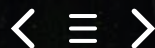




NATURE POSITIVE AND NET ZERO: THE ECOLOGY OF REAL ESTATE



**Urban Land
Institute**



ABOUT ULI

The Urban Land Institute is a global, member-driven organization comprising more than 45,000 real estate and urban development professionals dedicated to advancing the Institute's mission to shape the future of the built environment for transformative impact in communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 80 countries.

More information is available at uli.org. Follow ULI on [Twitter](#), [Facebook](#), [LinkedIn](#), and [Instagram](#).

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ABOUT ULI GREENPRINT

The ULI Greenprint Center for Building Performance is a research organization focused on climate mitigation and makes the business case for green buildings by tying carbon reductions to increased asset value. ULI Greenprint also includes a worldwide membership alliance of leading real estate owners and developers committed to improving the environmental performance of the global real estate industry, striving to reduce greenhouse gas emissions by 50 percent by 2030, and achieving net zero carbon operations by 2050. ULI Greenprint is organized within the ULI Randall Lewis Center for Sustainability in Real Estate, which also oversees the Urban Resilience Program and the Building Healthy Places initiative.

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ABOUT THIS REPORT

According to the World Economic Forum, half of global gross domestic product, or \$44 trillion of economic value, is highly or moderately dependent on nature for the services it provides. In addition, the world is currently undergoing the Sixth Great Extinction, with a 68 percent reduction in wildlife populations since 1970 and another 1 million species at risk of extinction in the coming decades.

The climate crisis and biodiversity loss are deeply interlinked. As the world accelerates toward net zero, nature-based solutions are poised to provide up to 30 percent of the necessary emissions reductions. The recent U.N. Climate Conference, COP26, brought these two ideas together, with many organizations pledging to preserve land and use nature-based solutions to create a regenerative environment.

The real estate industry has a large impact on land use both within and outside urban environments but has not often considered biodiversity or ecosystem services as part of its business or climate strategy. However, restoring and preserving natural systems are key to resilient and sustainable real estate, protecting material supply chains and preserving building value, while also achieving ambitious net zero carbon goals.

The goal of this report is to highlight key global market drivers for developers and owners to preserve and enhance biodiversity in development as part of their overall climate strategy as well as to educate owners and developers on best practices for implementing nature positive solutions at multiple scales.



Look Up Look Down Photography (Unsplash)

INTRODUCTION

“We need to look at climate, biodiversity, and land degradation as a threefold crisis. We can’t look at them separately because the solutions are also connected.”

—Elizabeth Maruma Mrema, executive secretary of the U.N. Convention on Biological Diversity and co-chair of the Taskforce on Nature-related Financial Disclosures (TNFD)

The 1992 U.N. Convention on Biological Diversity defines biodiversity as “the variability among living organisms from all sources, including, among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” This biodiversity is not just organisms one can see, but a complex web, including species such as soil microorganisms. Biodiversity is one of many ecosystem services, which are the positive benefits—both small and large—that nature provides to humans.

The loss of biodiversity is an indicator of overall decline of ecosystem services that humans and businesses depend on, including air filtration, pollination, flood protection, and climate regulation/carbon storage.

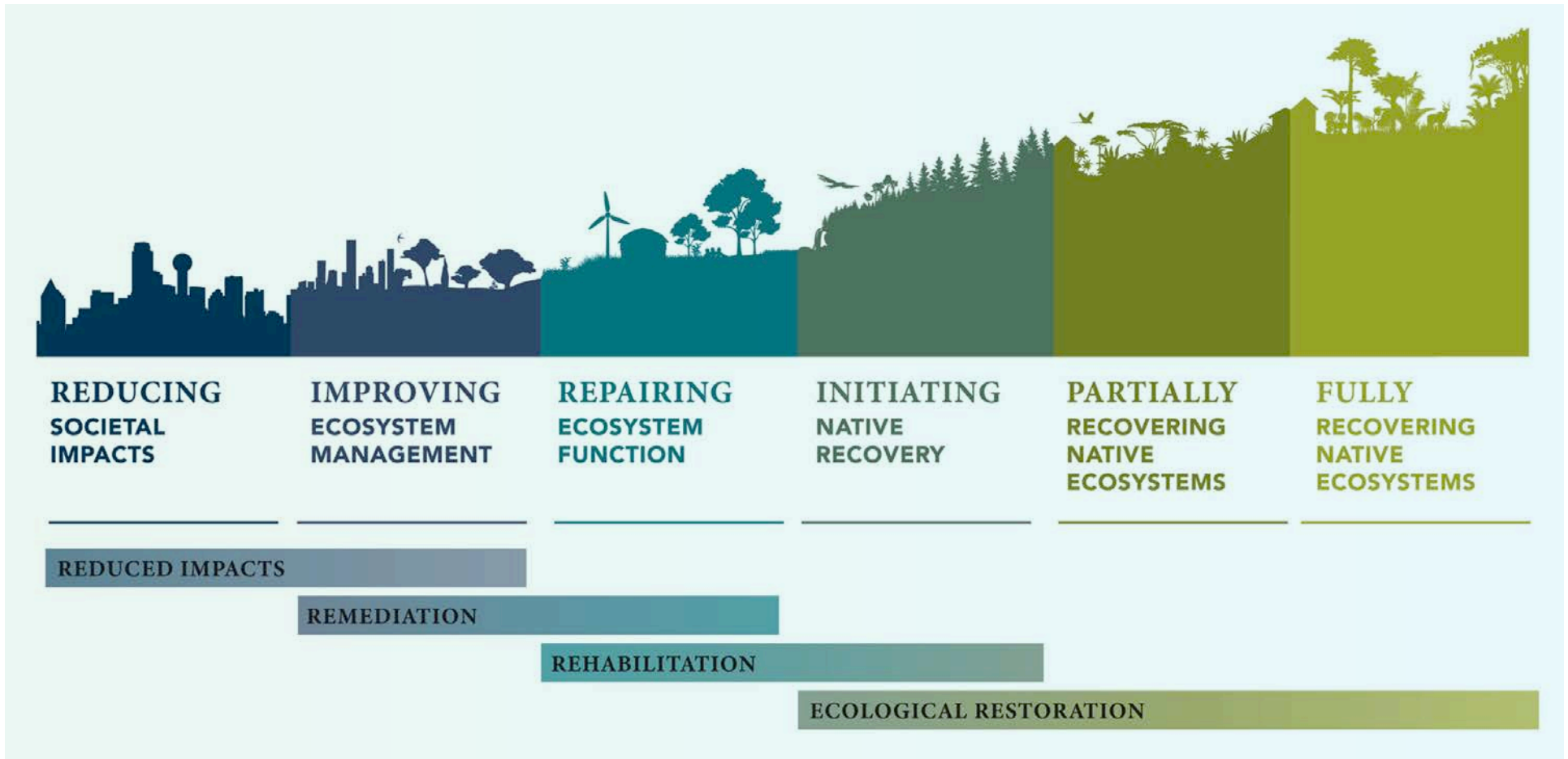
These natural assets have not been managed sustainably; as noted in the United Kingdom’s report *The Economics of Biodiversity: The Dasgupta Review*, while human-produced capital per person increased by 13 percent globally, stock of natural capital per person declined by 40 percent between 1992 and 2014. The primary drivers of biodiversity loss are the following:

- **Change in land use or sea use;**
- **Invasive species;**
- **Pollution;**
- **Climate change; and**
- **The direct exploitation of organisms.**

Real estate plays a role in this biodiversity loss, particularly through changes in land use, unsustainable sourcing of a wide array of building materials, and contributions to climate change. Recognizing these impacts, leading real estate owners and developers have begun incorporating nature-positive principles into their design, operations, and portfolio management strategies.

Nature-positive activities can range from reducing impacts on biodiversity to fully recovering native ecosystems as shown in the figure below. Real estate can strive to reach the highest level of nature restoration possible, while recognizing that activities at all points on this spectrum can contribute to optimizing ecological and social outcomes.

THE RESTORATIVE CONTINUUM



Source: [The Society for Ecological Restoration](#), from SER's International Principles & Standards for the Practice of Ecological Restoration.

Restoration activities range from reducing societal impacts on nature to fully recovering native ecosystems. Each level of activity on the continuum can play an important role in nature-positive real estate.



Adopting a nature-positive outlook is important for developers in all regions of the world, because even those in urban locations can make meaningful contributions to urban nature and have an opportunity to engage tenants and the broader community on the topic of biodiversity by helping people feel more connected to the environment. Urban areas have more than doubled since 1992, contributing to a decline in biodiversity, so a large opportunity exists for real estate in the built-up urban areas to reverse these changes.

“As we see with heat waves in the U.K. and across Europe, the extremities of climate risk and biodiversity loss are seen in cities in many ways, including the urban heat island effect, a lack of access to nature, poor air quality, physical and mental health. The solution is living and working alongside nature, whether in rural or urban environments, using nature-based solutions in cities to ensure humans are healthy and happy and starting to reverse catastrophic decline we’re seeing.”

—Tor Burrows, Grosvenor

WHAT DOES NATURE-POSITIVE DEVELOPMENT MEAN?

A nature-positive perspective is not just about conserving existing biodiversity in land use planning and development but is also seeking to enhance or restore natural functions and species richness to a site.

Nature-positive development in its fullest expression would ensure that any given development is as ecologically functional “as the wildlands next door” in supporting local species and their ecosystem needs, according to Nicole Miller, managing director of the bio-inspired consultancy Biomimicry 3.8. “Nature is our only successful model for regenerative impact.”

“Nature works in gradients: gradients of water, light, nutrients, temperature, among others, and something that nature does perfectly well is to fill voids. Wherever there’s a space, nature will take it. Every single part and piece in the core of the biggest city in the world has an opportunity to recover some functionality and wildlife. Every little intentional patch forms a matrix that together creates connectivity.”

—Juan Rovalo, Jacobs

Urban environments have often been dismissed as places bereft of nature or environmental processes worth preserving or restoring. However, cities are inseparable from the ecosystems, land, and waters they are built on, and many species of plants and animals already call cities their home. For example, the largest urban population of peregrine falcons in the world is in densely developed New York City. Creating more habitat for other living beings will not only enrich our cities further, it will also align urban places more deeply with the flows of water, air, soil, carbon, nutrients, and energy that connect the world and all its inhabitants.

The Role of Indigenous and Native Peoples in Stewarding Biodiversity

By some estimates, Indigenous and native peoples represent only 5 percent of the world’s population but protect and support 80 percent of the world’s biodiversity, and conserve more land than the world’s national parks and forests. However, many Indigenous peoples are at risk of displacement from irresponsible development; lack of free, prior, and informed consent; and the impacts of climate change. Supporting Indigenous rights and sovereignty over traditional lands and recognizing Indigenous expertise at maintaining healthy ecosystems are therefore critical human rights, climate, and biodiversity priorities. Real estate can operationalize this goal by treating Indigenous and native peoples as partners when development affects their communities (whether on traditional or reservation lands or in urban settings), respecting their right to self-determination, and incorporating their leadership on the environmental, social, and financial needs a given project can help meet.



