THE GRO MODULAR GREEN ROOF BEST PRACTICE GUIDE

MARCH 2026

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INTRODUCTION

This **Best Practice Design Guidance** has been produced through the GRO Technical Committee and specifically by the GRO Modular Green Roof Working Group consisting of Manufacturer, Supplier and Contractor GRO members with expertise in the field of Modular Green Roof Systems.

1 | DESCRIPTION

A **Modular Green Roof** cassette or tray consists of a base unit filled with a green roof substrate/growing medium and planting grown to maturity to facilitate the establishment of a pre-grown extensive green roof system. Typically shipped with approximately 80% plant cover, the cassette/trays may be interlocking.

A **Modular Blue-Green Roof** refers to a similar system, but with added functionality for the attenuation of rainwater, these trays are designed to retain and reduce rainwater runoff from flat or gently sloping roofs. This helps to manage stormwater more effectively and can even promote passive rainwater reuse.

2 | BENEFITS OF A MODULAR GREEN ROOF

- Modular Extensive Green Roofs enable single component green roof installation.
- The unit dimensions can aid installation on roof spaces with restricted access.
- The trays are pre-grown and supplied with established vegetation, providing an almost instant green roof.
- Suitable for temporary greening applications.
- Standardised off-site construction process with quality control carried out before delivery and assembly on site.

3 | DESIGN CONSIDERATIONS

The suitability of the roof waterproofing system for the installation of a Modular Extensive Green Roof System should be sought from the supplier to ensure that any guarantee/warranty is not affected.

Advice should also be sought from the roof waterproofing system supplier as to the requirements for any additional root barrier membrane or protection layer that needs to be installed before the installation of a Modular Extensive Green Roof System.

Modular Extensive Green Roof cassettes/trays are typically square or rectangular, therefore a layout plan should be created to suit each roof application area as roof areas cannot always be sub-divided equally by a module's dimensions, creating irregular border width at roof perimeters and around penetrations.

Some projects will suit modular systems more than others, for example, a scheme with curved sections of roof or those that require significant variations in growing medium depth are not best suited to modular green roof systems.

Modular Extensive Green Roof cassettes/trays are typically designed with uniform depth. Where greater or varying substrate depths are required within the scheme design, such as on biodiverse roofs, Modular Extensive Green Roof cassettes/trays are not a suitable solution.

