ENV2.4

Biodiversity at the site

Objective

Our objective is to maintain biodiversity in the local environment. The built environment has a significant influence on the diversity of the ecosystems (ecological communities, habitats and landscapes), the diversity of the species there and their genetic diversity. We want to encourage positive steps towards creating, maintaining and increasing biodiversity both on buildings themselves and in their environs.

Benefits

People generally feel happier and healthier when they are in a natural environment. Subjective well-being has an enormous effect on people's health and on what they can achieve. Furthermore, plants in, on and around the building and respect for the local fauna create a positive image of the building. This increases value of the property. In addition, choosing plants that are suitable for the site can reduce subsequent costs as these are often hardier, less susceptible to disease etc., and require less care.

Contribution to high-priority sustainability goals

	CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS (SDGS) OF UNITED NATIONS (UN)		CONTRIBUTION TO THE GERMAN SUSTAINABILITY STRATEGY	
Significant	15.5	Natural habitats	15.1	Biodiversity
Moderate	13.1 15.8 15.9	Resilience and adaptability Invasive species Ecosystem and biodiversity values in decision-making processes		
Low	11.5	Impact of catastrophes		

Outlook

Adapted to the DGNB scheme for districts, this criterion is being applied to buildings for the first time in the 2018 version. For a long time now, the considerable importance of biodiversity has required a pragmatic approach. Our short-term objective is to re-examine the methodology and increase acceptance of this issue. In the medium term, we plan to add further, relevant indicators to the methodology that are conducive to achieving our goal.

Share of total score

	SHARE	RELEVANCE FACTOR
Office Education Residential Hotel Consumer market Department stores Logistics Production	1.2%	1
Shopping centre	1.1%	1
Assembly buildings	1.3%	1

EVALUATION

In order to maintain the diversity of ecosystems, indicator 1 provides information on identifying "biotope area quality". An Excel tool is available for calculating this. In order to foster diversity amongst animal species, measures implemented to support this in indicators 2 and 3 will be reflected positively in the assessment. Indicator 4 plays a key role in maintaining the genetic diversity of flora. If ecosystems are interlinked or facilitate the travel or migration of animals from one area to another, this can be made clear using indicator 5. Finally, fulfilling indicator 6, "Development and maintenance care", demonstrates that a long-term commitment to cultivating the area has been honoured. 110 points can be obtained for this criterion, of which a maximum of 100 points can be awarded for just fulfilling the criterion. The additional 10 points can be obtained by earning an "Agenda 2030 bonus". Including the bonus, a maximum of 110 points can be awarded for this criterion.

NO.	INDICATOR	POINTS
1	**Biotope area quality**	
1.1	**Biodiversity index** Property-specific biodiversity index = (total (sub-areas * specific biodiversity indices) * (floor space index) / (plot area)) ■ Property-specific biodiversity index = 0.25 ■ Property-specific biodiversity index ≤ 0	**0–30** 30 0
1.2	**AGENDA 2030 BONUS – CLIMATE AND SPECIES PROTECTION GOALS** Green surfaces on the building: Property-specific biodiversity index > 0.25 (for every 0.015 whole number above this figure +1 bonus point, max. bonus points = 10)	**+10**
2	**Diversity of animal species in the outdoor area**	
2.1	**Specific measures for the active introduction of new and native animal species in the outdoor area** Measures to encourage and support existing species and introduce new and native animal species in the outdoor area have been and will be implemented as part of the building project on the plot of land covered by the project or in its immediate vicinity as part of the construction measure.	**20**
3	**Diversity of animal species on the building itself**	
3.1	**Specific measures for the active introduction of new and native animal species on the building** Measures to encourage and support existing species and introduce new and native animal species on the building itself (e.g. nesting boxes, beehives, bird protection glass, etc.) have been and will be implemented as part of the project.	**20**
4	**Invasive plant species**	
4.1	**Avoidance of invasive plant species** No invasive plant species (in accordance with the table in Appendix A, indicator 4) are planted on the land as part of the building project.	**10**

