

3. Design for harmony between the natural and built environments

3.1 Ensure occupant access to nature within building, offering biophilic benefit to people

State of health

By 2050, it is expected that 68% of the developed world will be urbanized¹. With advancing urbanization, the human species is becoming increasingly distanced from nature. The incorporation of nature into the indoor environment is referred to as biophilic design, connecting people to nature both inside and outside buildings. Biophilic design is understood to reduce stress, enhance creativity and clarity of thought, improve our well-being and even progress healing².

Due to humans' affinity to the natural world, interaction with nature in and around buildings enhances a sense of wellbeing by addressing our innate psychological need to be part of natural world. Biophilic design contributes to a wider nature-based sustainability in which we aspire for buildings and cities to progress in development in symbiosis with vegetation.

There have been numerous studies over the last 35 years on the benefits to the built environment through improving a connection to nature.³

- **Office design:** productivity can be increased by 8%, rates of well-being up by 13%, increases in creativity, with reduced absenteeism and presenteeism.
- **Hospitality design:** Guests willing to pay 23% more for rooms with views of biophilic elements
- **Education spaces:** increased rates of learning 20-25%, improved test results, concentration levels and attendance, reduced impacts of ADHD.
- **Healthcare spaces:** post-operative recovery times decreased by 8.5%, reduced pain medication by 22%.
- **Retail:** increase average rental rates on retail spaces with customers indicating they were willing to pay 8-12 % more for goods and services.
- **Homes:** can become more calming & restorative, with 7-8 % less crime attributed to areas with access to nature and can command an increase of 4-5% in property price.

Outcomes

Buildings to ensure occupant access to nature within the indoor environment, following principles of biophilic design to maximise mental and physical health and wellbeing benefits for occupant.

Strategies across the lifecycle

Design:

Biophilic design guidance includes:

- The incorporation of nature through environmental elements, lighting and space layout – examples include terraces, indoor water features, green walls and gardens
- The incorporation of nature's patterns in design
- Opportunities for human interaction with nature
- Consideration of sound isolation of buildings to protect surrounding nature and outdoor environment.

Benchmarks

Biophilic design patterns are flexible and replicable strategies for enhancing the user experience that can be implemented under a range of circumstances, and also require consideration of locally appropriate design.⁴ Benchmarks to standardise good practice in achieving appropriate levels of biophilia are therefore infeasible to dictate on a global scale, and design teams are encouraged to research and replicate local good practice, in and outdoors.

More information

- BCO Wellness Matters. Roadmap: 'Inside' <http://www.bco.org.uk/HealthWellbeing/WellnessMatters.aspx>
- Beam Plus New Buildings V2.0 'Health and Wellbeing': https://www.hkgbc.org.hk/eng/beam-plus/file/BEAMPlus_New_Buildings_v2_0.pdf
- BREEAM International New Construction Standard 'Hea 01 Visual comfort' and 'Pol 05 Reduction of noise pollution': <https://www.breeam.com/discover/technical-standards/>
- BREEAM International In-Use Standard 'Hea 06 View out' and 'Hea 11 Provision of rest areas': <https://www.breeam.com/discover/technical-standards/>
- Green Building Council of Australia (GBCA) 2018 'Building with nature, Prioritising ecology and biodiversity for better buildings and cities': <https://new.gbca.org.au/green-star/green-star-strategy/building-nature/#buildingwithnature>
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- Z. Myers. 'Wildness and Wellbeing. Nature, Neuroscience, and Urban Design' <https://link.springer.com/book/10.1007%2F978-981-32-9923-8#authorsandaffiliationsbook>
- Oliver Heath Design - <https://www.oliverheath.com/biophilic-design-connecting-nature-improve-health-well/>
- Terrapin Bright Green. 14 Patterns of Biophilic Design. <https://www.terrapinbrightgreen.com/reports/14-patterns/>
- Urban Land Institute. 2015. 'Building Healthy Places Toolkit' <https://bhptoolkit.uli.org/>

3.2 Ensure occupant access to nature outdoors, encouraging biodiversity within site footprint and surroundings

State of health

There is significant evidence demonstrating the positive impacts of green space and biodiversity on both human health and wellbeing and urban space.⁵ The percentage of the global population living in urban areas is set to increase to 70% by 2050⁶ and biodiversity contributes to the liveability of our cities. The human benefits of urban green space include reduced morbidity and improved physical health outcomes, improved mental well-being, increased social cohesion and the provision of ecosystem services that can offer human health co-benefits, such as air cooling and air quality.⁷

Access to good quality outdoor green space is associated with positive health outcomes⁸, including:

- improvements in mental health and wellbeing, such as depression, stress, dementia
- increased longevity in older people
- lower body mass index (BMI) scores, overweight and obesity levels and higher levels of physical activity better self-rated health

Access to green space is often impacted by socio-economic factors. People living in the most deprived areas are less likely to live near green spaces and will therefore have fewer opportunities to experience the health benefits of green space compared with people living in less deprived areas.⁹ An inequitable distribution of parks and other green spaces could exacerbate health inequalities if people on lower incomes, who are already at greater risk of preventable diseases, have poorer access.¹⁰

Green infrastructure integrates the natural world into the physical fabric of buildings, and is frequently implemented with green walls, green roofs and vertical gardens, particularly for high rise buildings. Green infrastructure offers benefits including; the removal of air pollutants, reduction of urban air temperatures and passive thermal benefits to buildings, improvement of local biodiversity through the provision of habitat for flora and fauna, rainwater attenuation, noise reduction and improved sense of wellbeing through biophilic connection for occupants¹¹:

Outcomes

Access to quality green space on building footprint, in addition to local community. Maximise biodiversity on site and encourage implementation of nature-based solutions at community level.