THE INTERSECTION OF NATURE POSITIVE AND NET ZERO

Net zero in the built environment describes a building portfolio that is highly energy efficient and fully powered by on- and off-site renewables and offsets. An increasing number of real estate organizations around the world are setting net zero commitments through organizations like [ULI Greenprint](#), the [UN Net Zero Asset Owner Alliance](#), [World Green Building Council](#), or the [U.K. Better Buildings Partnership](#).

Beyond providing carbon sequestration, emissions reductions, and ecosystem services, scientists with the U.N.'s 2020 Convention on Biological Diversity estimate that conserving 30 percent of the planet from human use through ecologically representative and well-connected natural areas could protect up to 80 percent of living organisms and secure 60 percent of

stored carbon and 66 percent of clean water. Other prominent scientists, like biologist E.O. Wilson, recommend an even greater goal of conserving [half the planet](#) to protect nature.

Leading real estate organizations have begun to incorporate biodiversity into their overall sustainability strategies, recognizing that protecting and restoring natural functions is integral to reducing emissions and protecting asset value. While each of the solutions identified in this report promotes biodiversity in real estate, there are often co-benefits, ultimately supporting buildings in achieving net zero. By considering nature as the irreplaceable foundation of our systems that includes climate, health, community, resiliency, and other benefits together, multifunctional solutions for real estate can be developed in a way that performs well environmentally, socially, and financially.

Using the U.N. SDGs as a Framework for Nature Positive and Net Zero

The 17 U.N. Sustainable Development Goals (SDGs) aim to end poverty while also improving global health, reducing inequality, and protecting the planet, tying climate, health, and biodiversity into a broad and global range of goals. While a number of SDGs support nature-positive solutions, the following two in particular seek to encourage biodiversity:

- **SDG 14**, Life below Water: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
- **SDG 15**, Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

For more information on what real estate is doing to align with the U.N. SDGs, see ULI's report [Global Goals: A Primer on the U.N. SDGs for Real Estate](#).



“Biodiversity enables Nature to be productive, resilient and adaptable. Just as diversity within a portfolio of financial assets reduces risk and uncertainty, so diversity within a portfolio of natural assets increases Nature’s resilience to shocks, reducing the risks to Nature’s services. Reduce biodiversity, and Nature and humanity suffer.”

—The Dasgupta Review

THE BUSINESS CASE FOR NATURE-POSITIVE SOLUTIONS



THE BUSINESS CASE FOR NATURE-POSITIVE SOLUTIONS

Cost-effective and value-enhancing solutions, new regulations, and stakeholder interest are driving more real estate organizations to recognize the connections between climate and nature and to invest in biodiversity at multiple scales. Market drivers for nature-positive solutions include the following:

- **Regulations:** Multiple jurisdictions have passed new policies that incorporate biodiversity into planning and financial reporting. Many real estate organizations with biodiversity plans cite getting ahead of the curve in markets with local regulations as a major driver for biodiversity projects. Cities and countries around the globe with these regulations include the following:
 - United Kingdom's Biodiversity Net Gain: In 2023, new net gain regulation requires a 10 percent net gain in biodiversity as a condition of planning permission for all new developments across England and Wales. These improvements will be measured in biodiversity units and must be maintained for at least 30 years. Development projects can use the [Biodiversity Metric 3.1](#) tool to calculate the number of biodiversity units required at a site.
 - France's Article 29: In 2021, France passed a decree that requires all financial institutions to disclose biodiversity- and climate-related risks as well as a strategy with specific targets for reducing biodiversity impacts.
 - Singapore's [Landscaping for Urban Spaces and High-rises \(LUSH\)](#): LUSH is composed of Landscape Replacement Areas (LRAs) and green-space incentives. Developments in strategic areas will provide LRAs that are minimally equivalent to the development's gross site area; at least 40 percent of the LRA requirement must be softscape and the rest may be hardscape.
 - Malmo, Sweden's urban greening factor: The urban greening factor gives points for each square meter based on its green value (0 points for a parking lot and more points for permeable pavement or a green roof). These numbers are added up and divided by the total property area. Malmo sets minimums, and the development can select any mixture of solutions to achieve that number.
 - Washington, D.C., Green Area Ratio: This zoning regulation sets requirements in certain zones for landscape and site design to minimize stormwater runoff and reduce the urban heat island effect.
 - Seattle Green Factor: This code requirement sets a minimum score based on a weighted menu of points relating to landscape elements like plantings, vegetated walls, green roofs, permeable paving, and other features. The total score is then divided by the parcel size, and compliance is required for project permit approval.

- **Property value enhancements:** Many tenants and owners recognize the importance of biodiversity. Biodiversity solutions are also highly visible to tenants, increasing marketability. It may be difficult to show tenants building investments in energy efficiency, but tenants can clearly see green roofs, native landscaping, or other features. These investments can pay off in the short term by increasing the marketing value through aesthetics, with one developer noting that a low-floor condominium unit with a rain garden sold for more than the units on the next two floors. Nature-positive designs can also expedite the permitting and approvals process by going beyond local requirements, reducing costs and time to development by garnering support from local governments. Biodiversity investments can also pay off in the long term by increasing efficiency and reducing operating costs, such as by reducing HVAC requirements through a green roof or treating rainwater on site.
- **Available low-cost opportunities:** Retrofitting landscaping to facilitate biodiversity can be done at a relatively low cost. For example, reducing/discontinuing mowing and sowing the landscape with native plant seeds can be aesthetically pleasing without increasing maintenance costs.

“During the COVID-19 pandemic, people came to appreciate the value of open space and views, and a place to step out on a porch and get fresh air. There’s a renewed interest by people to experience biodiversity—they may not know exactly what they’re experiencing, or use the term biodiversity to describe it, but they appreciate it and see it. All of those for us help improve our long-term return.”

—Andy Bush, Morgan Creek Ventures

- **Community engagement:** Since biodiversity investments are highly visible, they create an ideal engagement opportunity between building owners and the broader community, enhancing a company’s local brand. On-site green space can bring in community members and provides educational opportunities for adults and local schools. Building owners have reported positive feedback from the community on biodiversity projects. However, programming a space should be balanced with the conservation requirements of an area, so that visitors do not drive away or degrade newly created habitats.
- **Stakeholder interest:** Real estate organizations reported getting more questions from investors on the topic of biodiversity, shifting from a focus on carbon. In addition, some banks are offering sustainability-linked financing and setting biodiversity targets, particularly in locations with new biodiversity-related regulations.

“The investor space is pretty active in asking us what we’re doing on biodiversity. The conversation has turned from, ‘What are you doing in the carbon space?’ to ‘What are you doing in the biodiversity space?’ That’s obviously putting us in a position where we need to be on our front foot.”

—Darryl Stuckey, Lendlease

“Real estate is not an island; it’s collective with society, so there’s a level of responsibility regarding real estate actors and biodiversity. AEW is a fund management company, so we don’t own the building, but we assess biodiversity impacts of the asset, the building and land around it, and we come up with recommendations to improve biodiversity status of the asset and incorporate this action plan in the improvement plan of the asset’s 10-year capex fund. We include biodiversity questions in our ESG [environment, social, and governance] audits and scoring that must be assessed by an external auditor as well as specific biodiversity audit for existing and new construction.”

—Thierry Laquitaine, AEW

- **Resilience benefits:** Natural infrastructure can provide a range of resilience-related infrastructure benefits, which owners and tenants are increasingly aware of. For example, these include stormwater management and extreme heat mitigation (e.g., urban trees can support cooling during heat waves, while mangroves or planted dunes can help reduce coastal storm impacts). Inland, natural infrastructure can help slow water to reduce flooding, store it during peak flow, and discharge it safely later, and restore degraded landscapes to improve both ecology and the community’s quality of life. These investments can also be implemented at multiple scales, and investments made at the community level can have positive impacts at the building level.
- **New disclosure requirements:** Similar to the wide range of voluntary carbon reduction disclosure frameworks, new frameworks are under development for nature-related risks, including the [Taskforce on Nature-Related Financial Disclosures \(TNFD\)](#) and [Science Based Targets for Nature \(SBTN\)](#). TNFD is a financial market-led management and disclosure framework to report and act on evolving nature-related risks and opportunities, with the goal of helping organizations factor nature into financial and business decisions. SBTN aims to provide a clear pathway for reversing nature loss in line with science to create resilient businesses, healthy cities, and sustainable economies.

Nature-Positive Resilience Strategies

Nature-based solutions are a key part of building resilience to climate impacts and play an essential part in reducing the impacts of many types of physical climate risks. For more on these solutions, head to [ULI’s Urban Resilience program](#) to learn about addressing wildfires, flood impacts, drought, and more:

- [Cloudburst Infrastructure Workshop for New York City Housing Authority](#);
- [Enhancing Resilience through Neighborhood-Scale Strategies](#);
- [Firebreak: Wildfire Resilience Strategies for Real Estate](#);
- [Harvesting the Value of Stormwater](#);
- [On Safer Ground: Floodplain Buyouts and Community Resilience](#); and
- [Scorched: Extreme Heat and Real Estate](#).



- **Achieving green and healthy building certifications:** Many nature-positive and biodiversity solutions, such as enhanced green space and landscaping, can help achieve certifications, including LEED (Leadership in Energy and Environmental Design), the Living Building Challenge, or WELL, because of their important role in supporting both sustainability and health. For example, visible access to nature is correlated with reduced stress, improved mental health, and decreased sick days, improving employee satisfaction, wellness, and productivity. These certifications can increase asset value and marketability. Specific biodiversity-focused building certifications are popping up as well, as noted on [page 22](#).

Not all benefits of nature and biodiversity are immediately measurable and capturable. In particular, real estate should consider its exposure to impacts of reduced biodiversity on the material supply chain. Demand for low-carbon materials like mass timber is increasing, which can reduce embodied carbon, but there may be supply chain disruptions if these materials are not sourced sustainably, increasing construction time and costs.

“Development doesn’t need to have negative impact on ecology; it can instead have positive impact.”

—David Mellor, Prologis



Paul Szewczyk (Unsplash)

“Nature positive is the foundation for all social and cultural benefits you can reach. Every site requires different approaches, is subject to different dynamics, pressures, and past land uses. That legacy creates a set of conditions that needs to be understood in order to improve and elevate them again. Through nature is how we learn to adapt to current and future conditions. In some projects, it’s about soil loss and coastal erosion, while in others, it’s about fire risk reduction using landscape approaches. Nature positive is about stacked benefits for the company, community, and all species that lie around it.”

