



PLANNING GUIDE

Biodiversity Green Roof

Life on Roofs



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Biodiversity – Diversity of Eco Systems

The precondition here is a permanently established green roof that continues to thrive. This requires building-specific planning and the appropriate reliable ZinCo system build-up.

Natural, low-maintenance extensive green roofs above all are important areas of retreat for animal and plant species. Wild bees, butterflies and ground beetles find food and refuge here. The development of species diversity, however, depends very much on how the rooftop habitats that are provided for the plants and animals are actually set up.

Pure sedum green roofs, frequently installed in combination with very shallow substrate depths, do not allow for this potential to be sufficiently exploited.

Meanwhile, the biotope function of greened roof areas can be systematically facilitated with comparatively little effort by using various design measures and by observing the fundamental principles of biodiversity when planning and implementing the project.

When selecting plants, the significance in particular of forage plants for insects and birds can be taken into consideration.



Dead branches and tree trunks can provide valuable structural elements on the roof. They provide a habitat for mosses, lichens, fungi, beetles and flies.



Vegetation-free sand pockets and coarse gravel beds are an important enrichment for the habitat as they are used by insects and other roof occupants as a hideaway, a breeding ground and a sunny spot. There are many more nest aids that help permanent insect colonisation.

These include bumble bee nesting boxes and ant rocks, in addition to insect hotels for wild bees and ichneumonids.

Retro-upgrade of Existing Green Roofs

Existing, species-poor extensive green roofs or intensive green roofs that are hardly disturbed can be converted to a biodiversity green roof at any time. The use of the various biodiversity modules will enable the diversity of fauna and flora to increase substantially. A rich variety of species and ecologically valuable habitats will emerge in particular on large roof areas that have a wide range of vegetation types.

A sound basic knowledge of the ecological interrelations of natural habitats is a must when planning and designing for green roofs rich in species.

The additional load capacity of the roof structure and, where applicable, the height of the connections and finishes of the roof sealings have to be taken into consideration in advance.



