

Bauder Vegetation Guide

For extensive and biodiverse green roofs



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The Bauder Vegetation Guide for Extensive and Biodiverse Green Roofs has been written for landscape architects and ecologists to understand and select the correct species and vegetation from the different choices available for Bauder green roof systems.

The focus of this guide is specifically vegetation. For guidance on the initial design of a green roof, please refer to the Bauder Green Roof Design Considerations. Other combinations: blue and green roofs or Bauder BioSOLAR Systems are covered in their own design guides.

Green roof types

Sedum Roofs

Planted with mainly sedum species, these roofs are very drought tolerant and low maintenance. Most sedums are not UK native species and therefore sedum roofs are considered to have a lower environmental benefit.

Wildflower Roofs

The roof is planted with British native wildflowers. These types of green roofs are heavier and require more maintenance than sedum systems.

Biodiverse Roofs

A wide mix of plant species (normally all British native species) is used on a biodiverse roof. Designed to give a broad spectrum of differing habitats for plants and insects.

Brown Roofs

(Now referred to as biodiverse roofs)

This term is used to describe a self-generated biodiverse roof. This way of establishing a Biodiverse roof is no longer considered best practice.

Extensive Roofs

All of the above roof types and most green roofs with substrate under 200mm are classed as extensive roofs.

Intensive Roofs

A roof typically with substrates over 200mm, capable of supporting much more complex herbaceous, woody shrubs and trees, are classed as intensive roofs.



Choosing the type of vegetation

The reason for the green roof will often dictate whether sedum, native wildflower or biodiverse vegetation is specified.

Sedum gives a high aesthetic look to a roof and need very low levels of aftercare. Native wildflowers offer a more natural finish. British native species are used to complement the local environment and create natural habitats. They give an attractive show of flower in the summer. Biodiverse roofs use native wildflowers again to give a broad range of different habitats. A biodiverse roof also incorporates areas of bare ground, habitat piles of dead wood, stone, and sand. These can have quite a low aesthetic appeal at sometimes of year.

If there is a requirement for recreational use, then intensive/accessible green roof systems will be required. These are more traditional in layout with lawns and herbaceous planting.

Sedum systems

Sedum is still the most popular covering for green roofs. Bauder can be supplied as either a deeper substrate system or a single layer, lightweight system.

Advantages of specifying a sedum system

- Extremely tough and drought tolerant, making it low maintenance and giving a high aesthetic value.
- Will grow in very shallow substrate, spreading to give excellent low growing ground cover, which can give the lowest build-up of green roof when height is a consideration.
- Mainly evergreen, providing a pleasing aesthetic throughout the year.
- Sedum systems are typically the lightest green roofs, ideal for projects that have weight loading limitations.

Considerations when choosing sedum

- Sedum species are almost exclusively not British native species. If your planning requirements are for native species, a different green roof system may be a better choice.
- Sedum blankets are not very diverse and so have a limited flowering season. This makes them less valuable for pollinators.
- Sedum cannot be easily grown from seed at roof level. A sedum blanket will give instant greening and is already established.
- This system will not tolerate any foot traffic.
- Sedum green roofs need high levels of light. Shade created by buildings could hinder the establishment of your sedum roof.



Wildflower

With such a broad range of British native flowering plants available, wildflower can produce a green roof that is ideally suited to the location and aspect of the environment. The planting can be established by either blanket, plug or seed.



Advantages of specifying a wildflower system

- Bauder Wildflower Blankets (WB), seed and plugs are all British native species collected in line with Flora Locale Code. This ensures provenance and suitability for ecologically sensitive schemes.
- Wildflower systems can establish quickly and will produce a more diverse habitat to enhance biodiversity.
- Using the correct mix of Wildflower species will give a prolonged flowering season, giving a longer food source to pollinators.
- Wildflowers require relatively low levels of aftercare and maintenance.

Considerations when choosing wildflower vegetation

- A deeper build-up (150mm+) is required and so this system is heavier than sedum.
- Wildflower system will require some additional water in time of drought.
- Wildflowers will require more maintenance.
- When not in flower the swath can look untidy.
- This system will not tolerate any foot traffic.

Biodiverse roofs

Biodiverse roofs are primarily designed to maximise different habitats mixing vegetation with other features and bare ground to create a matrix of habitats. These varied areas attract many different invertebrates and insects which themselves become a food source for birds and bats.

Advantages of specifying a wildflower system

- Bauder biodiverse roofs use all British Native species typically supplied as seed and plugs, making them the most ecological beneficial green roof systems.
- Bauder biodiverse roofs can have a range of surface finishes and treatments to produce a more diverse habitat making them more likely to achieve planning approval.
- Biodiverse roofs normally contain a broad range of native species which can give a prolonged flowering season.
- Biodiverse systems require low levels of aftercare and maintenance.