—Juan Rovalo, Jacobs

SCALING BIODIVERSITY



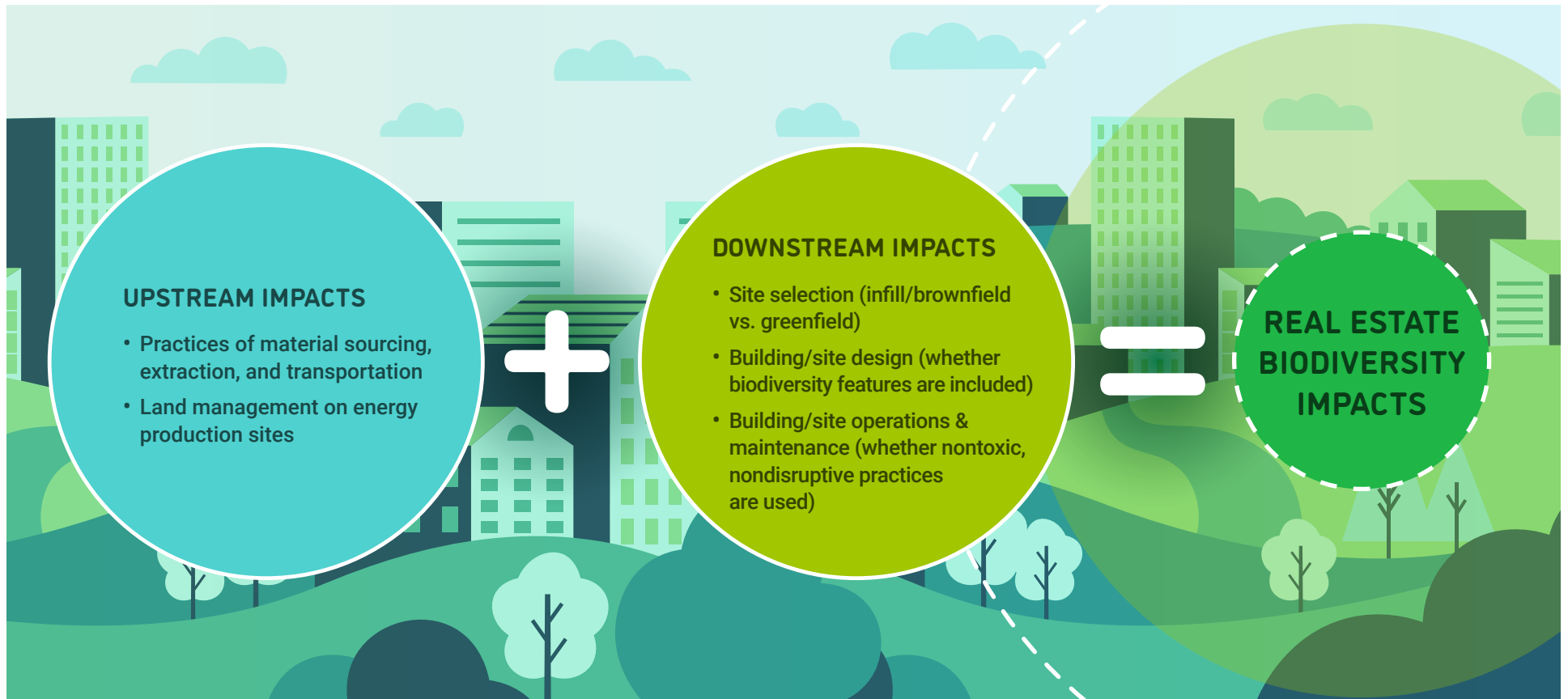
SCALING BIODIVERSITY

Biodiversity conversations often happen at multiple levels of an organization. At the highest level, the organization focuses on planning, building out a biodiversity plan for the organization. However, conversations are also happening at the property level, because of location-specific needs or motivated property management teams. To be successful, strategies across all levels must be in alignment.

As in the figure on the following page, real estate's impact on biodiversity can be categorized conceptually into upstream and downstream impacts. Upstream impacts on biodiversity, positive or negative, could occur through the sourcing of materials and energy for building construction and

operations, which can preserve or restore the ecosystems real estate relies on to create and run buildings. Downstream impacts could include avoiding development on greenfield sites, minimizing building footprints and maximizing site/building design for positive impact (e.g., through green infrastructure or bird-friendly glass), and ensuring building operations and maintenance practices do not pollute soil or waterways or disturb on-site biodiversity (e.g., through excessive or poorly timed mowing or tree trimming). Both upstream and downstream impacts can add up in scale from project or site to neighborhood, city, or region.

UPSTREAM AND DOWNSTREAM REAL ESTATE BIODIVERSITY IMPACTS



Source: ULI.

Real estate impacts on biodiversity, positive or negative, can be categorized into upstream and downstream impacts.

This report looks at biodiversity solutions across four different scales: portfolio-level, building-level, material selection, and off-site strategies. The list of solutions provided is not comprehensive, as organizations are still innovating and building internal capacity to understand risks and opportunities, but a selection of the most frequently mentioned strategies from across report interviews.

Finally, it is important to note that biodiversity solutions are not the only way to be nature positive. Biodiversity only supports a portion of the world's

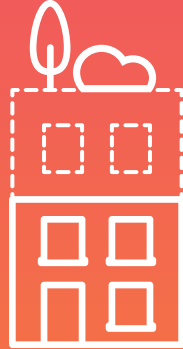
ecosystem functions. Other systems, like carbon and water cycles, should be considered in a holistic nature-positive strategy. Biodiversity cannot thrive without proper attention to the ecosystems that support it, and real estate will see greater gains from investing in comprehensive ecosystem health than by attempting to check the “biodiversity box.” The figures on the following pages outline selected nature-positive strategies at all four scales that real estate owners and developers can apply to their buildings and portfolios.

FOUR SCALES OF BIODIVERSITY STRATEGIES ANY DEVELOPER OR OWNER CAN APPLY



PORTFOLIO-LEVEL STRATEGIES

- Identify Co-benefits and Design Holistically
- Select Metrics for Measuring Biodiversity Risk
- Use Green Building Certifications
- Build Partnerships



BUILDING-LEVEL STRATEGIES

- Start Early
- Minimize Building Footprint and Site Impacts
- Protect or Restore Site Connectivity
- Create Native and Pollinator-Friendly Landscapes
- Use Green Infrastructure
- Practice Water Conservation
- Include Bird-Safe Design
- Integrate Biophilic Design
- Adjust Property Maintenance



MATERIAL SELECTION STRATEGIES

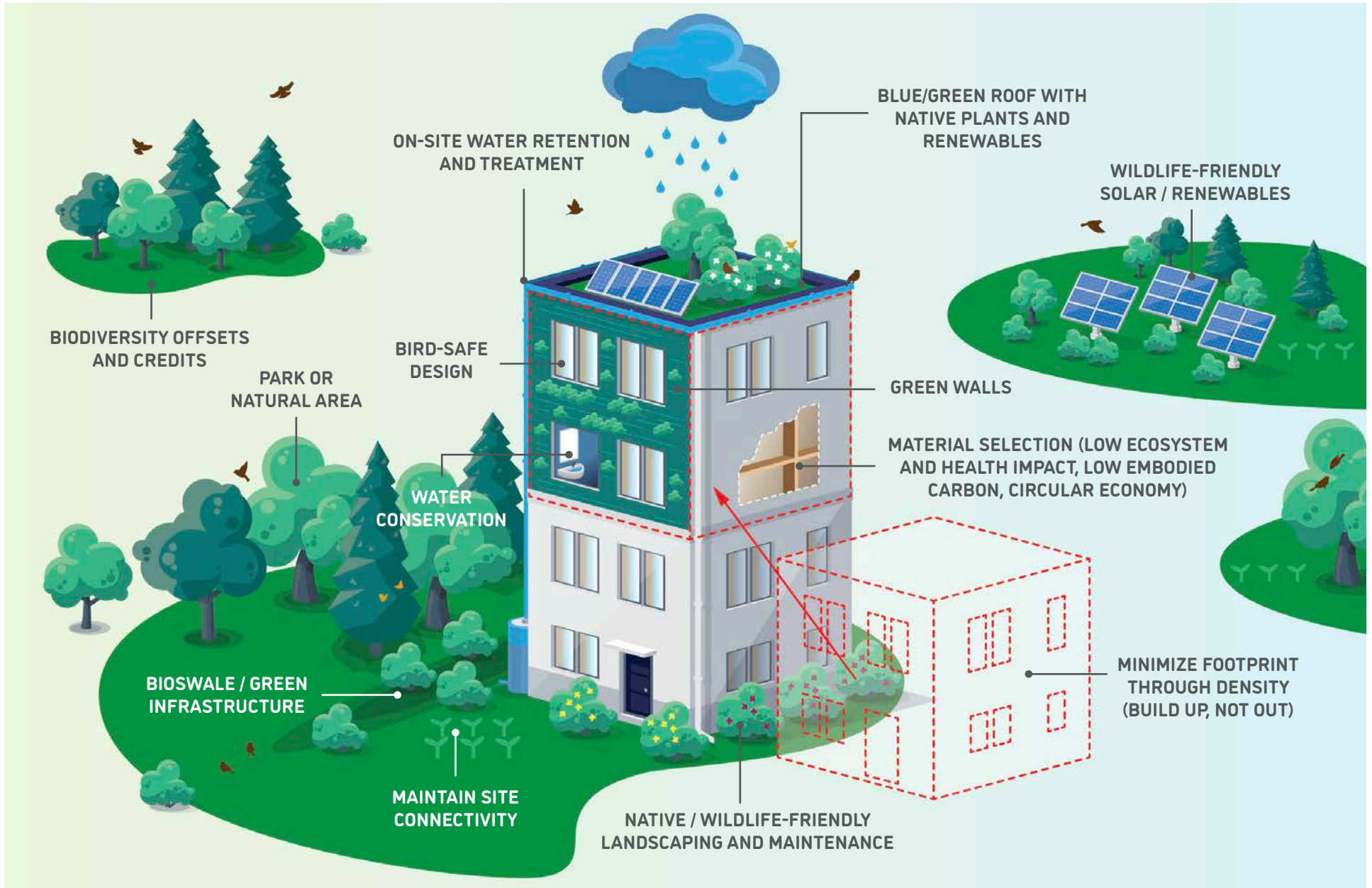
- Set Standards for Material Procurement
- Supporting the Circular Economy



OFF-SITE STRATEGIES

- Biodiversity in Renewable Energy Procurement
- Biodiversity Offsets and Credits

SELECTED BIODIVERSITY STRATEGIES AT MULTIPLE SCALES



Source: ULI

Selected nature-positive strategies at all four scales. Click on the label for each strategy to jump to that section.



PORTFOLIO-LEVEL STRATEGIES

- Identify Co-benefits and Design Holistically
- Select Metrics for Measuring Biodiversity Risk
- Use Green Building Certifications
- Build Partnerships



While occasionally considered during risk assessment for new investments in the past, biodiversity is increasingly embedded in an organization's sustainability strategy. By obtaining senior leadership buy-in and setting expectations from the start, organizations are better able to set baselines for biodiversity in a project, identify opportunities, and integrate nature from the start of a project, when costs are lowest and the potential impact highest. Portfolio-level strategies are addressed in the following subsections.

"Urban nature generates incredible value for property owners and residents, and real estate developers and investors could play a key role in unlocking that value. Whether preserving critical natural features or restoring what's been lost, an investment in urban nature is a cost-effective route to improving or increasing biodiversity, heat and flood resilience, energy savings, and carbon sequestration, among many other health, environmental, and social benefits."

—Julia Meisel, Rocky Mountain Institute



IDENTIFY CO-BENEFITS AND DESIGN HOLISTICALLY

By designing nature-positive projects with a systems approach, projects can achieve multiple co-benefits. This report aims to highlight the key co-benefits of nature-positive strategies through the use of co-benefit icons. The list of co-benefits featured in this report includes the following:

CO-BENEFITS OF NATURE-POSITIVE STRATEGIES



Environmental resilience: Projects at the community and building levels can protect assets from extreme weather.



