UP ON THE ROOF

Mums are great. They spend a large chunk of their life feeding, clothing and wiping up after you. Then just when you think your mum couldn't do any more they let you build a green roof on their garden shed. **STRI research manager Dr Tom Young**, and his mum **Rosemary**, give us a guide to making your very own green roof, from high up in the Staffordshire countryside.

Stage One: Structural Preparation

The first and most important step of any green roof construction is to check that the roof is structurally sound and able to take the extra weight. For larger scale residential buildings, I would strongly advise to seek the advice of a structural engineer. However, for small scale roofs a healthy amount of common sense should be enough to make sure the roof doesn't collapse on the building's occupants, or in my case, my mum.

For our roof we decided that three extra battens of wood would be more than enough to support the extra weight (Figs. 1 & 2). As the roof was a retro-fit we had to add extra sides to the roof to create a box in which to add growing media (Fig. 3). This box had a small gap at its lowest end to allow water to drain. We then added a PVC pond liner onto the existing roof to ensure that the system didn't leak into the shed in future years and to also create a barrier between the asphalt roof and the substrate (Fig. 4). We added some old sheets to protect the PVC layer from damage during construction and to provide a water absorbent layer at the base of the roof (Fig. 5).

Stage Two: Substrate Addition

Extra thought should always be given to the choice of substrate for a green roof as this is what the 'green' aspect of the roof will grow in. Green roof substrate is essentially an artificial soil designed to be nutrient poor and free draining in order to prevent excessive plant growth and saturation. The substrate can be altered to reflect the type of plants you are thinking of adding to the roof. If you fancy low growing succulents such as *Sedum* spp. then very low levels of organic matter are needed in the mix. However, if you would like larger perennials and herbs then it's a good idea to add a bit more organic matter that provides more nutrition and holds more moisture, whilst still maintaining free draining properties.