Considerations when choosing wildflower vegetation

- The range of habitats can make biodiverse systems appear scruffy and unkept.
- Biodiverse systems will suffer without water in times of drought.
- Biodiverse roofs still need to be managed. They can become weed infested without maintenance.
- Biodiverse roofs will not tolerate any foot traffic.



Intensive green roofs

Intensive roofs have deeper planting areas which enable large and more diverse plants to be included. The roof is likely to be a mix of soft and hard landscaping and have some form of public access.

Advantages of specifying an intensive roof system

- Typically, a mix of hard and soft landscaping is used making this roof system suitable for public access and recreation.
- Intensive roofs can incorporate any type of plant, from mature trees to lawns and water features, this gives clients to opportunity to make the area a real asset to the building.
- Intensive green roofs create an outdoor living space.
- Intensive roofs are normally designed with a very high aesthetic.

Considerations when choosing an intensive system

- Intensive systems are deep and heavy (250mm+ / 300-500kg/m²).
- These roof systems require regular maintenance and some form of irrigation system.
- Intensive roofs are expensive to construct and maintain.

Vegetation for BioSOLAR systems

Plants that will thrive on a Bauder BioSOLAR green roof must be low growing so as not to shade the PV panels, and shade tolerant if they are to grow under the panels.

Pre-grown vegetation blankets such as WB and SB blankets are grown in full sun and are therefore not suited to the areas in front of and under the PV panels. Sedums are in general not very shade tolerant species so again, not ideally suited.

Bauder's Flora 3 native seed mix has been specially designed to give a broad mixture of sun and shade tolerant species that are naturally low growing. This is the ideal mix for in front of and under the panels. Away from the PV array any of the other plants and establishment techniques can be used.



Vegetation supply options

For most roof types there are three main options for establishing the vegetation; Seed, Plug Plants and Vegetation Blanket.

Seed

This is the most cost-effective way to establish vegetation at roof level. However, seeding can only take place at the correct time of year will take some time (up to 2 years) to fully establish. Seeding at roof level is more difficult than sowing seed at ground level.

Wildflower Seed

Bauder produces five seed mixes of native wildflowers with additional additives to help the establishment process.

Bauder Flora range of seed mixes has been developed to give the seed the best possible chance of germinating and establishing on the roof. The mixes contain a carefully selected range of species for the type of green roof being established. In addition, the mix contains a tackifier to stick the wildflower seed to

the surface of the substrate, preventing it from being blown away or washed deep into the substrate. In addition, the mix also contains Mycorrhizal fungi and a slow-release fertiliser to speed up the establishment process.

Biodiverse Roofs

Seed is often combined with plug planting and other habitat features to produce a board mix of habitats.

Sedum Roofs

Bauder does not recommend trying to establish sedum on roofs using seed. The very small sedum seeds and the hostile conditions at roof level make establishment very problematic. The GRO Code warns against using seed and recommends instead using either a pre-grown vegetation blanket or plug plants.

Name	Bauder Flora 3 Seed Mix GB50120403	Bauder Flora 5 Seed Mix GB50120405	Bauder Flora 7 Seed Mix GB50120407	Bauder Flora 9 Seed Mix GB50120409	Bauder Flora 11 Seed Mix GB50120411
Location	General	Urban	Chalk Grassland	Coastal	Scottish
Description	Low growing and shade tolerant species to suit most conditions. Recommended for BioSOLAR installations.	Chosen plants can absorb pollution and CO ₂ and provide a habitat for insects and invertebrates.	These are key wildflower species found on the North and Downs, Mendips Chilterns, and the Cotswold.	Species that can cope with drier conditions, higher winds, and a more saline environment.	Seeds are certified to be of Scottish provenance to give Scottish sites truly native vegetation.
No of Species	49	38	28	24	33
Wild Flowers	31 (65%)	28 (80%)	23 (85%)	14 (75%)	26 (75%)
Annuals	8 (20%)	6 (10%)	None	3 (10%)	3 (15%)
Sedge and Grasses	8 (15%)	2 (10%)	5 (15%)	4 (15%)	2 (10%)
Sedum	2	2	0	3	2
Coverage	100g per m ²	100g per m ²	100g per m ²	100g per m ²	100g per m ²
RHS Perfect for Pollinators	35	34	22	20	29
Laval Food	12	9	11	8	6

These mixes can be used on their own or combined with Bauder British native plugs or other mixes to give a wider vegetation selection. All the mixes are sown at a rate of 100g/m² and applied in the same way. All the wildflower is harvested using the former Flora Locale charity code of practice. The mixes are also RHS approved Perfect for Pollinators allowing the logo to be displayed. The installation process is covered in the Green Roof Installation Guide.