Carbon sequestration: On-site plantings, habitat restoration, and off-site biodiversity offsets capture and store carbon naturally.



Health and wellness: Investments in nature can improve the health and well-being of building tenants/residents as well as community members who engage with the property by improving air quality or promoting recreation, among other health benefits.



Community empowerment and social equity: Community groups can support ecological preservation and restoration, including local nonprofits and Indigenous communities. In addition, environmental justice communities that are overburdened by historic contamination stand to benefit most from being engaged as partners in both project development and the positive outcomes of nature-positive real estate.



Energy efficiency: Building-level solutions can improve energy efficiency through reduced HVAC or lighting requirements.



Water quality protection: On-site plantings and permeable groundcover limit stormwater and pollutants reaching ecologically sensitive bodies of water.

LENDLEASE INCORPORATES RESILIENCE INTO WATERFRONT DEVELOPMENT

Lendlease, a global property and investment group, aims to maximize the co-benefits of nature-positive investments, including a number of projects with living shorelines, such as the following:

- **Clippership Wharf in Boston, Massachusetts:** The redevelopment of the historic property provides public access to the waterfront for the first time in more than 25 years. In addition to overall sustainability measures required to achieve LEED v4 Silver certification for Neighborhood Development, the living shoreline incorporates native plantings and wave dissipating features. Other shoreline mitigation measures include the stabilization of existing seawalls, new wetland resource areas, rain gardens, and bioswales, as well as the update of neighborhood stormwater infrastructure. The development itself is elevated to account for future sea-level rise. In addition, activity and educational programs were developed to engage the community and support public open space.
- **Barangaroo Headland Park (also known as Barangaroo Reserve) in Sydney, Australia:** Part of Barangaroo, Headland Park transformed an industrial site into a six-hectare (15-acre) park for the community featuring 75,000 native plants and native Australian bee colonies to support local pollination. Working with local researchers, Lendlease also enhanced the park's marine habitat, installing 384 habitat tiles made of oyster shells and crushed sandstone to mimic natural marine structures. Restoration of the shoreline and its integration with a seawall provide both resilience benefits and an opportunity for mollusk and seagrass growth. Lendlease also plans to work long term with local researchers to remove invasive species and monitor the process, hopefully informing future marine conservation. After one year, the project already features new seaweed as well as large and small fish.



Barangaroo Headland Park transformed an industrial site into a six-hectare (15-acre) community park, featuring 75,000 native plants and native bee colonies. The park also restored marine habitat for oysters and integrated a new shoreline with a seawall to provide resilience benefits and an opportunity for mollusk and seagrass growth.

“Lendlease recognizes our impact and opportunity on biodiversity and has begun looking at how to integrate biodiversity into master planning for urban regeneration projects. Our goal is to provide a community space, resilience, and a connection to nature.”

—Darryl Stuckey, Lendlease



SELECT METRICS FOR MEASURING BIODIVERSITY RISK

Setting targets can help boost progress on achieving all co-benefits, including resilience, health and wellness, energy efficiency, carbon sequestration, community empowerment, and water quality considerations.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Community empowerment and social equity



Water quality protection



Designers can use locally relevant, healthy landscapes to set targets for the ecosystem performance of urban projects.

Compared to climate mitigation, less progress has been made on biodiversity because it is more challenging to assess complex impacts on nature versus total carbon emitted. However, a number of metrics are now available for assessing risk and also measuring long-term performance of an initiative or project. Commonly cited metrics frameworks include the following:

- **The United Kingdom's Department for Environment, Food and Rural Affairs (Defra) biodiversity metric:** Frequently used by companies based in or developing in the United Kingdom, because the [Biodiversity Metric 3.1](#) tool is the required metric by which to calculate the number of biodiversity units required at a site.

- [The Integrated Biodiversity Assessment Tool \(IBAT\)](#): A geographic database for biodiversity, this tool consists of the IUCN Red List of Threatened Species, World Database on Protected Areas, and the World Database of Key Biodiversity Areas.
- [Biodiversity Footprint Financial Institutions \(BFFI\)](#): This tool from the Dutch government was developed to measure the impact of financial institutions on biodiversity.
- [ENCORE Tool](#): A U.N. tool to understand how the economy is exposed to natural capital-related risks, it includes a biodiversity module to support financial institutions in understanding how to align with global biodiversity goals and standards.

Data can also support performance-based design, by identifying patterns to integrate into design guidelines or track results after project implementation. In some cases, consultants can collect baseline measurements for locally relevant, healthy habitats to set an aspirational target for a project site on key performance indicators (KPIs) like amount of carbon sequestered, water filtered, or air particulates removed. For example, to support the necessary ecosystem service modeling for their biodiversity work, the Nature Conservancy and Dow Chemical Company collaborated to create the [Ecosystem Service](#)

Key Performance Indicators for Nature-Positive Design

Key performance indicators help clarify goals and track the success of nature-positive and biodiversity projects. For example, KPIs used by Biomimicry 3.8's Project Positive framework and approach typically include fundamental ecosystem services:

- Species support (small/large mammals, reptiles, amphibians, invertebrates, songbirds, etc.)
- Pollinator support
- Native plant succession
- Carbon sequestration and uptake
- Soil retention and erosion regulation
- Air temperature regulation
- Air particulate removal
- Water filtration, nitrogen removal, or phosphorus retention
- Stormwater storage capacity

[Identification and Inventory \(ESII\)](#) tool. ESII enables the identification and quantification of on-site ecosystem services rapidly and cost-effectively.

[Landsec's](#) biodiversity design brief outlines five principles for biodiversity in the company's planning, development, and operations of assets. In addition to an overall 25 percent biodiversity net gain target, each of the five principles includes metrics for success, such as percentage uplift in biodiversity units from pre- to post-development using the Defra biodiversity metric, an ecosystem

service delivery score based on the Ecosystem Service Matrix, and total proportion of green space.

Finally, metrics can help identify the most material environmental and social improvements for a project. By collecting data on water pollution or high asthma rates in the community, designers can identify what matters most to the community and prioritize design interventions that the community is on board with, preserving a company's social license to operate.



USE GREEN BUILDING CERTIFICATIONS

Green building certifications can include resilience, health and wellness, energy efficiency, carbon sequestration, community empowerment, and water quality considerations.



Environmental resilience



Health and wellness



Energy efficiency



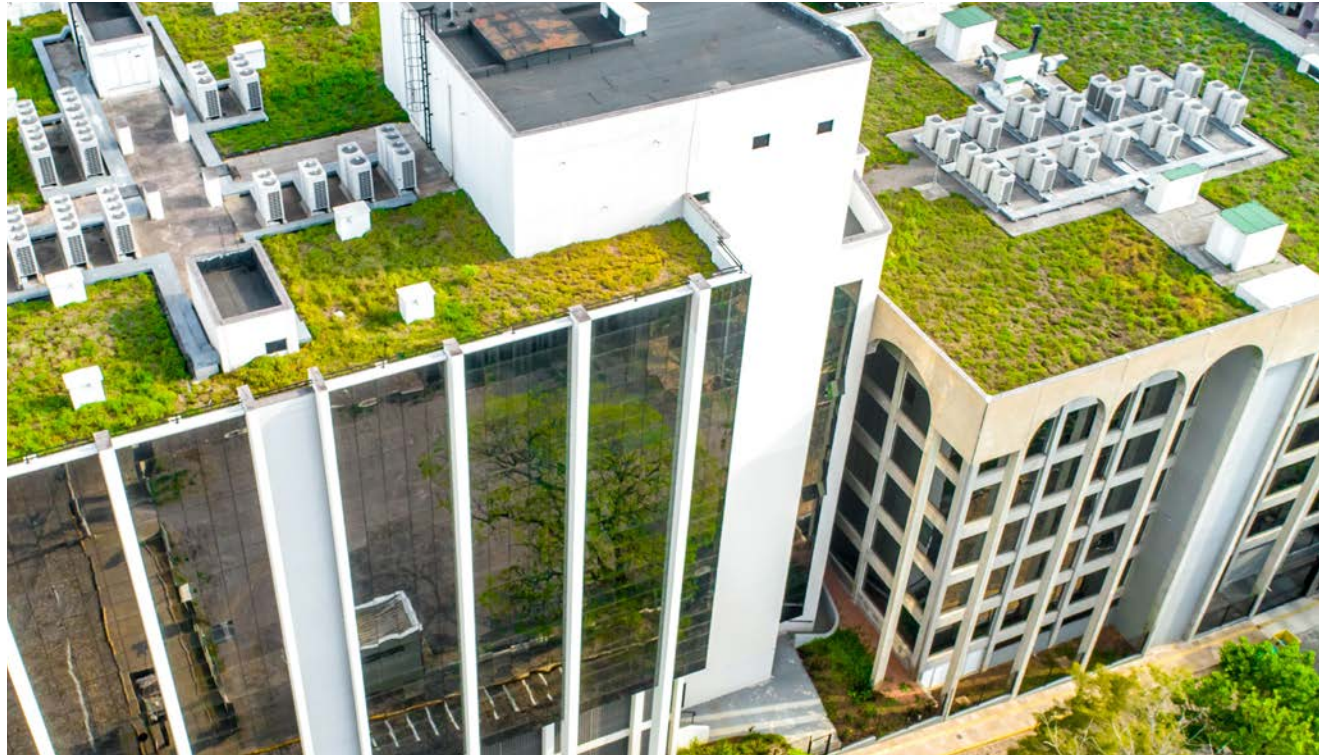
Carbon sequestration



Community empowerment and social equity



Water quality protection



For organizations new to biodiversity considerations in development, green building certifications can provide a useful framework for nature-positive planning and design. Although many of them incorporate nature in some way, the following green building certifications feature biodiversity improvements in real estate:

- [International Biodiversity Property Council \(IBPC\)'s BiodiverCity](#): The BiodiverCity label assesses and rates the performance of construction projects that take

biodiversity into account. It complements international certifications like BREEAM, LEED, or HQE, which consider biodiversity features, but do not necessarily conduct an in-depth assessment. The four elements of performance—commitment, available resources, evaluation of ecological advantages, and benefits for users—are subdivided into 27 issues and 63 objectives. Currently projects with this label are primarily located in Europe.

- [International Living Future Institute \(ILFI\) Living Building Challenge 4.0](#): Living Buildings aim to be regenerative, self-sufficient, and create a positive impact on human and natural systems that interact with them. The Living Building Challenge is organized into seven performance areas, or petals, that must be achieved: place, water, energy, health and happiness, materials, equity, and beauty. Multiple performance areas touch on biodiversity. The Place petal includes a core imperative for ecology of place, which intends to protect wild and ecologically significant places and encourage ecological regeneration and assess ecological health of a site based on an external methodology developed by ecologists. The Beauty petal includes a core imperative for biophilia, which incorporates elements that connect humans with nature. Even the Materials petal targets a nature-positive supply chain and filters out toxic materials to reduce pollution.