NO.	INDICATOR	POINTS
5	**Habitat connectivity**	
5.1	**Measures for habitat connectivity** An evaluation has been carried out with regard to the impact of the project and whether it disrupts or improves links between surrounding biotopes or the movement of animals between areas. Where disruption as a result of the project has been anticipated, measures have been put in place to mitigate the disruption or to interlink areas.	**10**
6	**Development and maintenance care**	**Max. 10**
6.1	**Development agreement** Once work has been completed to satisfy the initial-maintenance provisions, the outdoor area is tended for a further, limited period (generally 1 to 2 years) to encourage the growth of vegetation.	+5
6.2	**Maintenance care** The outdoor area is tended to ensure that it remains operational and to maintain the environmental quality as part of the maintenance provisions. A contractually agreed inspection takes place once a year.	+5
7	**Biodiversity strategy**	
7.1	**Devising and implementing a biodiversity strategy** A comprehensive, long-term biodiversity strategy that goes beyond the measures stipulated in the land-use plan or planning permit and provides for future site development is devised and implemented for the building and its immediate environs.	**10**

SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

The biodiversity index calculated in indicator 1 and information on whether or not invasive plant species are to be planted are good key performance indicators (KPIs) to report.

NO.	KEY PERFORMANCE INDICATORS (KPIS)	UNIT
KPI 1	Property-specific biodiversity index	[-]
KPI 2	Planting of invasive plant species	Yes/no

Synergies with DGNB system applications

- **DGNB DISTRICT:** Indicators 1, 2, 4 and 5 correspond to the content of criterion ENV1.4, indicators 2, 1, 4 and 3 from the schemes for urban districts, and business districts (Version 2016) and to indicators 1.4.1 and 1.4.2 from the scheme for industrial locations..

APPENDIX A – DETAILED DESCRIPTION

I. Relevance

A decline in biodiversity can be observed the world over. This puts the very foundation of human existence at risk because this loss is irreversible (*cf. BMU 2007*). To counteract this, for example, at the 1992 UN summit in Rio de Janeiro, international objectives for maintaining and increasing biodiversity were agreed, and these objectives are now to be implemented at local level (cf. UN 1992).

Demonstrating respect for nature by catering for biodiversity at the local development site projects a positive image, both externally to customers and visitors and internally to employees. Well-being is demonstrably enhanced by being in healthy, natural environments, which in turn benefits people's overall health.

Even in an urban context, biodiversity can be maintained or nurtured through appropriate measures to the extent that, in the urban environment, greater biodiversity can potentially be achieved than, for example, in mono-structural landscapes or rural areas with very little arable land that could be useful for this purpose. A strategic, environmentally friendly urbanisation concept can be used to integrate landscaping and architecture, e.g. in the form of green roof landscaping, new façade greening systems, realistic water features and small-scale urban farming, combining contemporary design, necessary utilisation and the development and protection of biotopes.

II. Additional explanation

–

III. Method

The indicators are evaluated on a partly qualitative, partly quantitative basis. Firstly, the overall ecological quality of the plot/project area is assessed using a biodiversity index; secondly, the introduction of new species for which evidence can be produced to the effect that these species were not previously present in the area, plus the avoidance of invasive species, are evaluated.

Indicator 1: Biotope area quality
The overall ecological quality of the project area is to be assessed. This evaluation is to be conducted on the individual sub-areas of the project area and their biological quality. For this purpose, a factor is assigned to each sub-area depending on its biological quality (see "Biodiversity indices" table below). For example, a fully tarmacked area is assigned a factor of 0, and a natural water area is assigned a factor of 1.0. Vertical greening and green roofs are also included in the evaluation. The property-specific biodiversity index could therefore theoretically also be higher than 1.0.

The biodiversity index is the sum of the project area's sub-areas multiplied by the specific factor, as a proportion of the total plot area, which is rated using the site occupancy index.