Plugs plants

More expensive than seed and slower to install, plug planting enables the greatest degree of control for the green roof designer. They guarantee that the correct species are planted in the optimal location. This is particularly useful for small green roofs where a high aesthetic finish is required. Plugs are difficult to establish at roof level and planting should only take place during the spring or autumn. Bauder supplies a large selection of Native Wildflower plugs (a small sample of which can be seen in the table on page 08) enabling the exact species to be supplied for the particular location. Bauder's British Native species plugs are all grown in the UK and sourced in line with the Flora Locale* code of conduct.

Bauder recommends plugs are planted at between 15-25 plugs per m². The plugs will require careful handling and aftercare. Refer to the watering and establishment section of this guide and the Bauder Green Roof Installation Guide.

Bauder British Native Wildflower Plugs

Bauder plugs are grown in peat-free compost. The production avoids using chemicals and uses primarily biological control methods including nematodes, mites, and parasitic wasps to keep aphids, Sciaridae flies and vine weevil under control.

Bauder supplies approximately 300 different species of British native wildflower plugs. These are supplied in trays of 52 or 104 as either single species or a mixed pack.

Plugs are very fragile when first planted and will need careful aftercare and watering for the first 10-12 weeks to allow them to establish.

*Flora Locale is a charity that provides best practice for the sourcing and collection of native seed in the UK.