Strategies across the lifecycle

Design:

- Implementation of green infrastructure in building design, such as;
 - Shared landscaped courtyards and/or grounds, particularly in areas of social and economic deprivation.
 - Green roofs: Green roofs can significantly reduce the cooling load of a building, resulting in reduced cooling requirements and therefore reduced energy consumption and associated output of atmospheric carbon dioxide¹²
- Incorporate endemic ecological planting. Ensure incorporation of native plant species to support local flora and fauna.
- Incorporate ponds, waterways and wetlands: Ponds and wetlands offer great value as habitats to encourage biodiversity, plus function as Sustainable Drainage Systems and pollutant control resources.¹³
- Rehabilitation of degraded land: Repair land degradation and protect from multiple forces of risk, including extreme weather conditions (particularly drought), and human activities that pollute or degrade the quality of soils and land utility.
- Dedicated fauna underpasses at crossings to assist in avoiding collisions between vehicles and animals
- Consider and mitigate risk of introducing pathogens and pests into the environment when introducing flora and fauna.

Benchmarks

- Biodiversity Assessment: the impact on biodiversity of a project can be measured assessing the value of habitats including the quality and quantity of biodiversity gained and lost, comparing the ecological value pre and post construction on a site by site basis.

More information

- BCO Wellness Matters. Roadmap: 'Outside' <http://www.bco.org.uk/HealthWellbeing/WellnessMatters.aspx>
- Beam Plus New Buildings V2.0 'Sustainable Site, Integrated Design and Construction Management': https://www.hkgbc.org.hk/eng/beam-plus/file/BEAMPlus_New_Buildings_v2_0.pdf
- Beam Plus Neighbourhood V1.0 'Site Aspects': <https://www.beamsociety.org.hk/files/Manual/BEAMPlusNDManualWithCorrigendumNo1.pdf>
- MC Public Health. Do low-income neighbourhoods have the least green space? A cross-sectional study of Australia's most populous cities - <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-292>
- BREEAM International New Construction Standard 'Tra 02 Proximity to amenities', 'LE 02 Ecological value of site and protection of ecological features', 'LE 04 Enhancing site ecology' and 'LE 05 Long term impact on biodiversity': <https://www.breeam.com/discover/technical-standards/>
- BREEAM International In-Use Standard 'Hea 11 Provision of rest areas', 'Tra 03 Proximity to amenities', 'Lue 01 Planted area', 'Lue 02 Ecological features of planted area', 'Lue 03 Ecology report' and 'Lue 04 Biodiversity Management Plan': <https://www.breeam.com/discover/technical-standards/>
- DGNB 'Liveable and Fit for the Future' <https://www.dgnb.de/en/council/publications/index.php>
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- Green Building Council of Australia Green Star - Design & As Built 'Land Use and Ecology': <https://new.gbca.org.au/green-star/rating-system/design-and-built/>
- IGBC Green Interiors Rating Tool: 'Outdoor Views' <https://igbc.in/igbc/redirectHtml.htm?redVal=showgreeninteriorsnosign#GreenHomes>
- IGBC Health and Wellbeing Rating Tool: 'Exterior Connectivity to Occupants' <https://igbc.in/igbc/redirectHtml.htm?redVal=showHealthWellBiengnosign#Resources>
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- Z. Myers. 'Wildness and Wellbeing. Nature, Neuroscience, and Urban Design' <https://link.springer.com/book/10.1007%2F978-981-32-9923-8#authorsandaffiliationsbook>
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- Report of the Hammersmith & Fulham Biodiversity Commission 8 October 2017 - https://www.lbhf.gov.uk/sites/default/files/section_attachments/biodiversity_commission_final_report_rev4.pdf
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- Urban Land Institute. 2015. 'Building Healthy Places Toolkit' <https://bhptoolkit.uli.org/>
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- World Health Organisation (WHO) 2015 Connecting Global Priorities: Biodiversity and Human Health, a State of Knowledge Review Available at <https://www.who.int/publications-detail/connecting-global-priorities-biodiversity-and-human-health>



- ¹ United Nations - <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>
- ² Terrapin Bright Green. 14 Patterns of Biophilic Design. <https://www.terrapinbrightgreen.com/reports/14-patterns/>
- ³ Oliver Heath Design - <https://www.oliverheath.com/biophilic-design-connecting-nature-improve-health-well/>
- ⁴ Terrapin Bright Green. 14 Patterns of Biophilic Design. <https://www.terrapinbrightgreen.com/reports/14-patterns/>
- ⁵ Green Building Council of Australia 2018 Building with nature, Available at https://gbca-web.s3.amazonaws.com/media/documents/gbca-future-focus-building-with-nature-fa-web_emZlpIB.pdf Accessed 28/02/2020
- ⁶ United Nations 2015
- ⁷ Kendal, D., Lee, K., Ramalho, C.E., Bowen, K.J., & Bush, J. (2016). Benefits of Urban Green Space in the Australian Context.
- ⁸ Public Health England - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/355792/Briefing8_Green_spaces_health_inequalities.pdf
- ⁹ Public Health England – Improving access to green spaces - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/355792/Briefing8_Green_spaces_health_inequalities.pdf
- ¹⁰ Do low-income neighbourhoods have the least green space? A cross-sectional study of Australia's most populous cities. <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-292>
- ¹¹ Biotecture: <https://www.biotecture.uk.com/benefits/benefits-of-exterior-living-walls/>
- ¹² Benefits of Green Roofs https://www.thegreenroofcentre.co.uk/green_roofs/benefits_of_green_roofs.html
- ¹³ Maximising the Ecological Benefits of Sustainable Drainage Systems - https://www.susdrain.org/files/resources/other-guidance/ecological_benefits_summary.pdf

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