- [Salmon Safe](#): Salmon Safe is a peer-reviewed certification and accreditation program that protects water quality, maintains watershed health, and restores habitat in Oregon, the Puget Sound, and British Columbia, with the goal of helping Pacific salmon thrive. This certification can be achieved by farmers, vineyards, land managers, and developers and provides independent verification for environmental practices that protect water quality and habitat. For developers, an interdisciplinary team of experts works with the design team during each stage



The Chesapeake Bay Foundation's Brock Environmental Center in Virginia Beach, Virginia, is a fully certified Living Building. Site and building design protects vulnerable coastal habitat and achieved net zero energy and resilience to flooding and wind hazards. Learn more at the Developing Urban Resilience [project profile](#).

of the design development process to evaluate project decisions and provide recommendations.

- [U.S. Green Building Council's \(USGBC\) Sustainable Sites Initiative \(SITES\)](#): The USGBC's LEED certification standard includes a number of points toward certification for incorporating sustainable sites and ecosystems, while SITES is a

comprehensive rating system designed to recognize regenerative landscapes, measure performance, and boost value. SITES aligns land development with innovative sustainable design and can be achieved on sites with or without buildings. The certification assesses performance through an online tool and allows projects to benchmark against performance criteria.

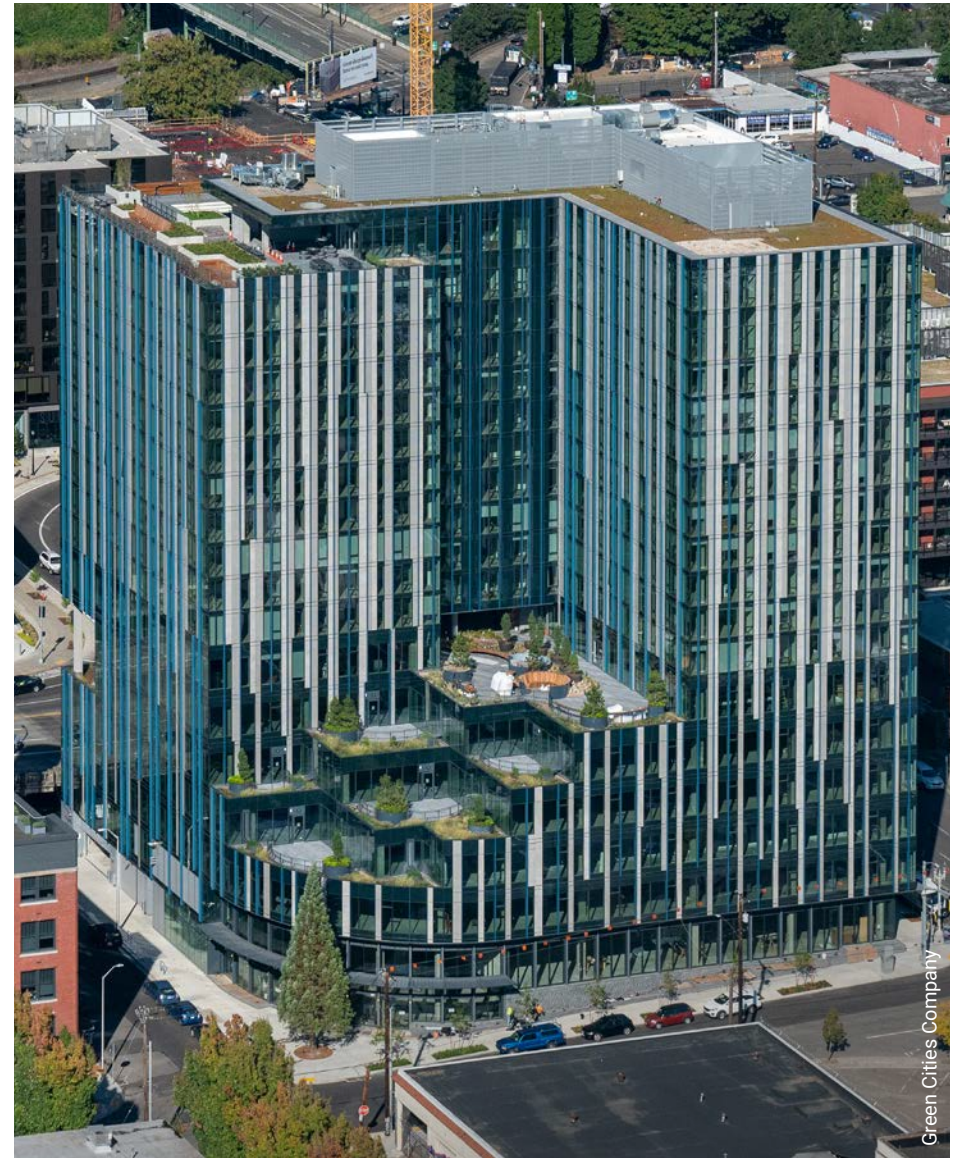
GREEN CITIES COMPANY AND SALMON SAFE CERTIFICATION

The Green Cities Company is a real estate investor and developer that pursues green certifications for each asset in its portfolio. At 5 MLK, a 17-story mixed-use building with 220 apartment units, 120,000 square feet of office space, and 15,000 square feet of retail space in Portland, Oregon, a Salmon Safe certification label was achieved to showcase the company's commitment to protecting local ecology. Located close to the water, the project was supported by the certification in managing stormwater, maintaining water quality, and protecting local habitat.

Achieving certification required a review of the building's stormwater management practices and water conservation strategies. The final project incorporated the following:

- Plantings on 35 percent of total site area (15 percent better than LEED criteria);
- Almost 100 percent on-site stormwater treatment through green stormwater infrastructure (first urban development project to achieve that level of performance);
- Water-efficient fixtures;
- Native plantings and drip irrigation to reduce irrigation demand by 75 percent; and
- Submeters for irrigation and hot water to support fast leak detection.

These investments supported the restoration of the site's pre-development hydrology.



At 5 MLK in Portland, Oregon, a Salmon Safe certification label was achieved to showcase the company's commitment to protecting local ecology. Features include a combination of landscape plantings, on-site stormwater treatment, and water efficiency measures.

Green Cities Company



BUILD PARTNERSHIPS

Partnerships that involve community members in biodiversity solutions can ensure projects reach their potential for social, environmental, and fiscal impact.



Community empowerment and social equity

“When you bring this type of creativity and innovation and desire to solve for biodiversity, you may have new stakeholders, who might have previously been adversaries, saying, ‘We want to get behind you.’ Tracking this can enhance your project, it may help with regulatory and permitting issues, and it can create some uncommon allies if you do it well, right, and sincerely.”

—Christopher Allen, Jacobs



Even real estate owners or developers with sustainability team members do not always have the internal expertise to assess, implement, or manage biodiversity projects. Many real estate organizations instead rely on nonprofit biodiversity partners or specific consultants that support their work in this space. For example, multiple interviewees referenced having a trained ecologist or biologist as part of the design

team from the start as a key success strategy. In addition, residents, community groups, and stakeholders can be treated as equal partners in the creation of biodiversity and nature-positive solutions, as these often affect the urban and rural landscapes they also rely on, and can provide essential input that can strengthen project outcomes for everyone.

PROLOGIS PARTNERS TO CREATE A LIVING LANDSCAPE

Prologis, a global leader in logistics real estate, is currently developing RFI DIRFT, a 700-acre intermodal (rail/freight) logistics park. In partnership with the Wildlife Trust (a federation of regional wildlife conservation charities), 193 acres have been transformed into an ecological habitat named Lilbourne Meadows, a mixed habitat of wetland and grassland with extensive hedgerows.

To gain the best possible outcome at the location, Prologis created one large nature reserve with a meaningful biodiversity net gain, supporting the habitat's development through zoning and ensuring the long-term financial viability of the site. The Wildlife Trust in turn supported the design and management of the land. The reserve now hosts oystercatchers, little ringed plovers, lapwings, skylarks, and meadow pipits alongside rare breeds of sheep. Butterflies and dragonflies can also be seen flitting around the grassland and ponds. Already large flocks of birds have been using the newly created lakes and wet grassland, while the sheep have been grazing the grassland pasture to help improve the habitat for wildflowers and invertebrates.

“Our partnership with the Wildlife Trust has been invaluable in helping us achieve biodiversity gain through the DIRFT III development. Through this relationship with the Wildlife Trust we are creating diverse habitats for wildlife and delivering valuable amenity space for the local community, two things that wouldn't have been possible without this partnership approach.”

—David Mellor, Prologis

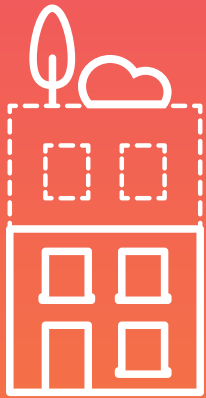


Prologis



Prologis

At Lilbourne Meadows, Prologis created one large nature reserve with a meaningful biodiversity net gain. The reserve now hosts oystercatchers, little ringed plovers, lapwings, skylarks, and meadow pipits alongside rare breeds of sheep.



BUILDING-LEVEL STRATEGIES

- Start Early
- Minimize Building Footprint and Site Impacts
- Protect or Restore Site Connectivity
- Create Native and Pollinator-Friendly Landscapes
- Use Green Infrastructure
- Practice Water Conservation
- Include Bird-Safe Design
- Integrate Biophilic Design
- Adjust Property Maintenance



Holistic design and operations considerations can yield positive ecosystem services and regenerative ecosystems at the building level. While each of the strategies in this section is presented individually, the leading-edge practice is to integrate multiple biodiversity strategies, as well as net zero, resilience and health, wellness, and social equity approaches into one project, achieving maximum benefits for people and the surrounding ecosystem. Common building and site components can be planned and designed with multiple co-benefits so they not only function as intended but can also regulate air temperature, manage stormwater, grow food, or remove pollutants, while providing a space for work, play, respite, recharge, and rest. Considering each asset as part of a larger ecosystem and providing connections to that ecosystem through furnishing habitat and maintaining water cycles, soil health, air quality, and nutrient cycles can scale positive impact.

In addition, within a building, there is a question of scale. Nature and biodiversity can be integrated into more than just the horizontal landscape, such as elements within a building (e.g., curtain wall or building skin), altering how they perform and add value.

Building-level strategies are addressed in the following subsections.

“The best strategies emerge from an intimate understanding of place—what the place is, where it’s nested, and what’s happening there. The ecological components or attributes of a given place should be viewed as assets, not constraints. It’s not something to try to avoid or work around, it’s something you should value and promote.”

—Juan Rovalo, Jacobs



Integrating nature-positive thinking from the beginning of a project maximizes opportunities to achieve all co-benefits in a cost-effective manner.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Community empowerment and social equity



Water quality protection



Roof garden on 1950s Rotterdam office building with flowers and honeybees.

As with other sustainable building features, setting a target to achieve low carbon or nature-positive projects is best done from the beginning. By starting off with a clear goal, project teams end up with a more streamlined process and fewer costly design changes.

Developers reported that landscaping plans were often done at the end of the design schedule. Instead of being an afterthought, many are now designing indoor and outdoor

spaces at the same time, making these projects more integrated and ensuring that there is no conflict between the two. Incorporating an ecological assessment of the site's pre-development performance early in the process will help design an appropriate property-level action plan for enhancing, maintaining, and monitoring biodiversity and nature-positive goals over time.



