incorporated into long-term planning and resourcing frameworks from the outset. Others observed that these hidden costs are rarely compared with the costs of maintaining conventional grey infrastructure, noting, for example, that emptying a single underground attenuation tank can cost up to €100,000. Overall, the participants emphasised the importance of consistency from local authorities when taking developments in charge. It was noted that the guidelines differ across differ authorities and in many instances the taking in charge guidelines contradict the development plan recommendations. Examples such as permeable paving, natural meadows, and lighting specifications were noted. The recommendation was for consistency nationwide and for local authorities to collaborate and share knowledge to align the policies.

An emphasis on the importance of early-stage planning for maintenance was noted as a key element in improving outcomes in the future. Participants noted that biodiversity features should be selected not only for their ecological value, but also for their long-term viability, and management is a key component of this. One respondent remarked that *"when you approach the long-term maintenance for NbS, approach it in exactly the same way as you do for the project management and maintenance of traditional infrastructure"*. They noted that while NbS can be more dynamic, less visible, and have more landowners than traditional infrastructure, it still *"has exactly the same basic project management, and maintenance requirements of traditional infrastructure, and needs the rigour of a proper infrastructure maintenance programme and rigour or understanding [of] who owns it, who is responsible for it, what failure is, what long term replacement is, etc"*

Suggested Measures

- Require all developments to include long-term biodiversity management plans, specifying the ownership, responsibility, funding mechanisms, and monitoring requirements for all biodiversity elements, habitats, and species.
- Strengthen enforcement of planning conditions relating to ecological features, with regular monitoring and public accountability.
- Establish or assign responsibility for inspection and enforcement of conditions, management regimes, and biodiversity features to a third party – either the local authority or a new entity.
- Incorporate biodiversity as a consideration into existing estate management structures, with clear roles for local authorities, residents' associations, or third-party management.
- Encourage early planting and ecological establishment in phased or multi-year developments to deliver early benefits and build community support.
- Provide guidance and training to those responsible for maintaining semi-natural habitats.
- Ensure adequate support and resourcing in line with workload, for local authority departments responsible for managing biodiversity elements.
- Standardise taking in charge requirements across local authorities and ensure they are in line with development plan objectives.
- Develop a monitored portfolio of Irish NbS projects to build an evidence base on lifecycle performance and costs.
- Compare the full cost of NbS maintenance with conventional grey infrastructure to demonstrate long-term value and inform funding models.

Relevant References

Utrecht Biodiversity Monitoring: The municipality of Utrecht monitors urban biodiversity using a "Utrechtse 30" indicator set, comprising 30 characteristic species selected in 2021 to reflect the effects of spatial policy and green management practices across diverse habitat types (forest, water, grassland, built, etc.). Trends for the house sparrow (*Passer domesticus*), common swift (*Apus apus*), and common pipistrelle bat (*Pipistrellus pipistrellus*) are reported annually, alongside additional species including fungi, red squirrel, badger, natterjack toad, rabbit, otter, and damselflies. The monitoring programme

aligns with the Urban Species Monitoring Scheme policy in the Netherlands, and while not all species are monitored annually due to resource constraints, the annual sustainability report details the data trends for all recently monitored species. Where species are associated with new construction, such as swifts, house sparrows, and common pipistrelle bats, developers are required to incorporate specific design measure targeting these species and the municipality is required by the provincial Species Management Plan (SMP) and environmental zoning permission to monitor the success of these measures and the use of nesting or roosting sites. An SMP registration system will be acquired in 2025 to systematically record and track all newly created habitats for these species

London Green Teams: Groundwork London's Green Teams are paid horticultural training programmes for individuals who are not in employment or education, providing them with accredited, work-based training in grounds maintenance and landscaping. Participants gain a City & Guilds Level 1 Certificate in Practical Horticulture Skills while working on live contracts, supported by mentoring and guidance. As part of the EU-funded *LIFE Housing Landscapes* project, Green Teams were deployed to implement and maintain nature-based solutions (NbS) across three social housing estates in Hammersmith and Fulham. This included construction and upkeep of sustainable drainage systems (SuDS), climate-adaptive planting schemes, and other green infrastructure features designed to support urban climate resilience.