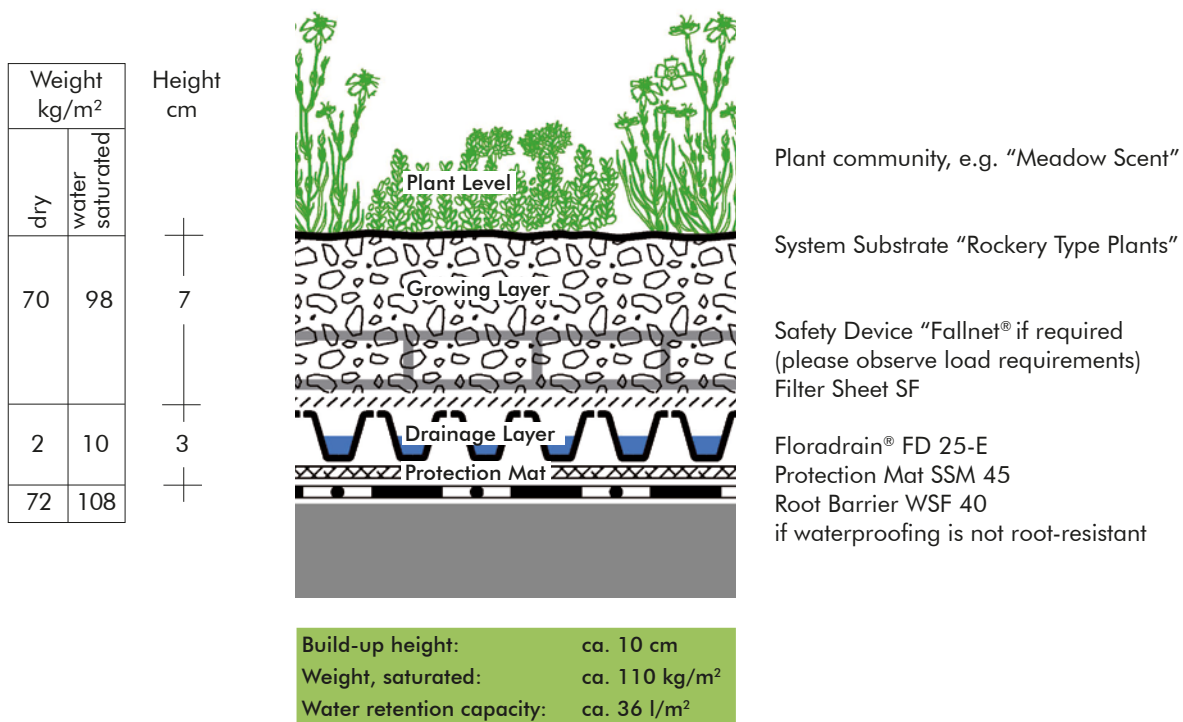
Build-up of a Biodiversity Green Roof

The Basis – Extensive Green Roof

The basis for a Biodiversity Green Roof is a reliable ZinCo System Build-up for an extensive green roof, selected according to roof pitch and roof structure, for example the System Build-up "Rockery Type Plants with Floradrain® FD 25-E".

A suitable plant community containing already a relatively large range of species is, for example, the seed mixture "Meadow Scent".

An extensive green roof becomes a biodiversity green roof when various different design measures (biodiversity modules) are applied.



Creating a Biodiversity Green Roof



The basis is provided by the system build-up "Rockery Type Plants", in this case the drainage element Fixodrain® XD 20.



The pre-loaded system substrate "Rockery Type Plants".



Sand, clay and gravel areas and substrate mounds provide structure on the surface.



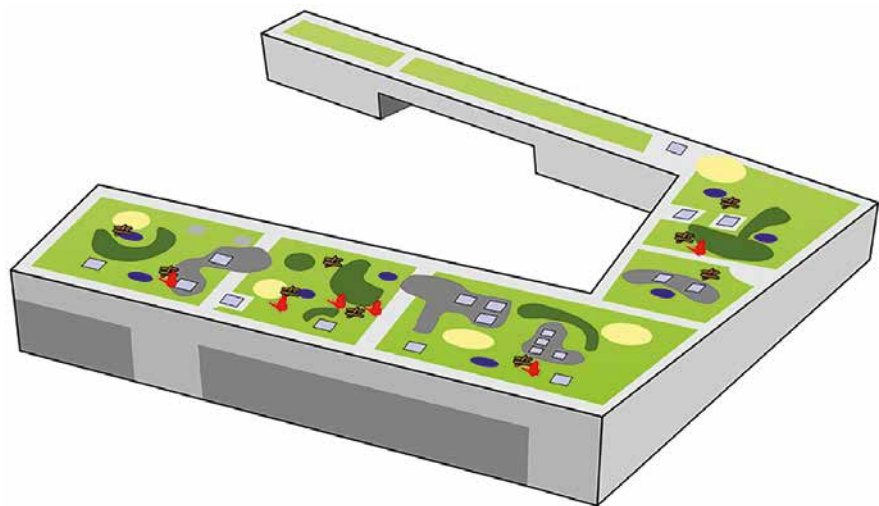
The Biodiversity Modules







In order to promote species diversity based on the fundamental principles of biodiversity, further biodiversity modules are distributed across the area in addition to the standard system build-up.

There are hilly mounds of substrate in some sections and the plant community is extended. Vegetation-free zones such as sand pockets, gravel areas and temporary water bodies are planned. Other structures could be deadwood or nest aids.

As is seen in the model on the right, while it is possible to consider a biodiversity green roof during the planning stage, the individual modules can also be incorporated at a later stage.

Any number of biodiversity modules can be used. Combining many different measures will facilitate and enhance the biotope function of the green roof.



-  *Substrate modulation and enhancement of vegetation*
-  *Coarse gravel or crushed stone*
-  *Temporary water body*
-  *Deadwood*
-  *Sand*
-  *Nesting aids*



Hilly mounds allow for a greater variety of plants.



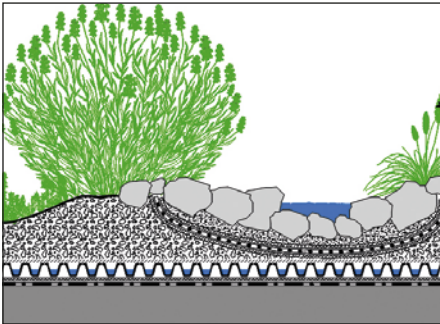
Temporary water bodies are created using drainage pipes and sheeting.