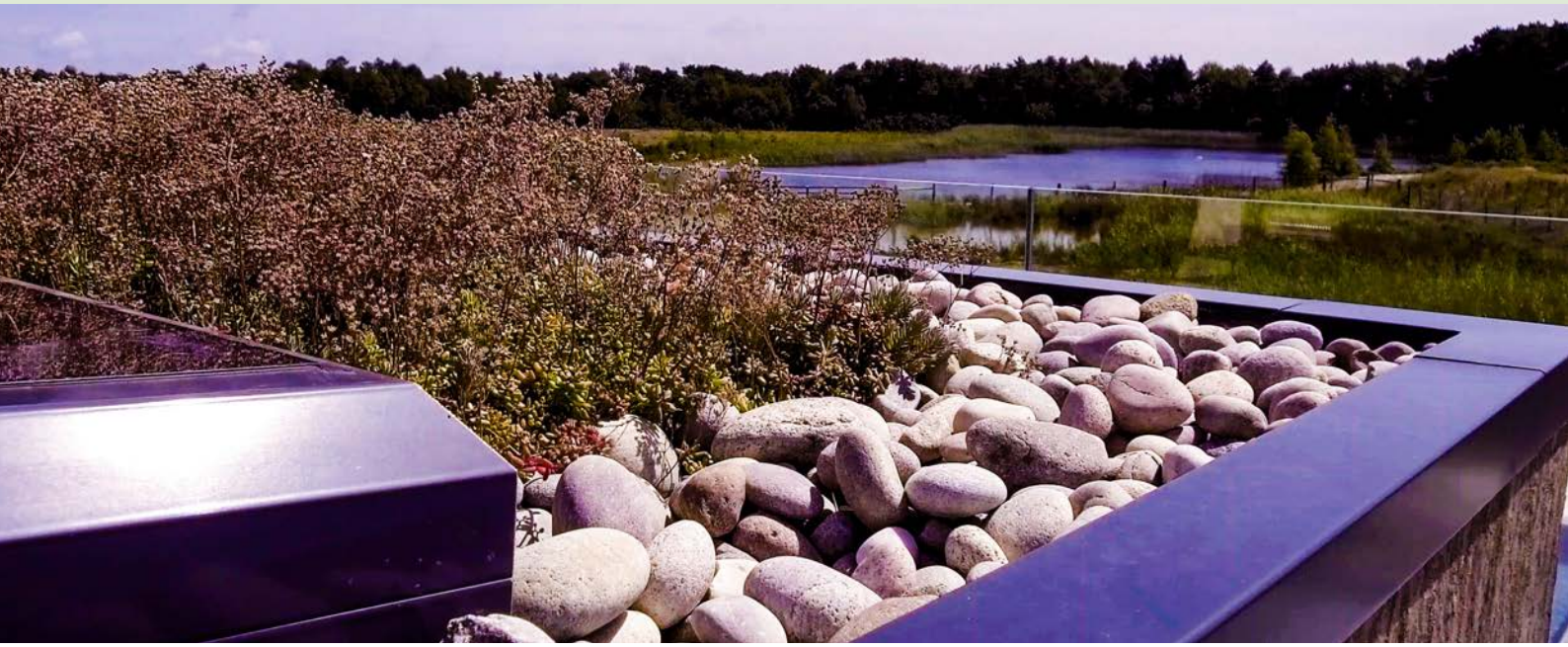
4 | WIND UPLIFT

The wind uplift resistance of a modular green roof system is dependent on the composition and weight of the substrate used and how each cassette/tray connects to those adjacent, but typically the weight of the system per sqm represents the wind uplift resistance.

Notes

- The wind uplift requirements will vary depending on locations, topography and whether the roof is a warm roof or inverted warm roof.

- Wind uplift resistance data should be requested from the supplier of the green roof module.



5 | FIRE CONSIDERATIONS

The Building Regulations fire safety criteria for domestic and non-domestic roofs apply to both assembled on-site and modular green roof systems.

The GRO Fire Performance of Green Roofs Best Practice Guide provides comprehensive guidance on achieving compliance with the regulatory requirements of the Building Regulations and Approved Document B. Three methods are referenced.

1. **Testing and Classification:** to DD ENV 1187:2002 and *BS* EN 13501-5:2016 which provide classifications such as $B_{roof}(t4)$.
2. **Deemed to Satisfy:** through a substrate containing less than 50% organic matter installed to a minimum continual substrate depth of 80mm.
3. **Assessment:** by a suitable qualified person, typically using available classification reports.

In addition, the guidance advises inclusion of fire/wind/maintenance breaks of either 500mm or 300mm at a depth of 75mm at perimeters and around roof penetrations is covered.

Due to the presence of the (often plastic) side walls in Modular Extensive Green Roof Systems fire performance compliance cannot be demonstrated through 'Deemed to Satisfy' rules. Therefore, either the testing and certification route, or assessment by a suitably qualified person (as defined in Appendix B of Approved Document B/Scottish Technical Handbook) for confirmation of Building Regulations Fire Performance Compliance.

Note: classification reports are specific to an as tested full roof construction covering the specific type and thickness of the deck, AVCL, insulation, waterproofing, protection and Modular Extensive Green Roof System tested, unless an Extended Application (EXAP) Report to TS 16459 covers wider scope.

If the roofing system used beneath the Modular Extensive Green Roof System differs in any way to that covered by the scope of the classification or EXAP report the performance classification is not valid for the as-built roof and should be assessed by a suitably qualified person, as defined in Appendix B of Approved Document B, for confirmation of Building Regulations Fire Performance Compliance.

