A roof under your head

As well as providing environmental and financial benefits, green roofs are good for mental health, as **Sara Wilkinson** and **Fiona Orr** demonstrate in this case study from an Australian project

St Canice's retrofitted rooftop garden, Sydney

About one in every five Australians experiences a mental illness. Elsewhere, the statistics are equally concerning (*http://bit.ly/2fkgT6K*); the UK Mental Health Foundation, for instance, states that:

- mental health is the main cause of overall disease burden and the primary cause of disability globally, resulting in more than 40m person-years of disability annually in 20–29-year-olds per year around the world
- one in six people in the UK experience a common mental health problem every week
- anxiety and depression are the cause of 20% of days lost from work each year in the UK.

Mental health may be affected by individual or societal factors, including economic disadvantage, poor housing, lack of social support and the level of access to, and use of, health services. The elderly are also at particularly high risk and, with our ageing populations, numbers afflicted Will grow.

In our increasingly urbanised, high-density, high-pressure and some say increasingly isolated world, there is growing evidence of a way to mitigate stress, pressure and mental illness. And it's right above our heads.

Unused and unloved

Rooftops are typically unused and unloved spaces. However, around 32% of all horizontal spaces in our cities are rooftops, and their potential is significant. Green roofs, whether retrofits or new builds, provide multiple economic, environmental and social benefits.

They can for example attenuate stormwater run-off, improve air quality, mitigate the urban heat island, increase biodiversity, improve thermal performance, increase property value and, importantly in this context, provide amenity space.

Where and how we live affects our mental health and wellbeing. The benefits of green spaces include offering a place to participate in activities that promote social interaction and physical exercise, reductions in stress, helping improve mood and attention, and having positive effects on anxiety and mood disorders. Proximity to green spaces and plants has also been demonstrated to increase productivity in the workplace.

In 1984, Edward Wilson advanced the biophilia hypothesis, which proposed that humans have an innate tendency to seek connections with nature for its calming effects. Biophilia literally means "love of life" or "love of living systems"; the question is, can biophilia be incorporated into the lives of people recovering from mental illness?

Green spaces

Green roofspaces take three main forms.

- **Intensive green roofs:** these have greater variations in the depth of substrate, or growing medium, which is typically more than 20cm, thus enabling it to host a greater variety of plants and shrubs (see Figure 1).
- **Extensive green roofs:** these have substrate depths of less than 20cm, require minimal or no irrigation, and are planted with low-growing succulents and stress-tolerant herbaceous species (see Figure 2).
- **Rooftop gardens:** these are typically small containerised garden beds interspersed with paths and recreational spaces and using varying depths of substrate with a higher organic component than extensive and intensive rooftops (see photo, above).

Sowing seeds

What do an engineer, a building surveyor and a mental healthcare nurse have in common? The answer is a retrofitted rooftop garden, where together they evaluated the impact of horticultural therapy on the health and wellbeing of people recovering from mental illness.

Engineer Rob Casilick contacted one of the authors, building surveyor Sara Wilkinson, with the news he had funding to evaluate the GROW Horticultural Therapy (HT) programme on a retrofitted rooftop garden at St Canice's, an inner-city church in Sydney's Kings Cross district. Sara knew she couldn't evaluate the health effects and so she contacted mental health nurse, and co-author, Fiona Orr.