If a qualified expert demonstrates that the environmental quality of an area of land merits a higher rating than that specified in Table 1, a new factor can be recorded for this area. For example, this may be the case if high-risk species have become established on an area of land.

Information with regard to the evaluation

The points for the indicator can be calculated using the following equation:
Property-specific biodiversity index = (total (sub-areas * specific biodiversity indices) * (floor space index) / (plot area))

Building activities (sealing, etc.) reduce the possible environmental quality of an area of land. For this reason, a correction factor is introduced in the form of the floor space index (fsi), depending on the specific development area. The floor space index (fsi) is generally defined in the national (local) land-use plan. If there is no land-use plan, this must be done by determining what area category the plot of land belongs to; see Table 5: Site occupancy index).

Tables 1–4: Biodiversity indices for sub-areas

NO.	DESCRIPTION	FACTOR
1.	**Sealed or partially sealed land**	
1.1	Sealed land Land cover impervious to air and water; no vegetative cover E.g. concrete, tarmac, slabs with a bound foundation	0
1.2	Partially sealed land Land cover impervious to air and water; generally no vegetative cover E.g. clinker, crazy paving, slabs with a sand/gravel foundation, water-bound covers, gravel surfaces, sand surfaces, grass pavers, spaced paving with grass jointing	0.3
1.3	Semi-open land or land cover permeable to air and water; infiltration, vegetative cover; e.g. lawns on gravel, wood-block paving	0.5

NO.	DESCRIPTION	FACTOR
2.	**Green spaces**	
2.1	Vegetation areas separate from the ground Vegetation areas on ground fill that is less than 80 cm deep	0.5
2.2	Vegetation areas separate from the ground Vegetation areas on ground fill that is more than 80 cm deep	0.7
2.3	Vegetation areas contiguous with the ground Vegetation contiguous with the adjacent ground, available for developing flora and fauna	1.0

NO.	DESCRIPTION	FACTOR
3.	**Green space on buildings**	
3.1	Roof greening Extensive or intensive greening of roof surfaces	0.7
3.2	Vertical greening, up to a max. height of 10 m Greening external walls; the real height up to max. 10 m is included	0.5

NO.	DESCRIPTION	FACTOR
4.	**Other**	
4.1	Rainwater infiltration per m² of roof surface area	0.2

Table 5: Site occupancy index

NO.	DESCRIPTION	FACTOR
1.	**Development area**	
1.1	Small housing development area	0.2
1.2	Exclusively residential area, general residential area, holiday area	0.4
1.3	Special residential area	0.6
1.4	Village area, mixed-use area	0.6
1.5	Town or city centre	1.0
1.6	Commercial area, industrial area, other special areas	0.8
1.7	Weekend home area	0.2

Indicator 1.2: Agenda 2030 bonus – climate protection goals
This is awarded if the biodiversity index result is more than the maximum possible number of evaluation points. 1 bonus point can be awarded for every whole number above this figure (a maximum of 10 bonus points can be awarded).

Indicator 2: Diversity of animal species in the outdoor area
The protection of existing animal species and the introduction of new, native animal species for which evidence can be produced to the effect that these species were not previously present in the area, are evaluated. Only measures that are implemented within or in the immediate vicinity of the project area are assessed. The active introduction of new species is intended to increase rather than just maintain biodiversity in the long term.
Species from the following genera can be selected:

- Birds, bats
- Butterflies, wild bees, wasps
- Amphibians, reptiles

A plan must be submitted for the selected species. This plan describes the critical site factors for the life stages "breeding/rearing", "food/sleeping place", "hibernation" and "courtship/mating phase", and their integration into the district. Following the principles of "Animal-aided design" (cf. Hauck, Weisser 2015), it is necessary to integrate the needs of the new animals into open space planning right from the very start. If animals become part of the draft design in this way, they not only inspire the design, but also make it better.
In order to earn the evaluation points, a binding statement must be made to the effect that the measures are not listed in the environmental report or land-use plan of an environmental impact assessment (EIA) or strategic

environmental assessment (SEA).