Scotland SUDs Features: The Water Environment & Water Services (Scotland) Act 2003 (WEWS) legally formalised Sustainable Drainage Systems (SuDS) in Scottish legislation and made Scottish Water the statutory drainage authority for qualifying SuDS infrastructure. Under WEWS, SuDS systems can be adopted ("vested") by Scottish Water if they comply with the technical criteria set out in statutory design standards. Scottish Water has a duty to maintain and carry out capital replacement of vested, public SUDs. Developers, local authorities, Scottish Water, and SEPA (Scottish Environmental Protection Agency) must collaborate during the design and planning stages to clarify ownership, operational and maintenance obligations, and to ensure sustainable treatment and flow control through appropriate SuDS design and long-term stewardship agreements.

2.4 Knowledge

A recurring theme across interviews was the need to improve ecological literacy, not only within the planning system, but also across the wider development sector. While ecological knowledge exists within local authorities and consultancies, it is often deployed too late in

the process to influence outcomes. Several participants highlighted the mismatch between ecological advice and the decision-making structures in which it is situated.

One interviewee explained that *"the knowledge and skills are there... but what happens is that the ecologists are consulted too late in the process. So, it's already designed, and there's not the time given to it."* This was noted as being particularly relevant on smaller projects. Another reflected that, in some cases, ecological input is seen as a risk to budgets or timelines, and that consultants, especially when they are engaged late in the design process, have to deal with the many competing interests: *"it's very difficult when you're employed by someone who… want[s] you to keep the mitigation measures to an absolute minimum."* Participants also described how this problem is compounded by the lack of ecological expertise within local authorities themselves, with many councils having no full-time ecologist, or only temporary posts, leaving decisions to planners without the necessary specialist knowledge.

Participants noted the importance of shared understanding across disciplines. One remarked that we *"need to make sure that we communicate in the same language about what stuff actually means on the ground."* This applies not only to technical terminology but also to framing biodiversity measures in terms that resonate with all stakeholders including developers, designers, finance teams, and end users. One respondent described how *"a nature-based solution to an architect [might be] a trench filled with pebbles just to take some of the runoff,"* illustrating the gap between the original environmental and ecological intention and the design interpretation. Interviewees emphasised that these misunderstandings are often not deliberate but arise from inconsistent internal policies and siloed training, for example, drainage engineers, architects, and ecologists each approaching the same feature with different assumptions and priorities.

There was strong support for improved training and knowledge sharing, both at third level and within professional practice. It was suggested that *"industry is ahead of the education system"* when it comes to biodiversity. One interviewee pointed out that *"a lot of architects aren't properly trained in college"* while another suggested that short, informal sessions led by ecologists could help other team members understand and engage with the principles of biodiversity measures earlier and more confidently. Rather than waiting until a critical decision is at stake, the knowledge can be shared in a more relaxed environment. It was noted that all team members from designers to finance teams would benefit from a basic understanding of the principles of planning and designing for biodiversity enhancement, and that this would help to scale up positive outcomes for biodiversity by increasing awareness and understanding of the design and spatial requirements. One participant proposed that public sector capital projects should lead by example in embedding biodiversity literacy across multidisciplinary teams, using them as training grounds and demonstrators for private sector practice. Several participants also noted the importance of building political and public literacy around biodiversity. They argued that

misconceptions, such as the belief that nature-based solutions are incompatible with compact development, persist largely because of poor communication, and that showcasing demonstration projects, using clear metrics such as the Green Space Factor, and creating accessible GIS tools could help make ecological principles more visible and relatable.

Suggested Measures

- Introduce cross-disciplinary training modules on biodiversity and ecological design for planning, architecture, engineering, and development professionals.
- Support and mandate early-stage engagement between ecologists and design teams to build trust, shared language, and collaborative approaches.
- Provide and effectively disseminate resources and guidance to help translate ecological objectives into practical design solutions.
- Invest in continued professional development for local authority planners and enforcement officers on biodiversity-related planning tools and legislation.
- Promote case studies and pilot projects that demonstrate effective cross-disciplinary practice, and good outcomes.
- Create a centralised knowledge base for best-practice approaches.
- Resource all local authorities with in-house ecologists and strategic drainage personnel to provide consistent expertise at decision-making stage.
- Use public sector housing and regeneration projects as exemplars of biodiversity literacy and training opportunities for multidisciplinary teams.
- Develop communication tools (metrics, maps, demonstration sites) that make biodiversity concepts clear and relatable for non-specialists, elected members, and the public.