The hilly mounds are planted with forage plants, for example, for wild bees.

Overview of the Biodiversity Modules

Substrate Modulation and Enhancement of Vegetation

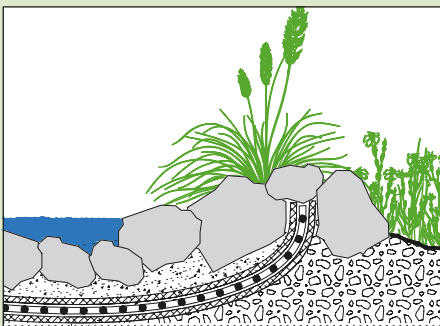


By modelling the substrate surface, the range of plant species can be extended considerably. While Sedum plants and low herbs thrive in the low areas, slightly larger grasses and herbs that require more root space and more moisture can also be planted on mounds of up to approx. 200 mm. The maximum substrate depth depends on the load-bearing capacity of the roof. If some additional organic material, e.g. Zincohum or the System Substrate "Heather with Lavender" is added to the substrate mounds, more demanding perennials and small shrubs can also be planted.



In the lower areas, sedum sprouts and mixed seed can be sown, organic material added to the hilly mounds and more sophisticated perennials planted.

Temporary Water Bodies



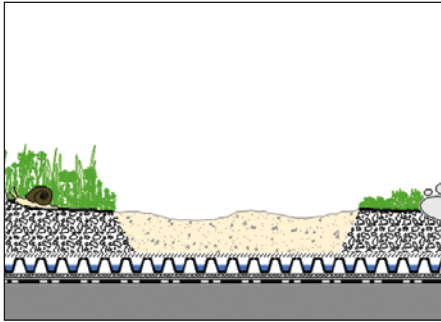
By means of a simple edging and an additional foil covered with sand, e.g. the Root Barrier WSF 40, areas can be created that temporarily store rainwater. In this way, water can be offered to insects and birds as a bathing place or drinking trough. Additionally, such water features create a cooler and wetter microclimate.



Insects and birds need water areas: They can be installed on the roof with sheeting.



Vegetation-free Areas e.g. Sand Pockets

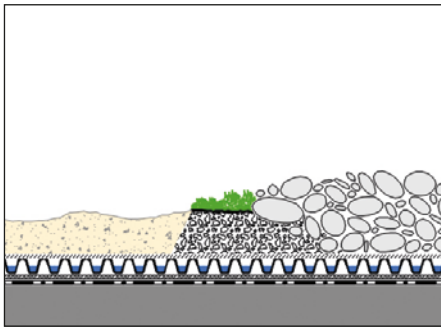


Areas free of vegetation, such as sand, gravel, crushed stone or clay surfaces are also valuable additional habitats on which many insects and invertebrates depend. For this purpose, the substrate is omitted in partial areas above the filter sheet and alternative material is introduced.



Many insects use sand pockets as breeding grounds or sunbathing areas.

e.g. Gravel or Crushed Stone

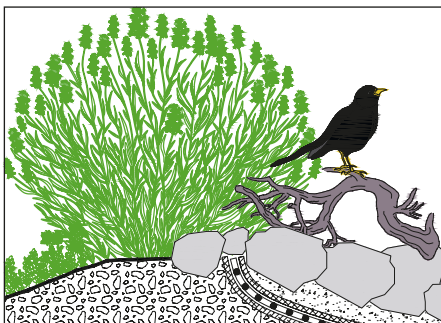


Other species find hiding places and shade between the crushed stones or gravel. Various beetle and spider species use them as hunting grounds.



The vegetation-free areas also help creating various microclimates on the green roof.