Indicator 3: Diversity of animal species on the building itself

Like indicator 2, except that only measures that are implemented on the building itself will be reflected positively in the assessment.

Indicator 4: Invasive plant species

The presence of invasive plant species in the district may have a continuous negative influence on environmental quality. "The intentional importation and unintentional introduction of invasive species are regarded throughout the world as the second largest cause of danger to biological diversity after the destruction of habitats" (*cf. BMU 11/2010*).

Evidence must be provided to the effect that the planning area/plot of land does not contain any invasive plant species included in the list of the main invasive and potentially invasive plant species that are used as ornamental plants or shrubs (see below and together with Regulation (EU) No 1143/2014 of the European Parliament of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species). The list was taken from the biodiversity criterion of the German BNB system for the evaluation of outdoor facilities *[BNB-System zur Bewertung von Außenanlagen,]* (*cf. BMUB 2010*). If invasive species are localised, a plan of action for combating them must be formulated, or proof must be provided to the effect that combating them has no prospect of success.

Table 6: Recommended courses of action with regard to invasive plant species[1]

ENGLISH NAME (BOTANICAL NAME)	RECOMMENDED COURSE OF ACTION
Box elder (Acer negundo)	Do not plant near bodies of water or pastureland. Plant at least 2 km away from bodies of water.
Tree of heaven (Ailanthus altissima)	Do not grow on open land. In residential areas, use must be justified by on-site conditions, e.g. drought resistance for highly urban sites where water is likely to be in scarce supply; evidence must be provided that measures have been taken to prevent their propagation (by means of vegetative reproduction or seeds).
Bastard indigo (Amorpha fruticosa)	Do not grow on open land. Plant at least 2 km away from bodies of water in residential areas.
Butterfly bush (Buddleja davidii)	Do not grow on open land.
Turkish warty-cabbage (Bunias orientalis)	Do not use as a herb (Bunias orientalis has no value as an ornamental plant).
New Zealand pygmyweed (Crassula helmsii)	Do not use.
Glandular globe thistle (Echinops sphaerocephalus)	Do not grow on open land.

[1] List of invasive plant species have to be adapted to the local conditions

Canadian pondweed (Elodea canadensis)	Use only in fenced-off water gardens/ponds. Plant at least 2 km away from bodies of water; planting any closer must be justified.
Nuttall's waterweed (Elodea nuttallii)	Use only in fenced-off water gardens/ponds. Plant at least 2 km away from bodies of water; planting any closer must be justified.
Common Japanese knotweed (Fallopia japonica)	Do not use.
Giant knotweed (Fallopia sachalinensis)	Do not use.
Bohemian knotweed (Fallopia x bohemica)	Do not use.
Red ash (Fraxinus pennsylvanica)	Do not grow on open land.
Jerusalem artichoke (Helianthus tuberosus)	Do not use if it is not possible to plant at least 2 km away from bodies of water.
Giant hogweed (Heracleum mantegazzianum)	Do not use.
Floating pennywort (Hydrocotyle ranunculoides)	Do not use.
Himalayan balsam (Impatiens glandulifera)	Do not use.
Small balsam (Impatiens parviflora)	Do not use.
Garden lupin (Lupinus polyphyllus)	Do not sow on open land or on the outskirts of residential areas (alternatively, sterile varieties can be used).
Goji berry plant (Lycium barbarum)	Do not grow on open land.
Yellow skunk cabbage (Lysichiton americanus)	Do not use.
Black pine (Pinus nigra)	Do not grow on open land. Do not grow on or in the area around calcareous grassland.
Weymouth pine (Pinus strobus)	Do not grow on open land. Do not grow within a 300 m radius of rocky areas that require preservation.
Carolina poplar	Do not grow on open land. Do not grow near naturally occurring