2.5 Finance

Financial concerns were acknowledged by most participants as a significant, but not insurmountable barrier to biodiversity integration. Several noted that while there is growing interest in nature-based approaches, this can become compromised when perceived to be in conflict with cost efficiency or housing delivery targets. The investment in biodiversity measures alone is generally acceptable, however, when it impacts the delivery of housing numbers it can become challenging. It was also noted that better ecological design does not necessarily increase costs, it simply requires early-stage consideration and a different perspective in approaching the overall project. Participants working with SuDS highlighted this specifically, noting that when drainage is considered early and designed as multifunctional green space, costs are often lower than conventional underground tanks.

There was consensus that robust evidence would help to scale-up the integration of biodiversity measures in housing developments. While it is understood by many that house values increase on a mature development site with lots of natural vegetation and biodiversity, proof is needed to make the case more robust. Furthermore, recognising the co-benefits of nature-based solutions was also stated as being key to ensuring economic backing, and quantitative evidence of these co-benefits is also required. Several participants argued the need for cost-benefit analysis of biodiversity measures to reflect their true economic contribution across all ecosystem services and climate resilience impacts. Documenting these broad value streams clearly and in economic terms was noted as being key to unlocking greater financial investment from wider sources. They noted that the cost of implementing and maintain these features typically falls to a small number of stakeholders and departments however, *"the value is in air quality, natural flood management, transport, health, biodiversity. None of whom pay for it."* If the true, broad-spectrum economic benefits are not recognised, and the expense justified or shared, biodiversity remains vulnerable to value engineering. This point was also noted in terms of maintenance. Participants stated that demonstrating economic and time savings for maintenance needs would be the most impactful in terms of incentivising change.

Some interviewees proposed targeted financial mechanisms to support nature-inclusive development, such as tax incentives for developers or homebuyers when a development project meets certain biodiversity thresholds. Others suggested embedding biodiversity criteria directly into existing public funding streams (e.g. Urban Regeneration and Development Fund, capital housing programmes, NTA active travel) so that projects must meet clear NbS standards to qualify, thereby normalising best practice rather than treating it as an optional extra.

Suggested Measures

- Support development of standardised economic metrics to quantify the benefits of biodiversity integration in terms of ecosystem services, asset value, and reduced maintenance costs.
- Promote green financing tools that reward developers or homebuyers for achieving ecological outcomes.
- Provide fiscal incentives or streamlined approvals processes for developments that meet defined biodiversity performance thresholds.
- Commission independent cost–benefit analysis studies comparing conventional and nature-inclusive developments in an Irish context.
- Encourage land valuation approaches that account for existing ecological value and future amenity or resilience benefits.
- Embed biodiversity criteria into existing state funding streams (e.g. URDF, housing capital programmes) to normalise nature-based standards across the sector.
- Develop comparative lifecycle costings of grey vs nature-based drainage and green infrastructure to demonstrate long-term savings.

2.6 Perceptions and People

Several participants emphasised the need to reframe biodiversity as an asset and take a 'positive planning' approach both socially and economically. This means not only quantifying the value of a nature-led approach but also demonstrating its everyday benefits to people. One interviewee described the importance of *"real benefits to the landscape and real benefits to the actual community when they move in, you need to have a sense of maturity of establishment… birds singing in your environment… the benefits of passive recreation."* It is critical for long term outcomes and the wellbeing of residents that we don't just build houses, we create places that offer contact with nature, and visual interest. Others spoke of the need to *"celebrate what we have,"* and promote positive case studies to shift the conversation away from biodiversity as an obstacle. Participants suggested that marketing

and communications could play a greater role here, with one emphasising the need to *"make low-rise medium-density nature-led developments appealing and challenge public perception of what is an attractive and aspirational home and home environment"*.

The role of lived experience and peer-to-peer learning was also highlighted. One respondent suggested that exemplar projects, especially those with active residents and visible biodiversity features, could be powerful in building public support. *"If they can hear from their peers, it definitely has a huge impact."* Another stressed the importance of communication, noting that many objections stem from unfamiliarity: *"you need to reassure the developers… reassure the homeowners that their day-to-day won't be impacted negatively, it will be impacted positively."* Participants noted that making biodiversity relatable to everyday quality of life, such as cleaner air, shade in heatwaves, or safer play spaces, can help build grassroots support and political will.