MINIMIZE BUILDING FOOTPRINT AND SITE IMPACTS

Thoughtful design and planning of developments to maximize natural habitat can make room for natural or built resilience infrastructure, create wellness benefits from access to green space, reduce need for air conditioning through natural cooling, enhance carbon sequestration by undisturbed soil and plants, and maintain natural water cycles.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Water quality protection



Rancho Mission Viejo/SWA Group/John Singleton

Rancho Mission Viejo, in Orange County, California, protected 75 percent of its site as a habitat preserve, boosting biodiversity and wildfire resilience.

Because it is better to avoid disturbance rather than restore later, the best thing developers can do for biodiversity and positive ecosystem service design is to minimize greenfield development, through redevelopment and infill

or grouping development in higher density, and preserving the rest of the space for nature. Redeveloping existing buildings also saves significant embodied carbon, contributing to net zero goals.

Thoughtful building placement minimizes site impacts and makes it easier to preserve and align to existing hydrology, habitat, soil health, aesthetics, and conservation planning. In addition, building with increased density would save land that could otherwise be used for carbon sequestration, as cities are often located near sensitive and biodiverse areas.

Developers recognize that people want to live close to nature, so limiting the developable footprint or weighting building/site programming and circulation equally with nature-based KPIs helps facilitate natural regeneration and enhanced performance while providing reasonable access for people. Particularly in residential and hospitality developments, land not used for development can be amenitized and add value to the project through urban agriculture or recreation. Interviews indicated that in some cases, preserved land adds greater value through tourism than additional floor space would have.

“We emphasize redevelopment to conserve as much area as possible and preserve ecosystems. That tends to be where we focus on those projects, to minimize disturbance, rather than restoring it afterwards. It’s better to avoid harm first.”

—Kevin Dahms, Biohabitats



Las Catalinas in Costa Rica is a new urbanist development in which buildings are gathered into a compact, walkable, car-free town, leaving nearly 90 percent of the site’s original tropical forest untouched.

An in-depth assessment of the land is necessary to identify where to focus development and areas that are sensitive and should be preserved. It can also help with the prioritization of local species, ensuring that an area is designed specifically to support one or more species and habitat needs. In some cases, developers have purchased land off site (but close to the development) to restore, allowing for development but maintaining the necessary local ecosystem functions.

Even in urban habitats, development can make significant contributions to green space. For example, in densely developed Singapore, developers are required by the government to replace any greenery lost during construction, and the government also covers 50 percent of the costs to install green roofs and walls. These regulations and investments will pay off in the long run as the city expects the total area of rooftop green space and walls to triple by 2030.

HOWARD HUGHES CORPORATION SYSTEMATICALLY PRESERVES OPEN SPACE

The Howard Hughes Corporation (HHC) is the owner, developer, and manager of commercial, residential, and mixed-use real estate across the United States, including a portfolio of master-planned communities (MPCs). HHC's legacy is built on the stewardship and long-term success of its communities through profound respect for nature, community, connectivity, and passion for innovation. Preserving and enhancing biodiversity and space for nature are a signature element within HHC's community designs.

"Twenty-five percent of HHC's MPCs across the nation are dedicated to green space of different kinds," said Gautami Palanki, senior vice president of ESG strategy at the Howard Hughes Corporation. "It's not just an urban park, for example—we have parks, trails, educational opportunities within the parks, pollinator gardens, safe habitats for monarch butterflies, and other features that promote biodiversity."

HHC's guiding principle—*how you live is how we build*—is evident in all aspects of planning and development, including plantings that are regionally appropriate. In HHC's Summerlin master-planned community nestled against the Red Rock Canyon, the company has gone beyond local restrictions for new construction by replacing older turf landscapes with new, desert-friendly plants and features landscaping that is drought tolerant. The company prioritizes tree planting on streetscapes in its Ward Village master-planned community in Honolulu, Hawaii, as well as in The Woodlands community in Texas where streets are lined with protected forest preserves. Also in Texas is HHC's Bridgeland master-planned community, which includes a 140-acre lake and birding area that has become a regional attraction while doubling as a stormwater management and retention feature.



Howard Hughes Company

HHC's Bridgeland master-planned community includes Josey Lake, a 140-acre lake and birding area that has become a regional attraction while doubling as a stormwater management and retention feature.

Open space is a multilayered ESG approach for the company: "Our 25 percent open space is a resilience approach in itself and creates a base as environmental strategy. For new developments, we think to expand on this strategy. It could be stormwater retention or a biodiversity approach. It's about cultivating life underwater and life on land," Palanki notes, referring to two of the U.N. SDG goals.



PROTECT OR RESTORE SITE CONNECTIVITY

Ensuring that ecosystem services are preserved through site connectivity can strengthen the environmental resilience of the overall landscape by protecting ecosystem services while also increasing water quality through connected blue corridors.



Environmental resilience



Water quality protection



Plantings around developments may connect to larger green spaces nearby.

Nature does not recognize the boundaries of a building lot. Thoughtful design can protect or restore historic ecosystem services and ensure that a project site remains connected to the broader ecosystem. Sometimes additional habitat restoration on site is not necessary, provided that a site maintains connectivity to other important habitats or functional ecosystems.

By maintaining broader ecosystem connectivity, for example by providing a small green or blue corridor for species to cross the site safely and reach other habitats, investments in nature do not need to be replicated across many sites that function as individual islands. Site costs can be lowered as not everything needs to be built on site. Community costs can also be reduced for maintaining ecosystem services that can also support local economies through agriculture or tourism.



Native and pollinator-friendly landscapes can boost drought resilience, create natural beauty that improves mental health for occupants, include trees that provide shade and natural cooling that reduces building energy consumption, include plants and undisturbed soil that sequester carbon, and provide filtration of water runoff.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Water quality protection



At the asset level, one of the primary ways to strengthen impact is by creating native plant landscaping for all green spaces. Most plants in urban environments are from other parts of the world, but native plants support local wildlife, pollinators, and ecosystems. In addition to biodiversity benefits, native plants can provide operational and cost benefits. Native plants have co-evolved with local soils and adapted to the average rainfall and climate of their region; they require less water, maintenance, pesticides, herbicides, and fertilizers. They reduce maintenance costs by requiring less water, as they should be acclimated to local conditions. Metrics to measure biodiverse landscaping

include the percent coverage of native plants and variety of native plants. In addition, plants that support greater numbers of other species can be prioritized to make a bigger impact.

A second way landscaping can support biodiversity is by adjusting maintenance practices to limit use of harmful pesticides, herbicides, and fertilizers or by reducing intensive mowing practices that disturb habitat. Pesticides often kill indiscriminately, affecting both the targeted pests as well as native butterflies, bees, insects, and other wildlife. If buildings are not able to transition to native landscaping right away, then eliminating pesticides and reducing



At a logistics center north of Paris, AEW has piloted use of forest restoration through the [Miyawaki method](#), which plants native trees in dense arrangements to mimic natural forest growth and succession. These micro-forests grow quickly, require little maintenance after several years, and support high levels of biodiversity.

herbicide and fertilizer use is a great first step. Owners can also request that landscape maintenance companies avoid deadheading flowers until they have finished going to seed to provide valuable sources of food for wildlife, and leave some leaves, dead branches, wood, or bare soil to provide nesting sites for cavity and ground-nesting native bees, butterflies, moths, and other invertebrates.

Often these strategies do not add significantly to the project budget, and once habitat is provided for native species, they will quickly move in. Developers that have shifted from mown grass to wildflower meadows were amazed by the number of insects and other wildlife they were able to find on site.

Find Native Plants and Reference Ecosystems for Your Area

Native plants can be thoughtfully integrated into landscapes in ways that replicate nearby reference or historic ecosystems, to the extent possible. Related native species should be assembled and planted because they are in these local ecosystems to support greater biodiversity, increase likelihood of thriving long term, and tie design to place. To understand plants that are native to and support the most wildlife in the United States, see the National Wildlife Federation [Native Plant Finder tool](#) and search for your zip code. For the United States and internationally, see the World Wildlife Fund's [Terrestrial Ecoregions of the World](#) for reference ecosystems.

GROSVENOR'S BIODIVERSITY BUFFET

Grosvenor, a global developer, manager, and investor, includes biodiversity as part of its U.K. development business's sustainability strategy, which includes a net zero carbon by 2030 goal. Each business area has biodiversity net gain targets: a 20 percent increase in biodiversity on managed green spaces and 100 percent increase on developments by 2030 using Defra's Biodiversity Metric 3.0.

To educate team members and summarize biodiversity design interventions for Grosvenor projects, a "Biodiversity Buffet" guide was created for both existing projects and those under development. Design opportunities in the guide include living roofs, green walls, landscaping, habitat features, bird and bat boxes, and temporary greening measures.

When selecting the right solution for a project, the team starts with an ecological assessment and analysis based on biodiversity value per asset and then reviews what is possible and what is a reach. For example, in areas with no current biodiversity, 100 percent increase is a minimum target.

At Grosvenor Square, an existing asset and the second-largest garden in London, Grosvenor set a specific target to increase biodiversity by 15.5 percent, with 26 more tree species and five times more plant species as well as blue infrastructure like wetland channels. At Holbein Gardens, a 1980s London office property will be retrofitted into a net zero building with 11 percent internal green space and ground-floor landscaping that targets a 200 percent biodiversity net gain.

All projects are mapped and uplift is tracked through GIS (geographic information system). Green assets are also monitored annually by ecological specialist partners by site surveys, to track progress over time and verify gains.



Rendering of the planned Holbein Gardens office retrofit in London.

"All of our targets are embedded into our overall sustainability road map, which outlines what every team in the company will do every year in addition to our 2025 and 2030 goals. We pushed ourselves to come up with our biodiversity targets, and so as one of London's historic garden squares, we aim for Grosvenor Square to be groundbreaking in biodiversity."

—Tor Burrows, Grosvenor



In some cases, Grosvenor has shifted from mown grass to wildflower meadows as a practical, low-cost measure to boost biodiversity.

However, achieving this type of landscaping has its challenges. First, native plants need to be available at local nurseries. Developers reported that many common nurseries do not have a wide selection of native plants. The availability of native plants at nurseries is expanding as awareness grows; however, selection may still be limited to specialty growers and nurseries. Native plant societies and similar organizations can be resources for selecting and sourcing native plants.

In addition, there is an education gap: trained professionals are required to install the plants and care for them through their first year of establishment. In California, the California Native Plant Landscaper Certificate Program, developed by the Theodore Payne Foundation, California Native Plant Society, and USGBC Los Angeles,

is training landscape professionals how to successfully manage native plant landscapes. Similar programs are available and under development in other states.

Finally, maintenance practices of natural landscaping require a shift in the expectations of many consumers who are used to neat, trimmed lawns that do not support biodiversity. Native landscaping looks wilder and can appear messier, and other species can create unexpected surprises in maintenance practices, but can offer greater aesthetics and cultural value than traditional, turf-dominated landscapes. Providing signage, workshops, and other educational engagement about the important function of native plant landscapes helps tenants and the public accept native plant landscapes and inspires them to plant native plants in their own landscapes.

“Building owners care a lot about landscapes and want tenants to feel comfortable in the space. Native plant landscaping is a powerful opportunity for building owners to engage tenants in a visual project that represents a commitment to biodiversity and healthy ecosystems. What’s more, native plant landscaping projects present meaningful opportunities for tenants to actively participate in something impactful for their community.”

