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# Quality compost use in green roof construction



## An introduction to green roofs

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It's highly probable the first green roofs were created by accident - but we've known for some time that the use of vegetation as a roof covering unlocks a range of desirable benefits.

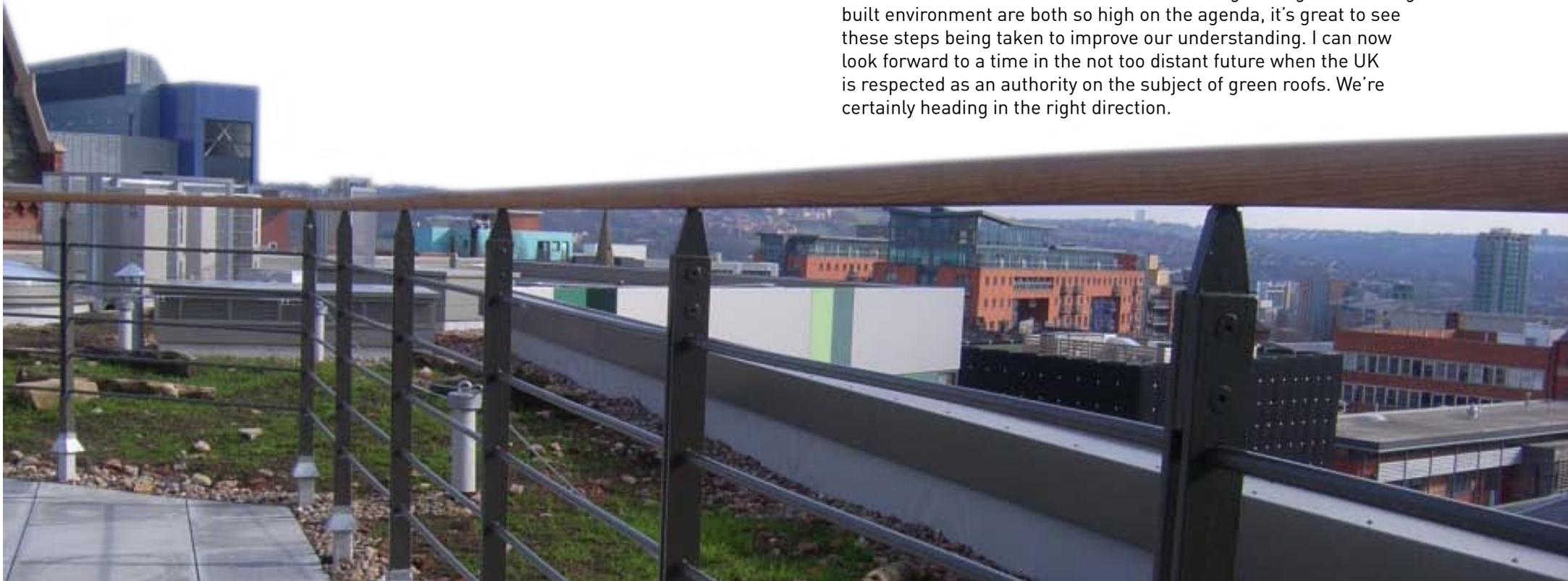
The addition of grass or plants to a rooftop provides natural insulation and will help manage rainwater drainage. It can require relatively little maintenance and obviously it looks good too - but the benefits don't stop there.

We're now beginning to better understand how green roofs can play an important role in improving our air quality, promoting biodiversity and creating green oases in urban environments. Maintained correctly, they can even extend the lifespan of your roof.

This range of benefits could be why we're beginning to see green roofs becoming a lot more common. Take a short walk around central London, for example, and you'll now be in close proximity to a vast array of impressive green roofs situated high above you. But the truth is we still lag behind much of Europe and America in our efforts to understand and embrace this practical yet aesthetically pleasing aspect of construction. The research now being conducted by bodies such as WRAP (Waste & Resources Action Programme) and the Green Roof Centre is therefore vital if we're to catch up and realise the full range of benefits.