(Populus x canadensis)	black poplar trees.
Black cherry (Prunus serotina)	Do not grow on open land. Do not grow in the area around open land biotopes.
Common Douglas fir (Pseudotsuga menziesii)	Do not grow on open land. Plant at least 2 km away from shallow, nutrient-poor rocky ridges or 'blockfields' (e.g. colourful sandstone from the Black Forest and the Odenwald), silver birch and common oak tree forests, sessile oak tree forests and dry, acidic silicate sites.
Red oak (Quercus rubra)	Do not grow on open land. Plant at least 2 km away from rocky biotopes.
Stag's horn sumac (Rhus hirta)	Do not grow on open land or on the outskirts of residential areas.
False acacia (Robinia pseudoacacia)	Do not grow on open land. Plant at least 500 m away from xeric grassland communities that need to be preserved.
Japanese rose (Rosa rugosa)	Do not grow on open land. Do not plant near the coast (even in residential areas).
Armenian blackberry (Rubus armeniacus)	Do not grow on open land. Plant at least 500 m away from oligotrophic grassland and semi-xeric grassland communities that need to be preserved.
Narrow-leaved ragwort (Senecio inaequidens)	Do not use.
Canadian goldenrod (Solidago canadensis)	Do not use.
Late goldenrod (Solidago gigantea)	Do not use.
Common snowberry (Symphoricarpos albus)	Do not grow on open land, near rough pasture or as roadside greenery.
American blueberry hybrid (Vaccinium angustifolium x corymbosum)	Do not grow on open land. Plant at least 3 km away from moorland.

Indicator 5: Habitat connectivity

A combination of soil sealing and urban expansion has shrunk and fragmented the habitats of many species of plant and animal. The few remaining habitats that play host to wild flora and fauna are becoming isolated, preventing genetic exchange between populations. To counter this, biotopes must be interlinked.
The assessment will evaluate whether the land features sufficiently effective biotope interlinking elements. The size and distribution of these elements must be defined using a biotope land-use plan with a biotope function map.

Definitions of interlinking:

- An area is regarded as being "interlinked" if it is connected by a sufficiently wide interlinking corridor to another open space. (Areas can also be considered interlinked if evidence is provided that what are referred to as "stepping-stone biotopes" are sufficient for the migration and travel of animals and for the exchange of species between areas.)
  If there is no interlinking for certain species (for example due to a busy road), measures (green bridge, frog tunnel, etc.) must be demonstrated that link the existing species inside the project area with those outside in order to include these areas in the evaluation. The usefulness of these measures must be confirmed by a qualified expert (this may also take place as part of the EIA). This applies to roads if they are wider than 3.5 metres.

Indicator 6: Development and maintenance care

- Monitoring, maintaining and adapting the measures in question is also important. The assessment will look into whether an upkeep agreement with a specialist firm is going to be drawn up, which defines the nature of the upkeep provisions, as well as the number of upkeep tasks and the frequency with which they are to be to be carried out. Development provisions in accordance with national (local) management and maintenance plan which are to be carried out once work has been completed to satisfy the initial-maintenance provisions, and are designed to ensure that the outdoor facilities become operational.
- Maintenance provisions in accordance with national (local) management and maintenance plan are to be carried out once work has been completed to satisfy the development provisions, and are designed to ensure that the outdoor facilities remain operational.

Indicator 7: Biodiversity strategy

- A comprehensive, long-term biodiversity strategy that goes beyond the measures stipulated in the land-use plan or planning permit and provides for future site development is devised and implemented for the building and its immediate environs. A clear definition of the target development state must be provided, and there must be a yearly inspection of the progress made, after which any necessary changes must be implemented.

APPENDIX B – DOCUMENTATION

I. Required documentation

A range of different forms of documentation is listed below. The documentation submitted must comprehensively and clearly demonstrate compliance with the requirements for the target evaluation of the individual indicators.

Indicator 1: Biotope area quality

- Brief explanation, photos of the implemented measures and, if necessary, mapping in an overall plan
- Site plan, urban design concept and aerial photograph
- Categorisation of the areas in the project area and their designation on an overall plan. Calculation of the biodiversity index using the Excel tool provided. Clear declarations of intent are necessary for areas for which there is still no open space plan and for façade surfaces.