—Jamie Bemis, Verdani Partners

Pros and Cons of Urban Beekeeping

Many real estate organizations are working to promote pollinators by placing European honeybee hives on the roofs of their buildings. While there are many benefits to getting communities excited about the ecosystem services that pollinators provide, cultivation of European honeybees outside of Europe poses significant ecological concerns because they can outcompete native pollinators. Real estate organizations should consider native plants and habitats for native bee species as well as other pollinating species.



Green infrastructure of various types can reduce flood and extreme heat impacts, improve access to natural landscapes that reduce stress, insulate buildings and improve energy efficiency, sequester carbon, involve community groups in planning, design, and upkeep, and provide water filtration.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Community empowerment and social equity



Water quality protection



Flickr/BeyondDC under CC 2.0

Anytime a square foot of development can achieve multiple functions, developers can increase asset value. Green infrastructure is a prime opportunity to maximize this value. In addition to providing habitat, increasing use of green infrastructure helps manage water where it falls by connecting rain to natural systems of soil, plants, and air. Allowing nature to manage rainfall helps replenish groundwater, lower ambient air temperatures, prevent soil subsidence, and maintain the integrity of the earth's water cycles to help decrease climate

variability and urban flooding. Green infrastructure also self-regulates, saving developers the costs of construction and replacement of high-maintenance pipe and drain systems.

"Anytime you can take a square foot of a development project and get multiple functions, you increase the value. It's a slam dunk for nature-based solutions; green infrastructure is definitely the low-hanging fruit."

—Pete Munoz, Biohabitats



Green roof with diverse plantings.

Green roofs: Green roofs are an alternative to traditional roofs that add soil and vegetation to roofs. Green roofs can be used as an amenity for tenants, providing views, aesthetics, and community spaces. Green roofs are not just for the top floor of a building but can be used on multiple levels to provide benefits to nature and humans. These spaces sustain plants and make buildings more energy efficient by reducing roof surface temperatures and lowering overall heating and cooling needs—up to 75 percent

reduction in cooling according to [a study of Canadian green roofs](#). Multiple jurisdictions either require or provide incentives for green roofs, including France, Toronto, Basel, New York City, Washington, D.C., and Denver. However, there are still challenges with this strategy, as not all roofs are able to bear the weight of soil, water, and vegetation, and depending on the plants used, green roofs may not provide connected or high-quality habitats for local wildlife species.

Biosolar Roofs Combine Solar and Vegetation

Biosolar roofs integrate solar photovoltaic (PV) systems and blue-green roof systems that incorporate rooftop vegetation. This networked system improves PV efficiency and output. A study in Sydney, Australia, comparing a standard rooftop solar array with a solar array on a roof with foliage, showed that the solar array on the green roof performed better than the standard green roof by 3.6 percent over an eight-month period and by 20 percent at peak times. This increase in performance generated an additional A\$2,595 (US\$1,891) or 9.5 megawatt-hours' worth of energy and lowered the temperature of the solar array by up to 20 degrees Celsius. Green roof materials also generally do not need direct sunlight and can be protected by the solar shading.





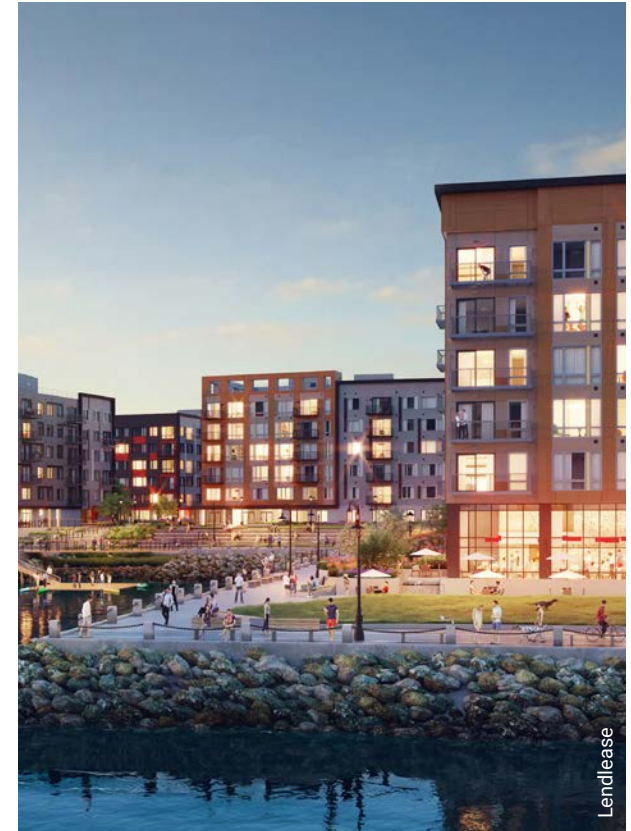
Oasia Hotel, Singapore.

Living walls: Living walls, also known as vertical gardens, can be found on the interior or exterior of a building, incorporating vegetation as part of a wall. Internally, living walls are often used to improve indoor air quality and for aesthetics purposes. When used on the facade of a building, a living wall can provide additional insulation and shading, lowering building temperatures and helping build resilience to extreme heat.



A rain garden with a branching, or dendric, motif.

Bioswales and rain gardens: Bioswales and rain gardens are vegetated wetland channels that can be used for natural irrigation and water treatment. This infrastructure can be used to collect pollutants before they reach nearby waterways, enhancing waterways and providing wildlife habitat. These systems can also reduce stormwater flooding.



Living shoreline at Clippership Wharf, Boston.

Living shorelines: These systems restore coastal and waterfront edges to naturalized conditions, replacing bulkheads or hard concrete. Living shorelines can restore a variety of coastal ecosystem types, depending on local relevance, for example planted dune systems, wetlands or marsh habitats, or mangrove habitats. These systems have significant resilience benefits for managing sea-level rise and reducing storm surge, and many can also enhance carbon sequestration (wetlands in particular are very effective at this process).



Street trees and right-of-way plantings.

Street trees and right-of-way plantings:

Street trees can significantly contribute to urban biodiversity while reducing extreme heat, enhancing the public realm, supporting health and wellness, sequestering carbon, and improving air quality. Planting street trees in areas that do not have as many can also help correct historic inequities in public tree planting, which have often left low-income and BIPOC communities bereft of trees and their benefits. Unpaved strips in the right-of-way can be planted to create additional habitat for urban wildlife and support flood absorption.



Reconstructed wetland at Sidwell Friends School in the Washington, D.C., area.

Restoring or “daylighting” historic waterways:

Urban environments have frequently paved over, filled in, channelized, or otherwise erased historic streams, creeks, rivers, ponds, and wetlands to make more room for development. These areas were frequently essential habitat for local species and used for drainage or storage of water, and today they are frequently subject to flooding, given that they are natural points in the landscape for water to gather. Restoring the functionality of these systems can therefore help reduce flooding while nourishing aquatic and terrestrial wildlife.

Green infrastructure occurs at multiple scales, from building or site to neighborhood, city, or region. Where practical, connecting building- and site-level strategies to larger green infrastructure, such as nearby forest preserves, wetlands, rivers, or greenway corridors maximizes connectivity for wildlife and ecosystem services. Inversely, considering these larger landscape contexts can help inform selection and design of building or site-level green infrastructure.

GREEN ROOFS ADD VALUE, BIODIVERSITY, AND RESILIENCE TO MIXED-USE BUILDING

District House is a 75,000-square-foot mixed-used development incorporating mid-rise condominiums and ground-floor retail in Oak Park, Illinois. Lawned terraces on one floor of the multifamily building and a rooftop wildflower meadow resulted in a building that connects tenants to nature, while providing the developer with a strong return on investment.

In the Chicago area, heavy precipitation during inland storms can lead to urban flooding and combined sewer overflow. District House aimed to manage 100 percent of stormwater on site, and green roof provider Omni Ecosystems tracked that the lawned terrace space had a retention capacity of 8,251 gallons of stormwater and the rooftop space had a stormwater retention capacity of 21,140 gallons. The green roof extends the building life cycle by reducing exposure to ultraviolet radiation and extreme temperatures, while also providing additional thermal insulation. In addition to the resilience and climate benefits, building units with the lawned terraces sold for an average price 12.4 percent higher than similar units without terraces on higher floors, for an average premium of \$95,030 per unit.

Omni Ecosystems has also worked with Studio Gang, founded by Jeanne Gang, winner of the 2022 ULI [Visionaries in Urban Development Award](#), to develop a rooftop prairie ecosystem complete with 70 native species including black maple, burr oak, and downy hawthorn trees.

For more details, see ULI's [case study on District House](#) on the Developing Urban Resilience website.



At District House, lawned terraces on one floor of the multifamily building and a rooftop wildflower meadow resulted in a building that connects tenants to nature, while providing the developer with a strong return on investment.



Water conservation boosts drought resilience; using less water helps limit pollutant runoff.



Environmental resilience



Water quality protection



Rainwater harvesting conserves water in the landscape for other species to use.

While native landscaping can reduce the total amount of water required to maintain plantings, overall water conservation, particularly in drought-prone areas, preserves water and aquatic habitats for local wildlife. As an increasing portion of the world faces unprecedented drought conditions, conserving on-site water use through low-flow fixtures, graywater recycling, or

other measures will be increasingly necessary and ultimately preserve the long-term value of real estate.

To learn best practices for real estate and land use professionals in drought-prone areas, see ULI's [*Water Wise: Strategies for Drought-Resilient Development*](#) report.



Turning off building lights reduces energy use.



Energy efficiency

“At Prologis, we are seeing a lot of inspiration around a vision of what the world would look like, if we had nature and well-being at the core of how we design and build. In our current and upcoming projects, we’re seeing how important it is to have biodiversity consultants, landscape architects, and ecologists at the design table.”

—David Mellor, Prologis



In the United States, glass collisions may kill up to 1 billion birds annually, as reflections during the day and lights at night confuse birds. This is particularly a problem along major avian migratory routes. Because many new buildings feature a large amount of glass, bird-safe design strategies are important to preserve local and migratory bird species. To prevent birds from colliding with windows during the day, glass facades should have external screens or visual markers to help birds notice the reflective surfaces. Interior plants can also be moved away from windows. At night, building lights should be turned off wherever possible.

New policies are also beginning to require bird-safe design strategies in buildings. Local Law 15 in New York City amended the building code to mandate bird-friendly materials in all new buildings and major retrofits. And a number of other U.S. cities have implemented a [lights-out program](#), dimming the lights of large buildings at night to reduce collisions. In Singapore, bird-safe building guidelines are part of the Building and Construction Authority’s Green Mark certification.