6 | TRANSPORTING, STORAGE & UNPACKING

When transporting and storing modular green roof trays it is important to handle them with care to preserve the health of the plants.

Avoid leaving cassettes/trays on pallets for more than 24 hours.

Upon receipt of delivery cassettes/trays should ideally be unpacked and laid out on ground if not being installed on the roof immediately, this is to prevent the plants from overheating.

If the modules are going to be unpacked, but stored, for more than 24 hours, watering must be applied in each 24-hour period.

It is particularly important to unpack the pallets quickly in hot weather, as the plants are prone to dehydration.

Prolonged storage on pallets can damage the plants, so quick unpacking and proper handling are essential to maintaining the

7 | MAINTENANCE

The maintenance protocol is similar to an on-site constructed extensive green roof system. Users should refer to the Maintenance section of the most recent GRO Green Roof Code. It is essential that maintenance is carried out at least twice per year to ensure the long-term health and performance of the modular extensive green roof system to include the following in addition to the manufacturers requirements.

- **Watering:** During dry spells or periods of extended high temperature (6+ weeks) it is critical that the roof should be watered to prevent the plants from drying out and dying back.
- **Fertilising:** GRO does not recommend excessive use of fertiliser on systems with low-nutrient growing mediums as used for green roofs as they can encourage invasive weeds and grasses and may leach into the watercourse. Each green roof should be assessed prior to any addition of fertiliser. **Note:** Fertiliser, where uses, should be slow, long release, and only used sparingly.

7 | MAINTENANCE (cont)

- **End-of-Summer Care:** At the end of summer, clear dead flowerheads and remove any weeds or grass that may have invaded the roof. Cutback and remove dead stalks. Remove unwanted plants in their entirety including the full root systems i.e. germination of tree seeds and other windblown invasive plants. If there are any bare patches Sedum from strong, healthy areas can be used to infill, or patches and plug plants can be added to maintain coverage.

- **Rainwater Outlets**: should be inspected for blockages and dead leaves etc. removed from the areas immediately around them.

- **Ongoing Maintenance:** The more maintenance attention the green roof receives, the better it will thrive over the long term, this is true for both on-site built-up green roofs and modular pre-grown green roofs. If any significant areas become damaged or show poor health, individual modules should be replaced with fresh ones. If the substrate levels drop to reveal the side walls of the cassette/tray top up with the same green roof substrate as the module so the sides are no longer visible. For detailed maintenance guidelines see **GRO Best Practice Maintenance Guidelines.**

- **Regular Inspections:** For commercial and larger scale green roof systems it is recommended to have a maintenance contract in place with a specialist green roofing or landscaping contractor. Inspections will typically be carried out 2 to 4 times per year.

By following these guidelines, a modular green roof can be maintained in excellent condition for many years to come.

8 | IRRIGATION

Irrigation systems are generally not required for extensive green roofs, as the plants are extremely hardy and drought resistant to an extent.

Temporary watering could be considered in dry periods of weather i.e. more than 6 weeks with no rain.

Some systems can include an integrated irrigation system.

GLOSSARY

Cassette / Module / Tile / Tray - the stand-alone unit which makes a single piece of green roof when enclosed, generally in a plastic container.

Sedum - hardy low growing Alpine succulent plant species commonly used on green roofs, cultivated and pre-grown for application in other environments, either as cuttings & seeds, plug plants or semi-mature pre-grown blankets.

Substrate - growing medium in which plants grow.

Systems - term often used to refer to the build-up of layers that make up a green roof i.e. vegetation; substrate; filter sheet; etc.

Vegetation - plants, often low growing sedum species in modular systems.

Wildflower – plants that grow naturally in the countryside cultivated and pre-grown for application in other environments, either as seeds, plug plants or semi-mature pre-grown blankets.

Please refer to the **GRO Code:** www.greenrooforganisation.org for any additional information.

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