Botanical name	Common plant name	Flowering colour	Flowering period	Positioning
<i>Achillea millefolium</i>	Yarrow	White	Jun-Aug	
<i>Agrimonia eupatoria</i>	Agrimony	Yellow	Jun-Sep	
<i>Allium schoenoprasum</i>	Wild Chives	Purple	Jul-Aug	
<i>Allium scorodoprasum</i>	Sand Leek	Purple	May-Aug	
<i>Anthoxanthum odoratum</i>	Sweet Vernal grass	Brown	Apr-Jul	
<i>Anthyllis vulneraria</i>	Kidney vetch	Yellow	Jun-Sep	
<i>Arabis glabra</i>	Tower Mustard	White	Jun-Jul	
<i>Armeria arenaria</i>	Jersey Thrift	Pink	Jul-Aug	
<i>Armeria maritima</i>	Thrift	Pink	Apr-Oct	
<i>Bellis perennis</i>	Daisy	White	Mar-Oct	
<i>Briza media</i>	Quaking Grass	Purple/Green	May-Aug	
<i>Campanula glomerata</i>	Clustered Bellflower	Purple	Jun-Oct	
<i>Campanula rotundifolia</i>	Scottish bluebell, Harebell	Purple	Jun-Sep	
<i>Carex arenaria</i>	Sand Sedge	Brown	May-Jul	
<i>Carex flacca</i>	Glaucous sedge	Brown	May-Jun	
<i>Centaurea cyanus</i>	Cornflower	Blue	Jun-Aug	
<i>Clinopodium vulgare</i>	Wild Basil	Pink	Jul-Sep	
<i>Cynosurus cristatus</i>	Crested Dog's-tail	Green/Light Brown	Jun-Aug	
<i>Dianthus deltoides</i>	Maiden Pink	Pink/Red/White	Jun-Sep	
<i>Echium vulgare</i>	Viper's bugloss	Blue	Jun-Sep	
<i>Erigeron acer</i>	Blue fleabane	Blue	Jul-Aug	
<i>Erysimum cheiri</i>	Wild Wallflower	Yellow/Orange	Mar-May	
<i>Festuca ovina</i>	Sheep's Fescue	Green/Light Brown	May-Jul	
<i>Festuca rubra</i>	Red Fescue	Green/Yellow/Reddish	Apr-Sep	
<i>Fragaria vesca</i>	Wild strawberry	White	Apr-Jul	
<i>Galium verum</i>	Lady's bedstraw	Yellow	Jul-Aug	
<i>Geranium pyrenaicum</i>	Hedgerow Crane's-bill	Purple	Apr-Oct	
<i>Geranium sanguineum</i>	Bloody Cranesbill	Purple	Jun-Jul	
<i>Glechoma hederacea</i>	Ground ivy	Purple	Mar-May	
<i>Helianthemum nummularium</i>	Common rock rose	Yellow	May-Sep	
<i>Hypericum perforatum</i>	Perforate St John's-wort	Yellow	Jun-Sep	
<i>Hypochaeris radicata</i>	Catsear	Yellow	Jun-Oct	
<i>Leontodon autumnalis</i>	Autumn Hawkbit	Yellow	Jun-Sep	
<i>Leontodon hispidus</i>	Rough hawkbit	Yellow	Jun-Sep	
<i>Leucanthemum vulgare</i>	Oxeye Daisy	White	May-Sep	
<i>Linaria purpurea</i>	Purple toadflax	Purple	Jun-Oct	
<i>Linaria vulgaris</i>	Common toadflax	Yellow	Jul-Sep	
<i>Lotus corniculatus</i>	Bird's-foot trefoil	Yellow	Jun-Sep	
<i>Lychnis flos-cuculi</i>	Ragged robin	Pink	May-Aug	
<i>Oenothera stricta</i>	Fragrant evening primrose	Pale Yellow (flowers in low light)	May-Sep	
<i>Ononis spinosa</i>	Spiny restharrow	Purple/Pink	Jun-Sep	
<i>Origanum vulgare</i>	Wild marjoram	Purple/Pink	Jul-Sep	
<i>Papaver rhoeas</i>	Common field Poppy	Red	Jun-Aug	
<i>Plantago coronopus</i>	Buck's-horn plantain	Yellow	May-Jul	
<i>Plantago lanceolata</i>	Ribwort plantain	Brown	Apr-Oct	
<i>Potentilla argentea</i>	Hoary cinquefoil	Yellow	May-Aug	
<i>Potentilla reptans</i>	Creeping cinquefoil,	Yellow	Jun-Sep	
<i>Potentilla rupestris</i>	Rock cinquefoil	White	Jun-Aug	
<i>Poterium sanguisorba ssp. Sanguisorba minor</i>	Salad burnet	Red	May-Aug	
<i>Primula veris</i>	Cowslip	Yellow	Apr-May	
<i>Primula vulgaris</i>	Primrose	Yellow	Mar-Jun	
<i>Prunella vulgaris</i>	Selfheal	Purple	Jun-Oct	
<i>Saponaria officinalis</i>	Soapwort	Light Pink	Jul-Sep	
<i>Scabiosa columbaria</i>	Small scabious	Blue	Jul-Sep	
<i>Sedum acre</i>	Biting stonecrop	Yellow	Jul-Aug	
<i>Sedum album</i>	White stonecrop	White	Jun-Aug	
<i>Sedum anglicum</i>	English stonecrop	Pinkish-White	Jun-Sep	
<i>Sedum rupestre</i>	Reflexed stonecrop	Yellow	Jun-Aug	
<i>Silene latifolia subsp. alba</i>	White campion	White	May-Oct	
<i>Silene uniflora (maritima)</i>	Sea campion	White	Jun-Aug	
<i>Silene vulgaris</i>	Bladder campion	White	Jun-Aug	
<i>Stachys officinalis</i>	Betony	Purple	Jul-Sep	
<i>Teucrium scorodonia</i>	Wood sage	Green	Jul-Sep	
<i>Thymus polytrichus</i>	Wild thyme	Purple	May-Aug	
<i>Viola riviniana</i>	Dog violet	Purple	May-Oct	
<i>Viola tricolor</i>	Wild pansy	Purple	Apr-Sep	

Vegetation blanket

Bauder supplies a range of pre-grown wildflower and sedum blankets, these have the advantage of giving an instant greening effect. Whilst more expensive, they demand significantly reduced establishment times.

Bauder's vegetation blankets are grown in Norfolk and are typically a year old when supplied, ensuring the vegetation is mature enough to withstand the lifting, transportation, and relaying process.

The blankets should have 80%+ vegetation coverage (typically 90%+). The blankets are grown outside so will always have small amounts of grass and moss within them. The correct establishment and maintenance of the blanket will reduce the weed species and allow the sedum to flourish.



Bauder produces an installation guide and videos which shows the correct way to build and install the various green roof systems and the vegetation finishes.

Bauder XF301

This is a specialist lightweight product designed to enable sedum to thrive on structures where their lightweight construction prevents other deeper substrate-based system from being installed. The sedum layer has a saturated weight of less than 44Kg/m².

On flat roofs the system is installed with a 20mm SDF drainage mat to prevent waterlogging of the sedum plants.

Bauder also supplies a retention system enabling the XF301 to be installed on pitches up to 25 degrees (please contact Bauder for pitches greater than 25 degrees).