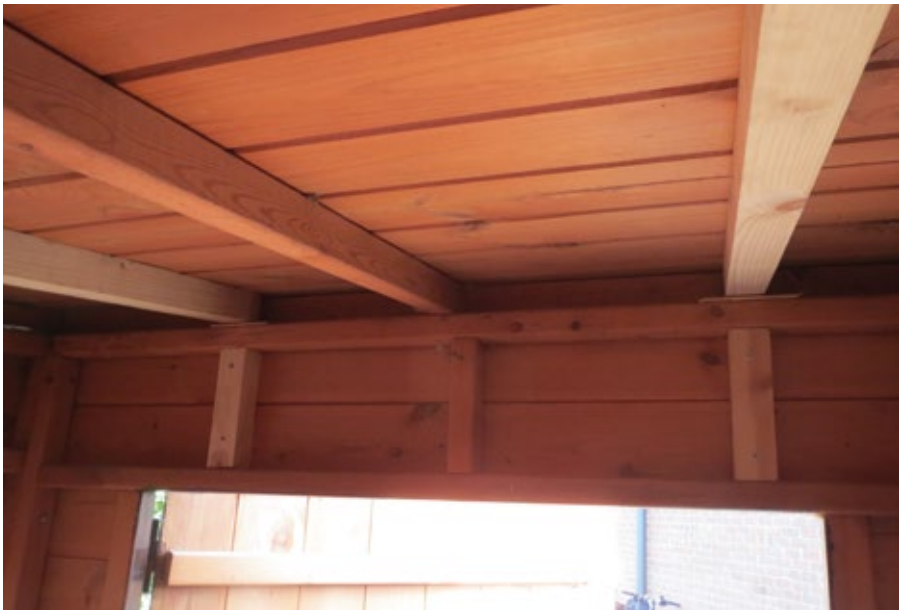

Fig 1: Wooden battens used as additional support for roof

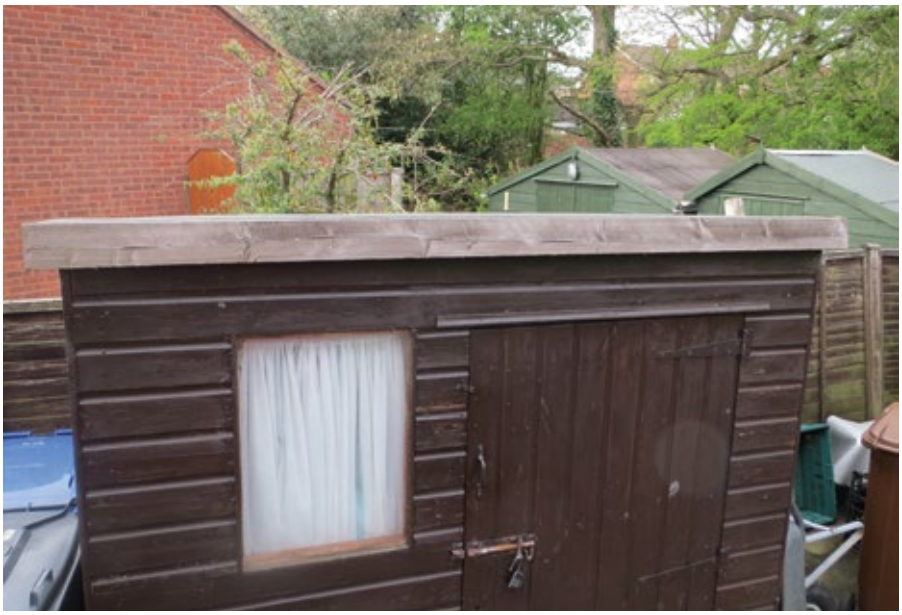

Fig 2: The shed used for the green roof

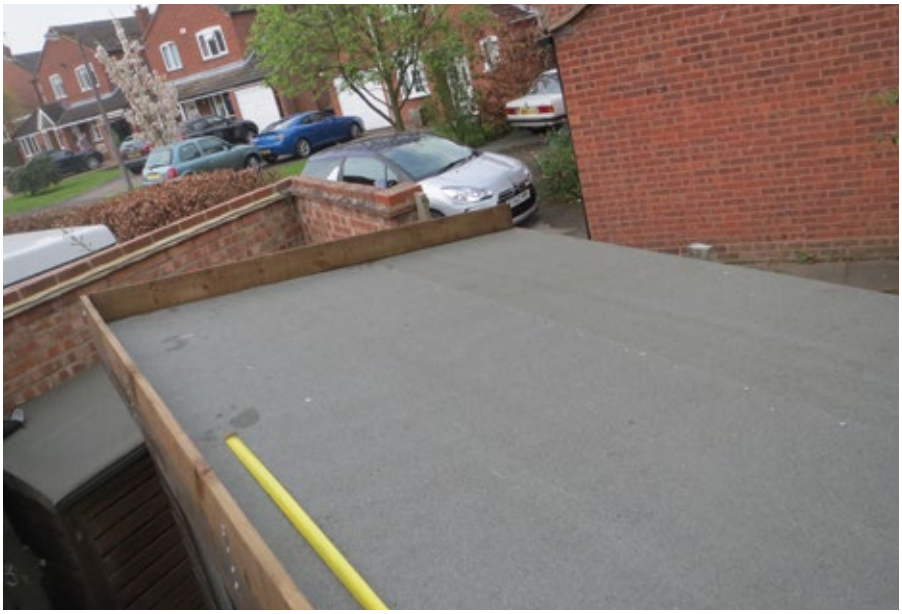

Fig 3: Wooden box constructed on existing roof

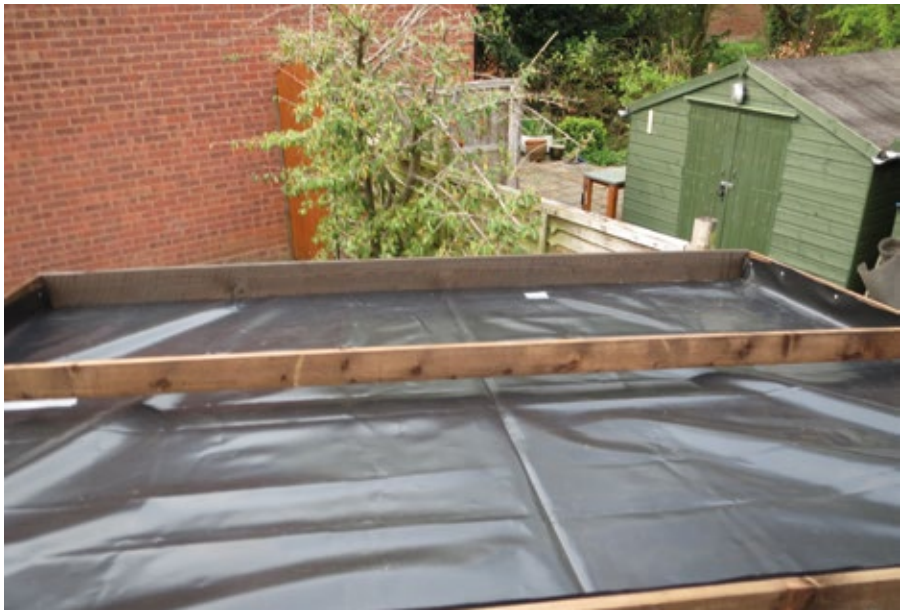

Fig 4: PVC liner added to roof and tacked in place

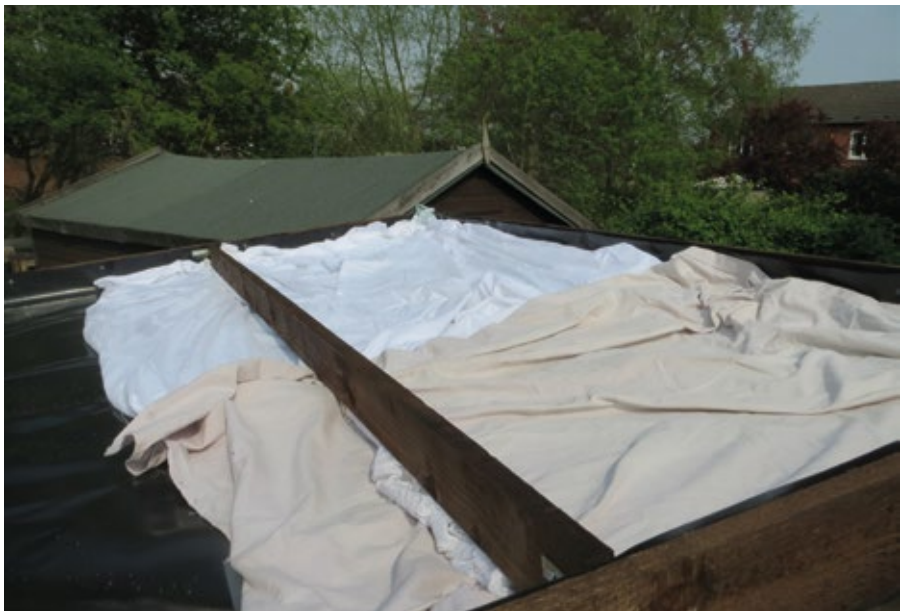

Fig 5: Old sheets used to protect PVC liner

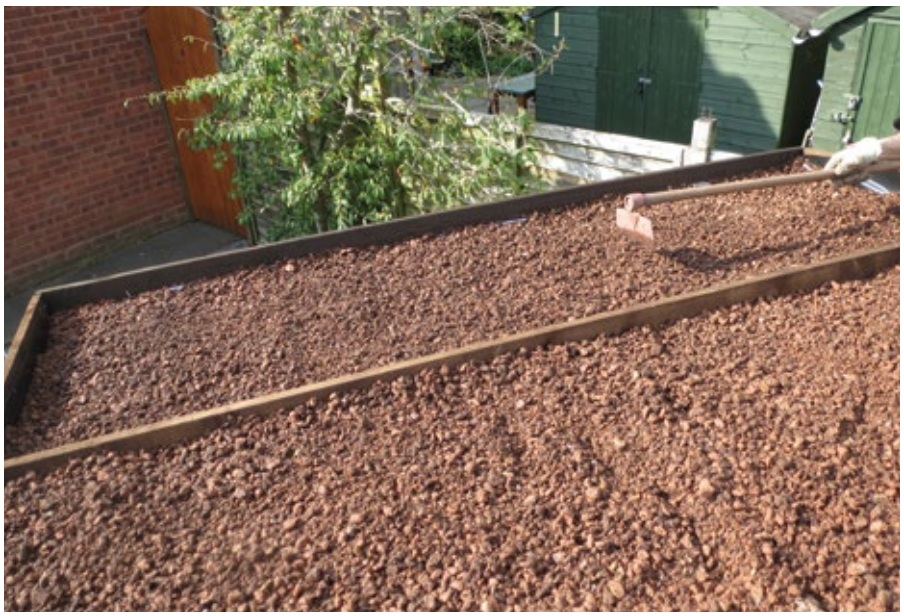

Fig 6: Substrate added to roof and raked in

Substrate depth should generally be at least 80mm, but if you can go deeper then it will always help the plants out. Our substrate was a mixture of green waste compost, lightweight heat expanded clay pellets and recycled crushed brick (Fig. 6). We also added in some polyacrylamide gel pellets that are often used in hanging baskets. These have been empirically shown to improve the drought-tolerance of plants on a green roof (Young *et al.* 2014), but obviously if rainfall isn't a problem in your area then this sort of addition would probably be unnecessary.

