



**Green Estate
Landscapes**

A Brief Guide to Green Roofs



This guide is intended to be for information only. Always consult a professional if considering installing a green roof.



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Green roofs perform a vital role in breaking up hard surfaces and man-made deserts. Not only do they slow down rainwater runoff, and providing a range of habitats for insects and birds, but also give visually stunning outlooks.

Definition

We will use 'green roof' to mean a roof, deck or other structure onto which vegetation is intentionally grown.

Other names or titles which come under this group include: extensive green roofs; intensive green roofs; brown roofs; eco roofs; biodiverse roofs; living roofs; wildflower roofs; meadow flower roofs; roof gardens and anything else which suggest plants in a lightweight growing medium build-up on top of a building.

Sedum roof is a term often used to mean green roof. However, sedum is a type of plant that is used on green roof, and although it has its place there are far more visually impressive plants and which support a wider range of wildlife.

Podium decks and full landscape installations which happen to be on a building, are a little different to what we are going to discuss here. But we do have experience of these too, so get in touch if your project is on the heavier side.



What are green roofs?

A green roof is a surface onto which vegetation is intentionally grown or habitats for wildlife is established. There are different types of green roof and it is important to understand that each type functions and looks different. This is because each green roof is unique environment and provides different types of habitat.

Green roofs can be extensive - implying shallow growing medium depths and low nutrition. Intensive roofs are the other end of the spectrum, with deeper growing medium with higher nutrition and larger plants, therefore requiring more intensive care.

Extensive – super lightweight. Very shallow growing medium depth (25mm), very low nutrition growing medium, very limited plant species range and growth potential. Very low maintenance.

Semi Extensive – deeper growing medium depth (60mm to 80mm), very low nutrition growing medium, medium plant species range and growth potential. Medium low maintenance.

Intensive – deep growing medium depth (100mm to 140mm), medium nutrition growing medium, wider species range and good growth potential. Regular maintenance requirement.

These definitions are not always clear cut and it is possible to have green roofs which have characteristics of more than one type, for example a 140mm deep substrate which still has low maintenance requirements.
protection before greening it.



Note: Waterproofing is a separate issue to roof greening and you should ensure that a roof has suitable waterproofing and root

Commercial green roof system build-up can consist of several layers of plastic below the growing medium and plants.

- Root resistant waterproofing/or separate root resistant layer on top of waterproofing
- Moisture retention/protection layer
- Drainage/reservoir layer
- Filter layer
- Growing medium
- Plants

For domestic and small scale green roof projects where there is no need for a warranted system, a simple build-up of root resistant waterproofing (pond liner), green roof specific lightweight growing medium and plants will produce good results.

The classifications often add an extra and unnecessary complexity to domestic projects.

A domestic green roof will perform well if it has:

Sunlight – Moisture – Drainage – Aeration to the plants root systems – Nutrients



Design Considerations

What to consider when planning a green roof?

Features to any Green Roof:

- A building structure designed to take the loads of the proposed green roof
- Waterproof membrane and root resistant element or membrane
- Protective sheet
- Suitable drainage system to allow excess water to leave the roof easily
- 500mm gravel or paving margin to all up-stands and roof penetrations
- Up-stands of a suitable height to prevent material being blown off the roof
- Growing medium with no more than 20% organic matter by volume

Most green roofs will have depths of between 80mm and 200mm, only roof gardens incorporating turf, shrubs and trees would be expected to have greater depths.



What are the considerations when planning a green roof?

Access

As with all roofs, and especially flat roofs, maintenance is required and therefore access must be considered. All green roofs require some degree of maintenance. Low maintenance should not be interpreted as no maintenance. Extensive green roofs require less maintenance than intensive roofs, but there is still a requirement every year to clear gutters and unwanted vegetation. Therefore, it is important to design for ease of access to all types of green roofs.

Edge protection and personnel containment must be in place during the installation of any roofing processes in line with current HSE guidelines. A means of safe access by a roof anchorage system, or better still a total containment system for roof inspection and maintenance is strongly recommended.

