

Condition 18

Condition 18 Green Roof

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Green Roof Details

It has been proposed that 4.5 ha area of roof habitat will be created across the IWMF building. This is proposed to be a pre-cultivated Sedum blanket. The sedum covering will provide a biodiverse hybrid roof creating a mosaic of habitats which promote biodiversity in a number of different ways:

- The type of vegetation and features on the roof can be tailored specifically to the area or to a particular species of plant or animal if required;
- The sedum roof can be used to introduce areas of vegetation to otherwise barren places or areas of low biodiversity value; and
- The sedum covering provides habitat diversity, attractive to a different set of invertebrates and other fauna.

Given the predominately arable setting of the development and the sheer size of the proposed green roof habitat there is a clear opportunity to enhance the biodiversity value of the Site through sensitive methods of vegetated roof habitat establishment, and subsequently, through sympathetic management.

The green roof will comprise a Bauder Extensive and Biodiverse system (or similar). Specification details of the green roof are provided within the Bauder leaflet on extensive & biodiverse vegetation and maintenance services.

The proposed roof build up is as follows:

Structural Deck

A deep profile structural deck system, such as TATA Roofdek, will be used, to span directly between the primary curved rafters without the need for secondary roof purlins. The proposed profile required to support the imposed loads from the roof is D135. Roof sheets will be galvanised steel.

Vapour Control Layer

Bauder VB20 polyethylene vapour control layer (or similar) will be used.

Rigid Insulation Board

Bauder Thermotech Glass flat board, fire resistant, zero ODP, highly efficient rigid urethane insulation (or similar). Insulation depth will be selected to achieve a maximum thermal conductivity of maximum U value of 0.25 W/m²K. Where required to meet the overall thermal performance specification for the structure, increased thickness of insulation to the roof may be provided to compensate for other elements of the facade. This is subject to completion of detailed SBEM calculations.

Roofing Membrane

The roofing membrane shall be single ply Bauder Thermofol U15, 1.5mm thick polyester reinforced waterproofing membrane (or similar) colour Light Grey attached by mechanical fixing.

Extensive Green Roof covering

The proposed Sedum roof system is Bauder Xero Flor XF301 vegetation Blanket (or similar). This is a unique sedum mat product developed for use directly over the waterproofing system without the need for a secondary substrate growing medium, making XF301 the lightest self-contained sedum blanket system available.

It incorporates a polypropylene mesh bonded to a vapour permeable base carrier sheet. This ensures that the blanket substrate is contained, doesn't compact and helps to maintain the vegetation in optimum condition. The product also has an integral moisture retention fleece that can absorb and retain up to 5 L/m² of water. The vegetation within this product is a mix of hardy sedum species with some grasses and moss also present.

The images below shows a typical installation of this form of sedum blanket, used on a curved roof form such as that proposed at Rivenhall:



Typical Sedum extensive green roof application



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The use of Sedum roofing has additional benefits in that the roof covering will act to improve the acoustic, thermal and fire performance of the roof.

Maintenance access to the roof will be facilitated by means of proprietary 'Latchway' type catenary wire safety system.

Samples

Samples of the proposed green roof are included within the Submission of Details against Condition 18 and comprise:

- 1 x Green roof sample from Bauder;
- 1 x Bauder Plant –E Capping Sheet (5mm thick chemically treated elastomeric bitumen root barrier – a spun-bound polyester reinforcement); and,
- 1 x Bauder BTRS Duo system natural slate (bitumen based featuring Bauder's patented DUO technology with torch bonded cap sheet and self-adhesive technology in the under-layer and vapour barrier).

Maintenance Procedure for Extensive Green Roof Systems

What to Expect From an Extensive Green Roof System

The appearance of the vegetation within an extensive green roof will change year on year, dependent upon fluctuations in the seasonal weather throughout the period. It should also be expected that more grass and moss will be present during the wetter months, because the conditions will be ideal for these species to exist,

although they will tend to die off during the dry summer months, as free-draining extensive substrates will not hold sufficient moisture for them to survive.