There was also recognition that policy and technical arguments alone are not always persuasive. Effective engagement depends on understanding who is making decisions, what influences them, and how success is perceived. This informs targeted approaches which align with and meet the needs of stakeholders. As one participant put it, *"it's back down to again, who are your stakeholders, who you're influencing, and what they see as success."* For example, success in a community context may be recreational or flood protection measures, not return on investment. To ensure universal buy in and enthusiasm, all perceptions of success must be considered and integrated, allowing a natural landscape approach to be seen as an overall positive rather than a mandate, or a constraint. It was also noted that nature-based solutions should not be seen in opposition to engineering solutions. Often the best approach combines a nature-based and an engineering approach. This can also be more effective at meeting the needs and concerns of stakeholders, as one interviewee noted *"you've got to give the right persons the incentive to go along with your decision … If I'm getting flooded, I'd like a wall built right now. I don't want to wait for 400 acres of trees to go in 20 miles up the river".* NbS can support and compliment traditional infrastructure approaches, as a type of 'insurance policy'.

Suggested Measures

- Promote public-facing case studies of successful nature-inclusive developments, highlighting resident experiences, ecological outcomes, and visual quality.
- Engage directly with developers, architects, and community stakeholders to build confidence in biodiversity measures and demonstrate their practical value.
- Encourage the inclusion of biodiversity narratives in public communications around housing, such as marketing materials, property features, and local media.
- Support knowledge exchange between projects and across sectors through peer learning, site visits, and knowledge-sharing platforms.
- Develop clear, evidence-based messages that link biodiversity to public health, climate adaptation, and community wellbeing.
- Use public sector housing and regeneration projects to demonstrate biodiversity benefits visibly and accessibly, helping to shift public and political perceptions.
- Challenge misconceptions around density and biodiversity through exemplar projects, showing how nature-led design can enhance compact development models.

3 Conclusions

The findings of this research suggest a disconnect between the aspirations of biodiversity targets and policy and the realities of housing delivery in Ireland. Although there is clear professional commitment and policy effort to improve ecological outcomes, the findings suggest that the planning and development system as currently structured does not go far enough to support or promote meaningful nature-led approaches. Interview participants described biodiversity as frequently marginalised in decision-making, consulted too late, treated as a compliance issue, or displaced by other priorities. Yet they also shared examples of where biodiversity has been successfully embedded: in projects where ecologists were involved from the outset, where land was master planned strategically, or where multifunctional spaces were designed to deliver tangible benefits for both people and nature. Examples referenced included low-rise, medium-density schemes where space was freed up for high-quality SuDS and ecological corridors, and public housing projects that acted as early demonstrators of best practice.

The six themes explored in this report, planning and zoning, design and delivery, long-term management, knowledge, finance, and perceptions, are interdependent. Policy changes alone will not be sufficient without corresponding shifts in professional practice, funding mechanisms, public understanding, and enforcement. Equally, local good practice cannot deliver system-wide change without national coordination and policy support. In this context, improving biodiversity outcomes in housing will require both technical adjustments and cultural shifts. It means enabling local authorities to plan more strategically, empowering design teams to take integrated approaches, and ensuring that biodiversity is no longer seen as peripheral or expendable. It also requires resourcing: dedicated ecologists and broader strategic staff in all local authorities, alongside guidance and training that equip both public and private sector actors to deliver and maintain nature-based solutions over the long term.

Overall, the findings highlight the complexity of the systems, stakeholder relationships, and competing priorities involved in housing delivery. A recurring theme throughout the interviews was the disconnect between written policy aspirations and the reality of what is

delivered in practice and in the long-term post development. It is critical to acknowledge this gap, and to use experienced stakeholder insights to inform future policies and action steps going forward. Meaningful progress will depend on closing this gap through pragmatic, well-informed measures that respond to the conditions on the ground, and work with the realities of development processes, site constraints, and organisational capacity. This includes designing and aligning policy with implementation pathways in mind and embedding ecological objectives from the earliest stages of planning and design. Participants stressed that this should include clear, enforceable standards, such as riparian buffers, hedgerow protection, or biodiversity metric frameworks, backed by mechanisms to prevent pre-clearance and ensure long-term management responsibility is defined. There is also scope to embed biodiversity criteria into mainstream housing and regeneration funding streams, ensuring that nature-inclusive approaches become the norm rather than the exception.

Importantly, the research also points to significant opportunities. With the right frameworks in place, including early engagement, strategic planning, and clear long-term management structures, Ireland is well positioned to deliver housing that enhances, rather than compromises, biodiversity. Such developments can also provide a range of wider societal benefits, including improved wellbeing, climate resilience, and enhanced landscape quality. There is substantial potential within Ireland's planning system, policy environment, and professional networks to establish nature-inclusive development as a mainstream approach.

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[1].

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

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

quality, enhances biodiversity, and offers recreational and well-being opportunities for communities [2].

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.[3]

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[4].

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

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

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

Appendix

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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