Stage Three: Planting

Plant choice is key for the success of your DIY green roof. Large scale green roofs are designed to be low maintenance and extremely hardy, however as DIY green roofs are generally smaller and more accessible you can be a bit more imaginative in your plant choice. We went with a selection of sturdy succulents (sedums), alpine perennials (potentilla), coastal (thift) and Mediterranean herbs (thyme) (Fig. 7). Clover was added, but even this proved to be too successful and now it requires regular cutting to prevent it from taking over the roof (Fig. 8). Many other types of vegetation can be used including turf which can give a nice instant vegetation coverage.

Stage Four: Maintenance

Maintenance for any green roof should be minimal as it should generally be self-sufficient in nutrition and water. However, at certain times a little bit of TLC won't go amiss.

Light irrigation should be applied to the roof during dry spells for the first three months after planting. Ideally this should be from a water butt to keep the environmental credentials of the roof. Some hand weeding can be done throughout the year if 'migrant' species are undesirable, however in my view green roof vegetation should be dynamic and allowed to change over time. An annual trim of some of the larger plants and removal of dead vegetation can

Fig 7: Plants after initial installation

Fig 8: Excessive clover growth

help to prevent the roof from becoming overgrown and a monoculture of one plant type. Sometimes in spring it may be necessary to top up substrate levels to account for any compaction and nutrient loss through leaching over the year.

At the start of 'year two' we topped our levels up with some spare lightweight expanded glass pellets, a small amount of compost as well as organic chickenfeed waste (Fig. 9). This gave a lovely flush of growth on the roof leading into summer without providing excess nutrition (Fig. 10). We plan to apply a similar mix every two to three years depending on how the roof and substrate levels are looking.