Deadwood

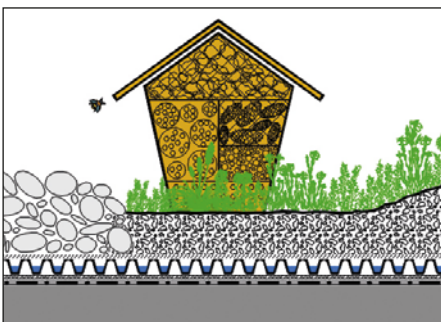


Dead wood is a particularly valuable structural element. On the otherwise very sunny roof, a shady and moist microclimate can be found under and between dead branches and tree trunks, so that mosses, lichens and fungi can also settle. Many small creatures such as beetles, wild bees, ants and flies find a habitat here.



“Deadwood” should really be called “biotope wood” as it is used as a habitat by moss, lichen, beetles and other insects.

Nesting Aids



The use of nesting aids can support the permanent settlement of insects. Nest boxes and nesting aids are available for wild bees, bumblebees, hornets, lacewings, earwigs and other free-living species. Practically all nest box manufacturers offer insect aids, and some nesting aids can also be easily made with limited manual skills.



Nest aids specifically support insect colonisation.

Suitable Plants for the Biodiversity Green Roof



The flowering period starts already in March and lasts until late autumn. All plant species are suitable in their requirements for the exposed location on the roof and cope well with a substrate depth of approx. 10 cm.

For other suitable species for areas with deeper substrate layers, you can refer to the plant list "Heather with Lavender" for semi-intensive green roofs, and you can also include other drought-resistant forage plants.

Plant Application and Seeding

The plants can be seed sown, e.g. with the seed mixtures "Meadow Scent" and "Country Colours" or planted as pre-cultivated perennials and grasses.

Drought-resistant succulents, herbs, dry grassland species and perennials are particularly suitable. Of special importance on a biodiversity green roof are forage plants for pollinators. The flowering periods of the different species should be well distributed throughout the growing season, so that bees, butterflies, bumblebees and other pollinators can always find sufficient nectar.

Plant Communities

A suitable plant community containing already a relatively large range of species is, for example, the seed mixture "Meadow Scent".

The plant list "Bee Pasture" exactly meets the requirements of bees and other insects and offers a wide range and, in the course of the year, especially long-lasting supply of nectar and pollen.

Local Biodiversity

For biodiversity green roofs, the use of native species is also possible, as long as they are drought-tolerant and suitable in their requirements for the location on the roof with the selected substrate height.

For many years now, ZinCo has been collaborating with Osnabrück University of Applied Sciences in the area of biodiversity (that is typical for the region) and has now published a practical guide. This guide contains important information about the selection (species list) and procurement of suitable wild plants – be it as seeds from a propagator specialised in wild plants or as rakings from local donor plots (in consultation with the conservation authorities).

In addition, it is important to consider the planting requirements of wild vegetation, e.g. with regard to layer build-up, substrate type/depth, water requirements and care and maintenance.

Local wild plants provide a very special food supply for local creatures, for example, for different types of wild bee. The guide also provides information about biodiversity modules on green roofs. It includes details of general funding options for green roofing and provides practical examples.

Existing green roofs, some of them species-poor, can be upgraded in terms of conservation with the developed wild plant seed mixtures and the retro installation of biodiversity modules.

In conjunction with Osnabrück University of Applied Sciences, ZinCo created a seed mixture for dry lawns in the Wagenfeld region. The seeds from the company Rieger-Hoffmann can be purchased from ZinCo. 1 kg in packets of 100 g is sufficient for about 50 m².





Bee Pasture

The System Build-up “Bee Pasture” is an extensive green roof and one module of a “Biodiverse Green Roof” with a special focus on a long-lasting supply of nectar and pollen. The vegetation layer can be realised with plug plants according

to the ZinCo plant list “Bee Pasture” and can also be established on partial roof areas. In dry periods, an additional irrigation is necessary to maintain the nectar and pollen production of the plants.



Irrigation and Maintenance

Overall, the Biodiversity Green Roof is low-maintenance. The aim is natural development without major human intervention. An herb meadow on the roof is mowed as needed and the mowed

material removed. Shrubs require some pruning and emerging seedlings of undesirable species must be removed. Seed stands may be cut if excessive self-seeding is not desired for some species.

Fertilization in early spring with a coated compacted slow-release fertilizer, e.g. ZinCo Plantfit® 4 M, is recommended, in the purely extensive areas every 2–3 years if necessary, on the mounds with more demanding vegetation annually.