Planning Consent/Permission

Incorporating a green roof (or roofs) into a development may gain support which can help to secure planning consent. It may be possible to retrofit green roofs on certain buildings without planning consent, under the 2008 'Development within the curtilage of a dwellinghouse' - alterations that protrude not more than 15cm beyond the original plane of the roof are permitted.

The planning authority should be consulted if there is any doubt.



Structural Capacity

The capacity of the building on which the green roof is to be installed **MUST** be structurally suitable to take the proposed load/weight. A Structural Engineer's report can confirm this.

Biodiversity

Creating a potential habitat in an environment that would not otherwise have supported insects and birds, is almost always good. It can however, be difficult to create a habitat for a specific species or type of insect.

It may take a while for a green roof to create the appropriate replacement habitat - It cannot be assumed that a green roof will be immediately successful in conserving key species. It should also be noted that green roofs cannot replicate most habitats that occur at ground level.

Simply by adding growing medium and plants on a roof insects and birds will be encouraged to come and investigate. If the situation suits them, they will make nest, have babies and establish mini ecosystem services. There is plenty of guidance on the internet about how to make the most of your green roof for wildlife, just don't overload the roof.



Irrigation

Ideally green roofs designed and installed in the UK should not need long-term irrigation. However, green roofs will often need 'watering in' at time of installation and during prolonged dry spells, i.e. more than 5 or 6 weeks without rain.

Rainwater Harvesting

Storm-water runoff from a green roof is reduced compared to a traditional roof. However, rainwater can still be collected from a green roof and used for any non-potable applications.

Up-stand Details

Up-stands, which maybe at the edge of the roof or at the edge of the area to be greened, need to be deeper than the depth of the growing medium and plant layer together.

For example: if the substrate depth (8cm) + plant layer (2.5cm) = 105cm the upstand should be at least 125cm. If the site is particularly windy, the upstand can be increased to approximately 150cm.



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Benefits

Green roofs provide lots of benefits, by considering each benefit at the earliest stages of design it will be possible to create a green roof which supports as many of the benefits as possible.

Visual Impact

Designing green roofs for people to access either physically or visually is a great way to get vegetation and some habitat types into built-up areas. High level meadow flower gives great visual impact, and if it is possible to access the area people will feel a benefit from being able to interact directly with nature. People love to stroke plants!

Increase biodiversity

Whilst green roofs do not directly replace ground-based habitats, they can be thought of as green 'stepping stones' for wildlife. Biodiverse roofs can be designed to mimic various habitats. The best designs may often be ones that supports a range of habitats for wildlife, including a range of substrates, microhabitats and substrate depths. Varying substrate depth will encourage invertebrates to build nest and establish ecosystems.

Reduce storm-water runoff as part of a sustainable drainage system

Green roofs store rainwater in the growing medium and plants, releasing the water back into the atmosphere through evapotranspiration and evaporation. The amount of water that is stored on a green roof, and then evaporated into the atmosphere, is dependent on the depth of the growing medium and vegetation used and regional weather. Generally, the deeper the substrate the greater the average annual water retention.



Roof lifespan increase

Roof surfaces are constantly under attack from ultra-violet light and temperature change. The original green roofs in Germany created in the 1880s were created when bitumen was covered with 6cm of sand, which colonised naturally with vegetation. This sand covering was to protect the bitumen from fire, however the covering was found to extend the life of the waterproof layer.

Green roofs have now been shown to double if not triple the life of waterproofing membranes beneath the green roof. This is possible because the very act of placing layers of organic material and moisture holding materials on top of the waterproofing protects the roof.

Reduce sound transfer

The build-up of organic material within a green roof significantly reduces the noise transfer through a roof's structure.

Reduce energy use

Green roofs will help to keep the buildings under them cooler, however they will have little effect on buildings insulated to a building code level.

Improving air and water quality

A living roof will help to remove airborne particles, heavy metals and volatile organic compounds from the local atmosphere.

As these contaminants are retained by the green roof itself, their infiltration of the water system through surface runoff is lessened, in turn improving local water quality.