A typical Sedum Blanket contains approximately 8 to 10 different plant species, some very similar in appearance to others but being more drought tolerant. Not every species incorporated will survive and the more dominant will be expected to prevail over time because they will adapt better to a particular location. Regardless of this, we would anticipate that as a minimum 50% of the species will flourish.

Extensive green roofs that have a deeper substrate growing medium, where the vegetation is provided either by selected plug plant species, vegetation cuttings or seeds, will generally support a broader species mix, which can include wild flowers, grasses and herbs. An increased amount of dead vegetation will arise from this type of species mix following flowering, which will need to be cut back and removed, both to reduce the bio-mass on the roof and to encourage seed drop from the dead flower heads.

In the early spring the first signs of life returning to the vegetation within an extensive green roof are led by any grasses present, quickly followed by a general "colouring up" of the sedum foliage, with other species following suit shortly thereafter. The growth and flowering of the individual species within the vegetation mix through the late spring and summer will be dependent upon the weather prevailing at the time, which will also determine which species will be most prominent in any given year. In the winter, sedum plants will appear to shrink back, the leaves will become smaller and turn red/brown in colour as they prepare themselves to withstand the coming winter frosts. This gives extensive vegetation mixes a generally red/brown hue in the late autumn and winter months, which is sometimes mistaken for the plants being distressed, when in fact they are in optimum condition for the time of year.

General Maintenance

General maintenance is normally carried out annually during springtime. However, certain tasks which will be dependent upon the location of the roof, such as the removal of weeds, seedlings and accumulated leaf litter from overhanging trees may also need to be done during the autumn.

During May, June and July, sedum plants flower and you will see a mixture of colours – predominantly whites, pinks and yellows with some purple. The foliage of some species of sedum, such as Sedum Album "Coral Carpet", blush red naturally during the summer and autumn, and so the vegetation can take on a more 'red/brown' appearance. This becomes more noticeable once plants have flowered, leaving remnants of dry brown seed heads. The best visible indication of the health of a plant is if the leaves are fleshy and contain plenty of water.

When exposed to extreme conditions, sedum plants have a tendency to turn a deep red colour. This is a natural phenomenon and is important to help the plant to acclimatize, ready to survive a cold winter or hot summer. This will usually occur during extreme cold weather as well as periods of prolonged drought, in very exposed locations or when the plants are in distress through lack of nutrient (fertilizer).

Only a relatively few species of sedum and other plants suitable for an extensive green roof installation will persist in partial and full shade, and they will generally be greener in colour and grow "leggier" in these locations. There will be a significant variance in the growth and colour between the plants growing in full or partial shade and those in full sun and this should be recognised as a feature of the living nature of each individual roof.

With the exception of saplings, which should always be removed, weeds in an extensive green roof should be considered as a problem only of aesthetics. If considered excessive, they can be removed either manually or by using a 'spot weed wipe', ensuring that care is taken to follow specific instructions regarding the use of any proprietary products. After the removal of weeds and saplings, treat the affected area as if it were a bare patch (see below). All extensive green roof installations will at times include some moss and grass.

Bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September. Vegetation cuttings from surrounding areas of abundant growth are taken and placed on bare patches. A light sprinkling of sand mixed with compost should then be dressed over the affected area to improve the uptake of the cuttings. The best results will be achieved if this work is carried out during spring maintenance and the affected area is kept moist for a short period afterwards.

Sedum Blankets are grown in a shallow growing medium which contains very little nutrient, so the annual application of fertiliser is crucial to ensure that the plants remain healthy. Fertiliser should ideally be applied during March/April, as it helps the plants to prepare for extreme weather conditions and flowering whilst also allowing the different species to gain sufficient nutrients without competing against each other.

Organic fertilizer can be obtained in 25kg bags, which is sufficient for an area of 312.5m² when applied at the recommended rate of 80gm/m². Areas of up to 30m² may be applied using either a hand held spreader or strewn by hand from a bucket. Larger roofs should always be done using a trolley applicator, which can be purchased direct from the supplier. Always apply the fertiliser at the given rate written on bag.

It is generally not considered necessary to irrigate extensive substrate green roof systems. It is, however, always advisable to ensure that there is a water supply point adjacent to the green roof, both to assist with general maintenance and as a precaution against extreme drought conditions.