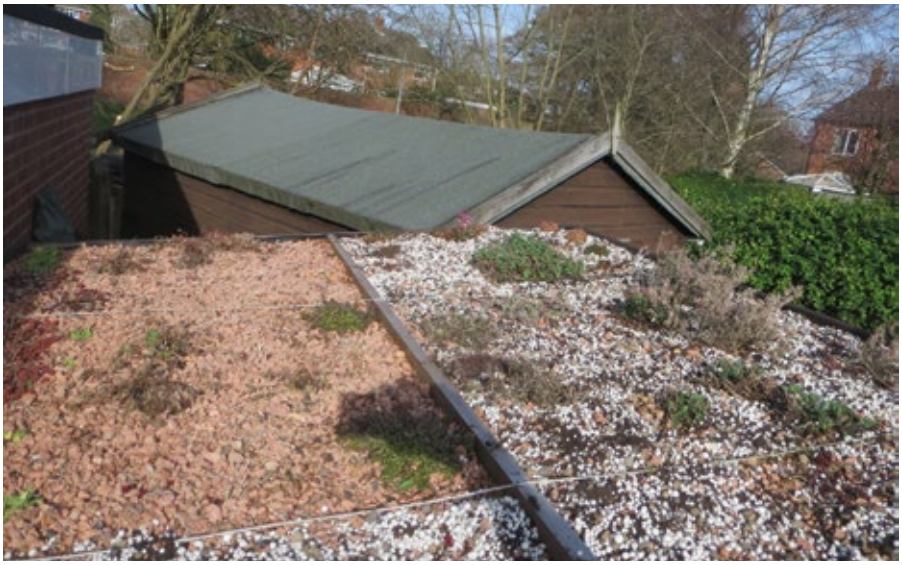

Fig 9: The roof mid-way through the spring renovations

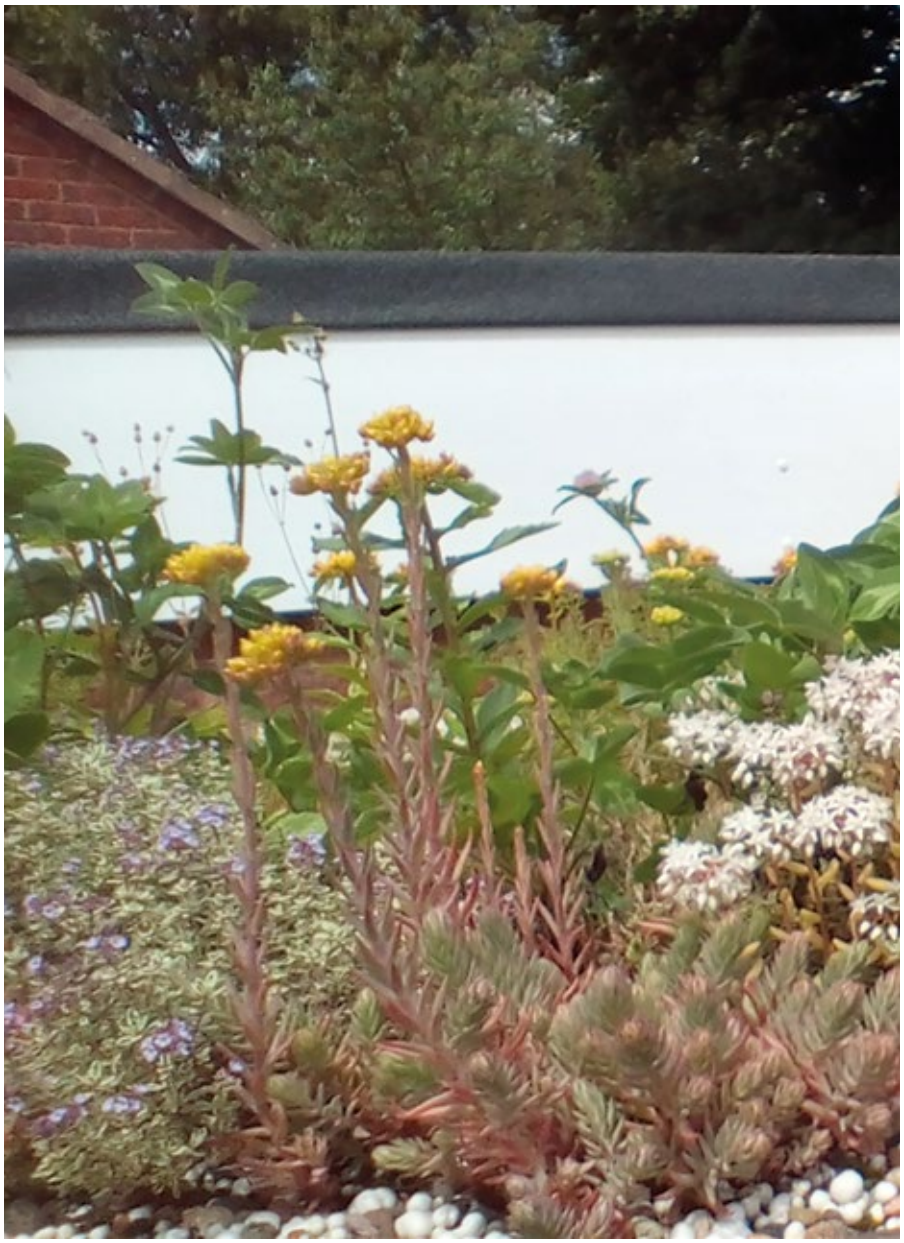

Fig 10: Green roof in summer 2016

REFERENCES:

Young, T.M., Cameron, D.D. & Phoenix, G.K. 2015. Increasing green roof plant drought tolerance through substrate modification and the use of water retention gels. *Urban Water Journal* http://dx.doi.org/10.1080/1573062X.2015.1036761

Green roofs are a great way to liven up boring structures such as sheds and log stores. They also draw attention to wider environmental issues: my mum's shed has received many admiring comments and sparked interesting debate amongst her neighbours. They are also enormous fun to construct yourself and there is no real right or wrong way to build them. Worst case scenario, you can take it off and start again!

If you are interested in constructing your own green roof, please contact me at **tom.young@strigroup.com** and I will try and point you in the right direction.