St Vincent's Hospital in Sydney agreed to trial two HT programmes for people

Images © Sara Wilkinson and Fiona Orr

Figure 1

Intensive green roof section

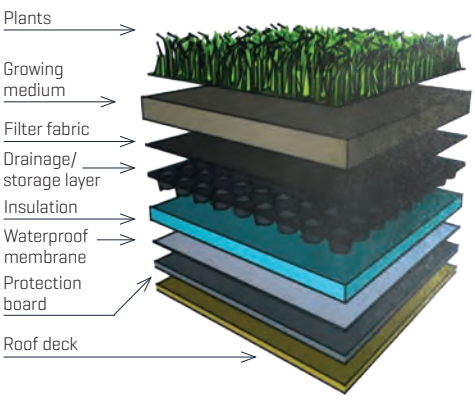
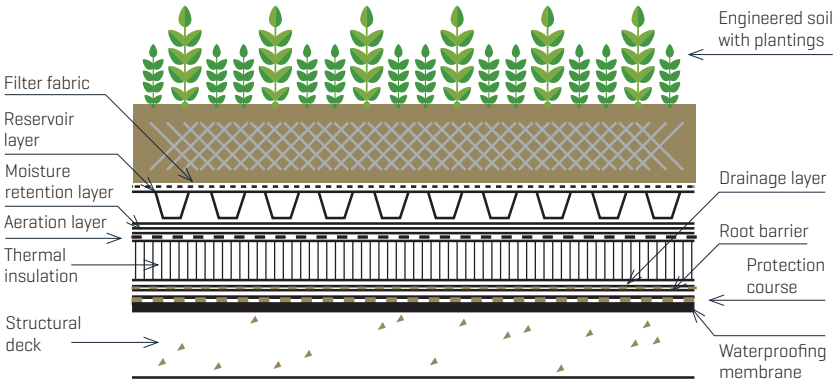


Figure 2

Extensive green roof section



Source: US National Roofing Contractors Association

recovering from mental illness. The rooftop space at St Canice's was around 55 sq. m, with garden beds containing vegetables, small shrubs, flowering plants and herbs, as well as a small vertical garden for flowers and strawberries. Some vegetables and herbs grown on the rooftop garden were used by the church's kitchen in preparing meals for local homeless people.

The GROW HT programme comprised eight weekly two-hour sessions led by a horticultural therapist and supported by a professional gardener. During two sessions, guest presenters with specialist skills in music and cookery led activities that complemented that week's gardening programme.

The majority of the participants did not have their own garden, so the HT programme provided them with opportunities to access a relaxing and beautiful space that enhanced their health and wellbeing. Regular connection with others, developing friendships, experiencing enjoyment and restorative health were some of the many benefits they identified.

These outcomes are not surprising, but all too often we fail to take the opportunities around us to improve and enhance our environments and, with them, our wellbeing. Imagine the savings we could make in the costs of healthcare nationally with widespread adoption of such spaces.

Positive outcomes

The benefits to participants in the weekly programme were clear, as they were for both authors. Possibly the best outcome is that, on the basis of the evaluation of the two programmes, the education liaison officer at St Vincent's Hospital made a case to retrofit three unused rooftop spaces at the hospital itself.

The case was supported, and the hospital is now retrofitting two of the roofs for on-site HT programmes that will start in mid-2018. The authors will be undertaking pre-and post-retrofit evaluations of staff, visitor and consumer experiences of the spaces, as well as the ensuing HT programmes.

The roofs were not previously used for on-site amenity or HT space but are visible from the wards, so the pre-retrofit evaluation will explore the property and health staff's rationale for selection and the physical and technical drivers and barriers for retrofitting the spaces, as well as the organisational ones.

This approach could also be taken in other contexts where people experience periodic stress or isolation, such as the corporate sector or high-density residential areas. Increased productivity and less social isolation are two significant factors that will ensure a good social return on investment. Concurrently, there are environmental gains such as improved thermal performance, reduced stormwater run-off, improved biodiversity, attenuation of the urban heat island and increased property value.

Indeed, a recent AECOM report (*www.aecom.com/au*) estimated the typical uplift in property value for the average Sydney home from green space on the site to be AUS$50,000 (£30,000).

Considerations

When assessing the potential for a green roof, the aspects to consider include:

- roof size
- type of construction
- pitch
- orientation
- overshadowing
- structural capacity
- drainage
- water supply
- substrate
- plants
- suitability for a design life of around 50 years.

Bear in mind that rooftop gardens, as opposed to green roofs, have less contact with roof coverings, so are potentially relocatable and cheaper.

All these considerations have been evaluated in the RICS guidance note *Green roof and walls* first edition, Australia (*www.rics.org/greenroofsguidance*). Published in 2016, this was produced by a chartered building surveyor, a valuation surveyor, a property management surveyor, an engineer and a green roof designer and installer.

The guidance note also provides a template for a licence to develop a rooftop, and a valuation methodology for rent so owners can generate income from the space – green roofs can be good for your health and your wallet too.

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