At the same time, roof drains and connections as well as fixing devices must

be checked. Dead wood may need to be replaced from time to time as branches decompose over the years.

We recommend signing a maintenance contract with a specialized company.

Additional enhancement of the species spectrum is possible if a permanent irrigation system is installed. If this is desired, we recommend installing our



Biodiversity Roofs in Practice

Project Example: Refurbishing Project

Karlsruher Eislauf- und Tennisverein e. V. (KETV), Karlsruhe



It was agreed quite quickly that the refurbishment solution for the outdated clubhouse roof of the KETV ice-skating and tennis club would be a forward-looking biodiversity green roof. KETV applied to the city and to the Baden Sports Federation for a grant to green the 235 m² roof.

A biodiversity green roof involves somewhat more weight but a check of the structural capacity of the clubhouse roof showed that it was very well suited. The design provided for various vegetation areas with substrate depths of between 10 and 30 cm. By creating hilly substrate mounds, it was possible to use a wide variety of plants.

The water-air household, perfectly ensured by the different function layers of the ZinCo system build-up, is vital for the permanent establishment of the plants. As natural precipitation is sufficient for the selected plants – with the exception of the growth phase – there was no need to plan for additional irrigation.



The KETV roof as a “naked” bituminous roof prior to the re-design as a green roof.



A wide range of biodiversity modules enhance the green roof, providing a new habitat for flora and fauna.



The green roof was combined with the existing solar energy unit – therefore producing synergy effects.

Project Example: Local Vegetation

Naturschutzzentrum Schopfloch

As part of an extension and conversion project, a 180 m² near-natural green roof was created on the roof of this nature conservation centre. The aim was to channel as closely as possible the vegetation community of the semi-arid/barren lime soil of the Swabian Alb and provide inspiration for a sustainable roof vegetation. At the same time, the greened roof area was a research

project carried out in conjunction with Prof. Sigurd Henne of NGU Nuertingen-Geislingen University.

The basis was a system build-up for extensive green roofs. In order to replicate the natural ground of the surrounding areas, a shallow substrate depth of 8 cm was chosen and instead of the regular system substrate, a special mixture of

lime grit from the Swabian Alp, round-grained lava and a specific proportion of top soil was used.

In addition to the roof areas, special near-nature substrates and near-nature vegetation systems with native types were used in most of the outdoor areas.



The substrate used is a special mixture of lime grit, lava and top soil.



The target species were brought in by way of native seeds.



After two initial dry years, the areas have developed well in terms of coverage.

Hall Roof, at Luetvogt, Wagenfeld

A veritable lighthouse project for the protection of species was achieved in Wagenfeld, Lower Saxony, with the new warehouse at Friedrich Lütvogt GmbH & Co. KG, the mineral water company – with funding from the European Union and the State of Lower Saxony.

Thanks to the vegetation that is typical for the region (sandy-dry grassland), the approx. 10,000 m² large Biodiversity Green Roof offers a habitat and a food source for domestic butterflies, wild bees and other insects.

Sedum sprouts of local origin were used in addition to certified local seeds and rakings that contain seeds from local sandy-dry grasslands. System variants with Aquatec® AT45 and drainage rolls of Fixodrain® XD 20 were used.



The 10,000 m² large green roof was created in collaboration with Osnabrueck UAS with biodiversity typical for the region on the warehouse roof at Luetvogt. © Architekturfotografie Steffen Spitzner



In certain marked out areas, certified native seeds were spread together with rakings containing seeds from local sandy-dry grasslands. © Daniel Jeschke, Hochschule Osnabrück

The low-maintenance ecological compensation area on the rooftop.

This planning guide will help with any queries you might have about Biodiversity Green Roofs. Our technical experts are of course here to provide you with advice and support when you are preparing your own building-specific project: from the planning stage right through to the preparation of the bill of quantities texts.

Challenge us!



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ZinCo GmbH · Lise-Meitner-Strasse 2 · 72622 Nuertingen · Germany
Phone +49 7022 6003-0 · info@zinco-greenroof.com · www.zinco-greenroof.com