WRAP's current range of studies is especially relevant in increasing our appreciation of the fundamental make up of the materials needed to create a green roof. They're showing that the use of BSI PAS 100 compost not only helps ensure good rates of healthy growth, but also provides another end use for this high quality recycled and renewable material.

At a time when sustainable construction and 'greening' our existing built environment are both so high on the agenda, it's great to see these steps being taken to improve our understanding. I can now look forward to a time in the not too distant future when the UK is respected as an authority on the subject of green roofs. We're certainly heading in the right direction.



## Choosing the right materials

The demands of a green roof substrate are highly specific. They need to be lightweight, drain well, and be able to cope with extremes of moisture, temperature and wind exposure, as well being able to survive for extended periods with minimal maintenance.

The choice of materials used in green roof construction is vital and quality compost, manufactured to the BSI PAS 100 specification, makes an ideal component for use within a variety of green roof substrates. Manufactured from recycled organic waste, such as grass clippings, tree prunings and leaves, it is a rich, organic material which contains major nutrients such as nitrogen, potassium and phosphate, all of which are essential for the development of healthy vegetation. Compost also has excellent water retaining properties which facilitate a key function of green roofs – better rainwater management.

The BSI PAS 100 specification sets out the minimum benchmark for quality compost, and ensures that products produced to these strict requirements are safe, consistent, reliable and



**“The use of green compost in green roof substrates has potential. It’s a rich organic material that contains a great deal of beneficial nutrients that actively promote growth and help absorb and retain water. At higher rates of inclusion, growth was actively promoted in some plants”**

Dr Paul Alexander  
Royal Horticultural Society

fit for purpose. The specification is supported by the Quality Protocol for Compost (applicable in England, Wales and Northern Ireland), which recognises that quality compost is no longer a waste material, but a product in its own right. This makes it ideal for use in green roof applications where the reliability and predictability of materials being used is essential.

In previous WRAP trials – from brownfield regeneration projects and tree planting schemes, to bioremediation and mulching, BSI PAS 100 compost has been proven to be a versatile, adaptable material that can be used to deliver measurable cost and environmental benefits. In the case of green roofs, WRAP trials are helping to build up a picture of how this useful material can contribute towards the long-term health, stability and attractiveness of green roofs.

## New UK guidance

In 2010, the Sheffield Green Roof Centre will publish the first UK-specific Green Roof Code of Practice which will establish criteria for the development of green roofs in the UK. Drawing on previous experience in Germany, Switzerland and Austria, the specification guidance will outline how to create green roofs that are sustainable, effective and long lasting. It will include guidance on planning, implementation, maintenance and the use of materials in green roof design, including BSI PAS 100 compost.

At present, the choice and mode of use is largely influenced by German FLL green roof specifications. However, they contain no guidance regarding BSI PAS 100 compost because this specification only applies in the UK. As a result, the benefits of quality compost use in UK green roofs are based purely on informal and anecdotal evidence, rather than objective research. Similarly, the use of other recycled, UK-sourced materials – such as lightweight aggregate or crushed brick, is also largely unproven. WRAP is therefore involved in a number of trials to build this scientific evidence base.

## Compost trials – Royal Horticultural Society

The rapid, strong development of vegetation is an essential requirement of a green roof. To date however, very little research has been conducted into the optimum inclusion rates of quality compost in green roofs.

Although compost is being increasingly used as an organic component within green roofs, it is rare that it is included at ratios higher than 15 per cent due to concerns over plant nutrient requirements, leachate and organic decomposition. Nevertheless, higher rates of quality compost could help to boost the growth of vegetation on a green roof. A trial is currently underway at the Royal Horticultural Society's (RHS) field research facility at Deer's Park in Wisley. It examines the extent to which BSI PAS 100 compost can be included in a green roof substrate without having a detrimental impact on the quality of the vegetation and water running off the substrate.