Bauder Sedum Blanket XF301 indicative plant list

Sedum Species

- Sedum album
- Sedum ellacombianum
- Sedum floriferum
- Sedum hybr. Czar's Gold
- Sedum montanum
- Sedum kamtchaticum
- Sedum oreganum
- Sedum pulchellum
- Sedum reflexum
- Sedum rupestre Angelina
- Sedum sexangulare
- Sedum spurium 'coccineum' (Purple Carpet)
- Sedum spurium
- Sedum spurium 'Summer Glory'
- Sedum stenopetalum
- Sedum stoloniferum
- Sedum saxifraga granulata
- Sedum hispanicum*

The exact percentages of seed and mix of species is reviewed and adjusted prior to each production of sedum blanket.

Wildflower Blanket

Bauder’s British Native Wildflower Blanket is designed to give a long flowering season. There are more species than would normally be sown in a wildflower meadow at ground level. The number and type of species reflects the challenging environments found at roof level.

The Bauder WB Native Wildflower Blanket is grown on 100% bio-degradable carrier, typically 6 -12 months old at time of harvest. The blanket deliberately contains a very broad mix of species as not all species will flourish in the individual conditions found on any given roof. The seed is all of British Providence, harvested in line with the Flora Locale code of conduct. This pre-grown vegetation mat greatly speeds up establishment, reducing the risks and difficulties associated with trying to establish vegetation at roof level.



Bauder Green Roof designs including the WB Blanket and Flora seed mixes follow the following standards:

All native seed is collected under the Flora Locale code. Seed mixes are approved as Perfect for Pollinators from the RHS. Biodiverse Specification and Habitat layout designs are approved by Buglife (the Invertebrate Charity).



Wildflower Species

Scientific name	Common name
<i>Achillea millefolium</i>	Yarrow
<i>Agrimonia eupatoria</i>	Agrimony
<i>Aquilegia vulgaris</i>	Columbine
<i>Bellis perennis</i>	Daisy
<i>Campanula glomerata</i>	Bellflower; Clustered
<i>Campanula rotundifolia</i>	Harebell
<i>Centaurea cyanus</i>	Cornflower
<i>Centaurea nigra</i>	Knapweed; Common
<i>Chicorium intybus</i>	Chicory
<i>Clinipodium vulgare</i>	Basil; Wild
<i>Daucus carota</i>	Carrot; Wild
<i>Dianthus deltoides</i>	Pink; Maiden
<i>Dipsacus fullonum</i>	Teasel
<i>Echium vulgare</i>	Viper’s-bugloss
<i>Feoniculum vulgare</i>	Fennel
<i>Geranium pratense</i>	Crane’s-bill; Meadow
<i>Linaria vulgaris</i>	Toadflax; Common
<i>Lotus corniculatus</i>	Bird’s-foot-trefoil; Common
<i>Lythrum salicaria</i>	Purple; Loosestrife
<i>Malva moscahta</i>	Mallow; Musk
<i>Origanum vulgare</i>	Marjoram; Wild
<i>Papaver rhoeas</i>	Poppy; Field or Common
<i>Pilosella aurantiaca</i>	Fox-and-cubs
<i>Plantago media</i>	Hoary plantain
<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i>	Primrose
<i>Ranunculus acris</i>	Buttercup; Meadow
<i>Rumex acetosa</i>	Sorrel; Common
<i>Salvia verbenaca</i>	Clary; Wild
<i>Scabiosa columbaria</i>	Scabious; Small
<i>Scorzoneroide autumnalis</i>	Hawkbit; Autumn
<i>Silene dioica</i>	Campion; Red
<i>Silene flos-cucculi</i>	Ragged-Robin
<i>Silene uniflora</i>	Campion; White
<i>Succisa pratensis</i>	Devil’s-bit scabious
<i>Tanacetum vulgare</i>	Tansy
<i>Thymus polytrichus</i>	Thyme; Wild
<i>Trifolium pratense</i>	Clover; Red
<i>Viola riviniana</i>	Common dog violet
<i>Viola tricolor</i>	Pansy; Wild or Heartsease
Grass species	
<i>Festuca ovina</i>	Sheepfescue
<i>Festuca rubra</i>	Slender Creeping Red Fescue
<i>Briza media</i>	Quaking-grass
<i>Hordeum brachyantherum</i>	Barley; Meadow



UNITED KINGDOM

Bauder Limited
70 Landseer Road, Ipswich,
Suffolk IP3 0DH,
England
T: +44 (0)1473 257671
E: info@bauder.co.uk
bauder.co.uk

IRELAND

Bauder Limited
O'Duffy Centre, Carrickmacross,
Co. Monaghan, Ireland
T: +353 (0)42 9692 333
E: info@bauder.ie
bauder.ie