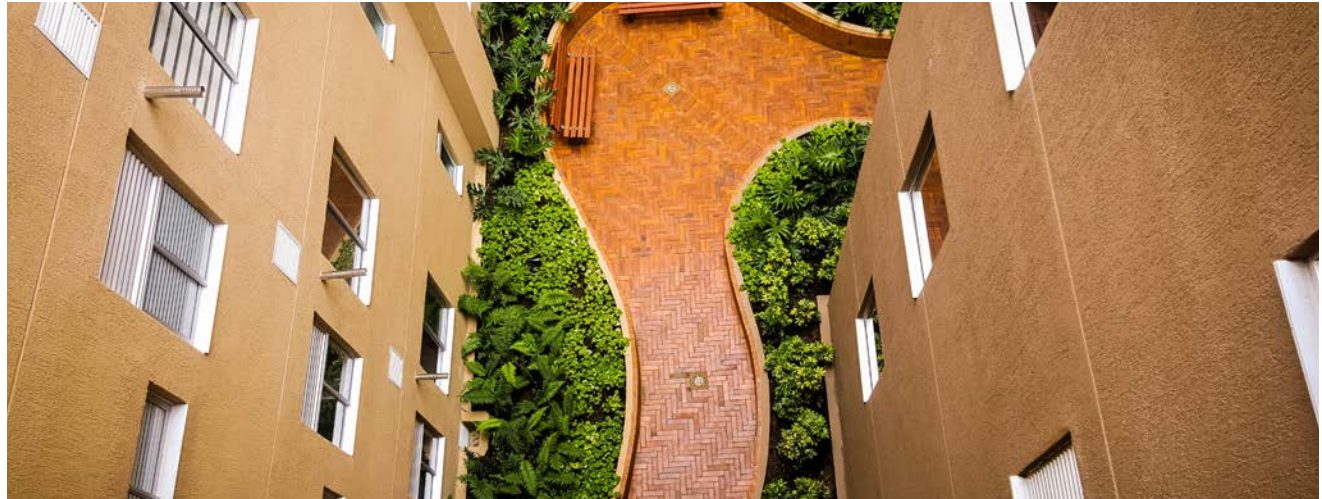
Integrating nature into buildings provides significant health and wellness benefits by reducing stress, filtering indoor air, and improving lighting quality.



Health and wellness

“Biophilic design is a set of strategies that from the outset is based on the principle that there is a connection between a natural context and wellness, so how can we make our built environment more like nature? In terms of outcomes, it’s very much about introducing nature and natural materials and processes back into our built environment and achieves similar outcomes as nature-based solutions, in terms of creating conditions conducive to life. These are healing environments and environments where improved productivity, cognitive performance, and stress reduction have been observed.”

—Erin Rovalo, International Living Future Institute



Biophilic design promotes the connection between humans and nature in the built environment in a way that maximizes occupant satisfaction and promotes health and well-being. According to Terrapin Bright Green, 14 patterns of biophilic design split into the following three categories:

1. Nature in the space:

- Visual connection with nature;
- Nonvisual connection with nature, such as auditory or olfactory;
- Nonrhythmic sensory stimuli;
- Thermal and airflow variability including air flow and humidity changes;
- Presence of water;
- Dynamic and diffuse light similar to what can be found in nature; and
- Connection with natural systems and processes.

2. Natural analogues:

- Biomorphic forms and patterns that occur in nature;
- Material connection with nature through ecology or geology; and
- Complexity and order of the senses.

3. Nature of the space:

- Prospect or unimpeded view;
- Refuge where occupant can withdraw;
- Mystery to entice the occupant to engage further; and
- Risk/peril with an added safeguard.

See Terrapin Bright Green’s [14 Patterns of Biophilic Design](#) guide and the International Living Future Institute’s [Biophilic Design Toolkit](#) for more information.



Reduced use of machinery to maintain landscapes reduces energy use (and carbon emissions, if equipment is not electric), and reduced use of harmful chemicals protects water quality.



Energy efficiency



Water quality protection



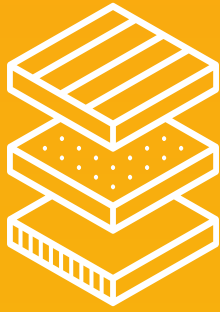
Tim Dennell, CC 2.0

Limiting mowing and allowing landscaped areas to flower and go to seed create better habitat.

For nature-positive design to be effective, nature-positive maintenance is also necessary to ensure high-quality and long-term performance. Similar to the emphasis on natural design, site management and maintenance can promote biodiversity by elevating natural processes and reducing human intervention, such as limiting mowing, which also helps reduce operations and maintenance costs. As sites switch to performance monitoring of nature-positive solutions,

an adaptive management plan enhances long-term results by ensuring that the design is not static and instead continues to flourish.

In addition, procurement of maintenance materials can promote biodiversity by limiting use of toxic chemicals to reduce pollution in land and water or limiting or reusing packaging to minimize disposal.



MATERIAL SELECTION STRATEGIES

- Set Standards for Material Procurement
- Supporting the Circular Economy



Reclaimed wood reduces need for timber harvesting.

As noted previously, reductions in nature and biodiversity can disrupt building supply chains. To help overcome these potential

impacts, material selection during design and operations is key. Material-level strategies are addressed in the following subsections.



Material procurement that protects ecosystems that provide source materials increases their resilience to climate impacts, protects the health and wellness of communities that inhabit those ecosystems, maintains their ability to sequester carbon, can boost social equity through better treatment of workers in the supply chain and reduced environmental degradation in marginalized communities, and protects local water quality.



Environmental resilience



Health and wellness



Carbon sequestration



Community empowerment and social equity



Water quality protection



Building materials such as timber can be sourced from suppliers that either restore or maintain ecosystem services to reduce ecosystem impact.

Raw building materials for development projects rely on growing, extracting, manufacturing, and transporting resources. Each step of this process can affect biodiversity through habitat destruction or pollution, while also releasing carbon—for example, by disturbing soils or cutting mature forests that sequester large amounts of carbon.

Life cycle assessments can help architects and developers understand a portion of the biodiversity impacts of material selection, from embodied carbon and net zero impacts,

to eutrophication, acidification, and resource depletion. These are common aspects of certifications like LEED and the Living Building Challenge.

Developers can set material procurement standards, sourcing materials with limited ecosystem impact and from suppliers that either restore or maintain ecosystem services. Setting targets for a minimum number of materials with comprehensive Environmental Product Declarations can help operationalize these goals.



Reusing resources and decreasing extraction, waste, and pollution preserve ecosystems that source materials, helping maintain their resilience to climate impacts and ability to sequester carbon, protect the health and wellness of communities that inhabit those ecosystems, and safeguard local water quality.



Environmental resilience



Health and wellness



Carbon sequestration



Water quality protection



Recycled materials reduce resource extraction.

The principles of the circular economy can support biodiversity preservation, by eliminating waste and reducing pollution, reusing products and reducing resource extraction, and ultimately regenerating nature. In real estate, the reuse of building materials or choosing to redevelop buildings promotes circularity and reduces material impacts on biodiversity by limiting new raw resource extraction, manufacturing, and transport, while supporting net zero goals by decreasing emissions from new construction.

For more information and examples of how real estate can reduce embodied carbon through material reuse, see ULI's [*Embodied Carbon in Building Materials for Real Estate*](#) report.



Recycled waste plastics converted to building materials.



OFF-SITE STRATEGIES

- Biodiversity in Renewable Energy Procurement
- Biodiversity Offsets and Credits



Restoring native ecosystems, like coastal mangroves, can be an important off-site strategy that is ripe for real estate investment.

Real estate organizations are also turning to off-site biodiversity strategies to achieve both their nature and carbon goals, whether by investing in carbon removal projects or balancing the impacts of new developments through biodiversity offsets.

Off-site strategies are addressed in the following subsections.



Integrating plantings with renewable energy helps these landscapes sequester carbon and provide water filtration.



Carbon sequestration



Water quality protection



Mexican sunflowers in front of solar panels. Their orange petals attract butterflies.

Developers and building owners that set net zero goals but cannot meet their energy needs with on-site renewable energy will need to procure off-site renewables. This power is often purchased from off-site solar farms, which are usually developed over a wide expanse of gravel or lawn grass. To maximize the biodiversity benefits of solar, organizations can procure pollinator-friendly solar that uses planting of native and pollinator-friendly vegetation around and under the solar array.

These plantings combat habitat loss for critical pollinators such as bees and butterflies, improve surrounding soil and water quality, and have even been shown to improve crop yields in neighboring agricultural plots.

To incorporate pollinator-friendly solar into off-site procurement, sample language can be found at the [Center for Pollinators in Energy](#).



High-quality biodiversity offsets and credits can increase ecosystem resilience to climate impacts, protect the health and wellness of communities that inhabit those ecosystems, maintain landscapes' ability to sequester carbon, boost social equity through access to employment and reduced environmental degradation in marginalized communities, and protect local water quality.



Environmental resilience



Health and wellness



Energy efficiency



Carbon sequestration



Community empowerment and social equity



Water quality protection



Biodiversity offsets, similar to carbon offsets, aim to create measurable increases in nature outside the project area to compensate for the negative impacts of a project. They can generally be categorized as restoration offsets or protection offsets, and while many think of offsets as an international option, they could theoretically take place anywhere, even a few city blocks from a new or existing asset. Real estate organizations interviewed mentioned researching these opportunities to offset biodiversity impacts and even embodied carbon as part of achieving their net zero goals.

While impactful, it should be noted that the relevance of these investments to a specific project can be difficult to explain to stakeholders, making on-site opportunities a key first choice to consider, or potentially siting offsets as close to the project site as possible, where the connection with the project is clearer.

Though somewhat distinct from purchasing separate offsets, some companies, like Prologis, include purchases of land nearby in addition to the development site as part of acquisition and oversee ecological restoration there to help meet biodiversity net gain targets, whether internal or as required by legislation.

The International Union for Conservation of Nature (IUCN) and Business and Biodiversity Offsets Program (BBOP) have set standards to assess biodiversity offset projects.

Biodiversity offsets often require the cooperation or engagement of local communities, which can include local Indigenous communities that have been stewards of the land throughout history. Selecting projects that adopt strong social practices and deliver positive social outcomes is important to ensure that these communities remain equal partners in project development and maintain sovereignty and access to native lands and that projects do not negatively impact poor or vulnerable populations, or generate conflict.

Biodiversity credits are another off-site tool, distinct from offsets in that they are not meant to compensate for harmful biodiversity impacts at a 1:1 ratio. Instead, the World Economic Forum defines voluntary biodiversity credits as a proactive "investment in nature's recovery, rather than an offset for damage," through the creation and sale of biodiversity units anywhere in the world.

“There is so much we can solve on the climate crisis by learning from and aligning with nature. It can be a dramatic and effective domino effect as companies see cost efficiencies with greater operational and supply chain resilience; happier, healthier, and more productive employees; and tenants who become more connected to each other and their communities. When development, procurement, and operations are approached holistically like a natural system within an organization and within the communities in which they reside, the components of this system inherently become more balanced and self-regulating, much like an ecosystem in nature.”

—Jade Paul, Jacobs

MOVING TOWARD NATURE-POSITIVE REAL ESTATE



MOVING TOWARD NATURE-POSITIVE REAL ESTATE

The links between biodiversity, net zero, and human health are clearer than ever. Nature must be recognized as an intrinsic part of the building life cycle, from the creation and circular management of materials to build the building, to creating a long-term sense of place for tenants and the community. Today's developers are building properties that will be a part of the landscape for the next 50 years and maximizing building

value requires them to make the economically and environmentally smart choice from the start. Immediate action is required to finance and implement nature-positive measures so that the built environment helps regenerate ecosystems and supports the transition to net zero.

The time to begin this work is today.

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