Indicator 2: Diversity of animal species in the outdoor areas
and
Indicator 3: Diversity of animal species on the building itself

- Concept within the framework of "Animal-aided design“ demonstrating how the needs of the new animals are integrated into open space planning right from the very start
- Presentation of the planned and/or implemented measures for introducing new and native species.
- Evidence that the chosen species have integrated into the area (taking critical site factors into consideration).
- Statement by (by a qualified expert) that the land does not contain any invasive species in accordance with Appendix 1 – in the event that it does, however, a mandatory plan of action for combating these invasive species must be formulated.

Indicator 4: Avoidance of invasive plant species

- Statement by a (qualified) expert that the land does not contain any invasive species in accordance with Table 6 and with the Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. In the event that it does, however, a mandatory plan of action for combating these invasive species must be formulated.

Indicator 5: Habitat connectivity and movement areas

- Site plan, urban design concept and aerial photograph
- Brief explanation, photos of the implemented measures and, if necessary, mapping in an overall plan
- Statement by a qualified expert on how interlinking between ecologically relevant open spaces for certain species is to be achieved (stepping-stone biotopes, migration tunnel, green bridges or similar crossing aids)

Indicator 6: Development and maintenance care

- Excerpt from the concluded development and upkeep agreement

Indicator 7: Biodiversity strategy

- Excerpt from the finalised biodiversity strategy

APPENDIX C – LITERATURE

I. Version

Change log based on 2018 version

PAGE	EXPLANATION	DATE
all	General: scheme “Assembly buildings” has been added	16.09.2021

II. Literature

- Bundesamt für Naturschutz [German Federal Agency for Nature Conservation]. Informationsblatt über den Handel mit Holz geschützter Arten innerhalb der Europäischen Union (EU) [Information sheet on trading protected wood species within the European Union (EU)]
- Bundesamt für Naturschutz [German Federal Agency for Nature Conservation]. Information from the Bundesamt für Naturschutz. Liste der im WA und der VO(EG) Nr. 338/97 geschützten Holzarten [List of wood species protected by the CITES and Council Regulation (EC) No. 338/97]. February 2012
- Bundesamt für Naturschutz [German Federal Agency for Nature Conservation]. Information from the Bundesamt für Naturschutz. Holzverbote [Wood bans]. April 2011
- Kaule, Giselher: Umweltplanung [Environmental planning], Eugen Ulmer Verlag, Stuttgart, 2002
- Küchler-Krischun, Jonna; Walter, Alfred Maria: Nationale Strategie zur biologischen Vielfalt [German national biodiversity strategy], Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit [German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety] (ed.), October 2007
-
- Law on the implementation of Regulation (EU) No. 1143/2014 on the prevention and management of the introduction and spread of invasive alien species
- Sustainable Development Goals icons, United Nations/globalgoals.org
- Vogelfreundliches Bauen mit Glas und Licht [Bird-friendly building with glass and light], Schmid, H., W. Doppler, D. Heynen & M. Rössler (2012): Vogelfreundliches Bauen mit Glas und Licht. 2nd, revised edition, Schweizerische Vogelwarte Sempach [Swiss Ornithological Institute in Sempach], ISBN no.: 978-3-9523864-0-8
- Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species.

Websites

- WISIA – Artenschutzdatenbank des Bundesamt für Naturschutz [Species protection database maintained by the German Federal Agency for Nature Conservation] (URL: www.wisia.de, 16.02.2011)
- Wettbewerb Bundeshauptstadt im Naturschutz [German national nature conservation capital competition] (URL: www.duh.de/uploads/tx_duhdownloads/Dokumentation_Naturschutzkommune.pdf, 27.01.2011)
- http://naturschutzbund.at/files/projekte_aktionen/vielfaltleben/downloads/EU-Liste_Beschreibungen_Auswirkungen.pdf