The RHS created five individual substrate mixes using differing proportions of BSI PAS 100 compost, charcoal (biochar – for soil conditioning) and crushed brick (for structural support). The mixes ranged from 35 per cent and 50 per cent compost inclusion. Five wildflower species were chosen for use, including St John's Wort, Yarrow, Lady's Bedstraw, Cowslip and Clustered Bellflower. These were chosen for their natural tolerance of free draining soils and their ability to survive in drier conditions – as are often found on green roofs.

The results so far are very promising and show that even at the highest inclusion rates using quality compost does not adversely affect plant establishment or run off quality. Plant growth has also been notable, and within four weeks the Yarrow had achieved over 80 per cent coverage.

## Compost trials – Harper Adams University College and Vital Earth

Keen to establish scientific, commercial and environmental reasons for the use of recycled materials, Vital Earth working in partnership with Harper Adams University College, Shropshire, has conducted a number of laboratory and deck (tray-based) trials to examine the longterm benefits of using recycled materials within greenroof substrates.

Based at Harper Adams University College, the trials use a mixture of lightweight granulated fuel ash, crushed brick or crushed tile and two grades of BSI PAS 100 green compost. The compost is used at 10 to 30 per cent by volume, which is higher than is more commonly used. In total, 36 decks were established, seeded with meadow flowers or planted up with sedum, then assessed for a range of criteria, including run-off attenuation, leaching (nutrients and organic matter), stability and vegetation performance.

“Fifteen months later, treatment effects are already striking, as Dr Arnie Rainbow, Vital Earth's Research & Development Manager explains. “Some minerals are releasing much less nutrient & organic matter than others and are thus potentially less polluting. Higher rates of compost are tending to enhance plant growth, without encouraging weeds, whilst the coarse compost – lower in nutrients & water holding capacity - seems particularly well-suited to Sedum.”



## Planning guidance encourages green roofs

Planning policy is gradually working to increase the prevalence of green roofs, with many authorities specifying their inclusion as part of relevant applications.

In the London Plan's Living Roofs and Wall Policy (4a.11) green roofs are being encouraged in all new developments. Likewise, in Sheffield, from 2011 a developer will need to include 80% vegetative cover on any new building over 1,000m<sup>2</sup> (non-residential) or in a development with more than 10 dwellings (residential). Manchester and Brighton & Hove are likely to follow suit, and in Scotland, the Scottish Green Roof Forum has been formed to develop green roof policy guidance across the country. The signs are that more planning authorities will follow their lead so the industry needs to be ready to respond.

### Support from the Landscape Institute

**“Green roofs play an important part in the creation of ‘green infrastructure’ (GI), the networks of green spaces, rivers and lakes that intersperse and connect villages, towns and cities throughout the UK. Green roofs are attractive, functional and contribute to the many benefits of GI. Our towns and cities can become simply better places with the addition of green roofs.”**

Paul Lincoln,  
Director of Policy and Communications  
Landscape Institute.



## What next for quality compost use in green roofs?

There are sound reasons why green roofs should form part of the UK's response to a changing climate as they offer designers, engineers and developers the opportunity to enhance the visual impact of a building. However, it is crucial that the industry begins to understand what needs to be done to ensure that green roofs remain healthy over a long period of time. The Sheffield Green Roof Centre's Code of Best Practice will underpin much of this, but the use of BSI PAS 100 compost in green roofs, as evidenced in WRAP supported trials, could help safeguard their longevity and effectiveness.

It's also easy to source BSI PAS 100 compost. Using WRAP's Compost Suppliers Directory, specifiers can identify their nearest supplier by postcode and keep both cost and transportation to a minimum.

Visit [www.wrap.org.uk/compost\\_suppliers](http://www.wrap.org.uk/compost_suppliers) for more information.

### Useful links

[www.wrap.org.uk/compost\\_suppliers](http://www.wrap.org.uk/compost_suppliers)

[www.livingroofs.org](http://www.livingroofs.org)

The Sheffield Green Roof Centre: [www.thegreenroofcentre.co.uk](http://www.thegreenroofcentre.co.uk)

The London Plan: [www.london.gov.uk/thelondonplan](http://www.london.gov.uk/thelondonplan)





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