

Rooftop Landscapes Make Gardening on Roofs a Possibility

A rooftop landscape, otherwise known as a vegetated roof, ecoroof or living roof is a roof of a building that is partially or completely covered with vegetation. A rooftop landscape consists of a vegetated roof covering which is planted over an existing roof structure. While roofs have been greened in Scandinavia for centuries, modern rooftop garden systems, which allow a more varied selection of plants are a relatively new phenomenon.



Greenery on a rooftop, complete with trees, turns a dilapidated building into a feature of the city in New York.

This modern trend spread from Germany, who greatly developed green roof technology in the 1960s. Today, it is estimated that about 10% of all German roofs have been “greened.” In Copenhagen, Denmark, it’s now mandatory that all new flat roofs and pitched roofs under a 30 degree-pitch, both private and public, have to be vegetated. If old roofs have to be retrofitted, the building owner may be able to receive public financial support for a green roof. [2]

Now, Rooftop Landscapes, a Johannesburg-based company, is bringing this technology to South Africa. The company is led by two ex-aeronautical engineers, Justin Witten and Justin Sam, as well as Brett Hargreave, who has been involved in the construction and stainless steel fabrication industry for over 15 years. Rooftop Landscapes may be installed over pitched or flat roofs.

Justin Sam explains, “Governments from North America to Europe and Japan have begun to offer tax incentives and subsidies to encourage greening of roofs and South Africa is no exception. The Green Building Council of South Africa (GBCSA) has developed the Green Star SA rating tools. These tools provide

the commercial property industry with a basis for measuring the effectiveness of green buildings and to recognise and reward environmental leadership in the industry [3]. We’ve been in contact with the Council and we’ve ascertained that the installation of Rooftop Landscapes can earn property developers a significant number of green building credits under the Green Star SA ratings. In addition, rooftop landscaping affords corporate clients the ability advertise their commitment to the green revolution in a way that is highly visible and more marketable than, for example, environmentally-friendly paint.”

Rooftop landscaping benefits urban residents and the environment in several ways [4], explained Brett Hargreave, “In dense urban environments, greened roofs provide increased amenity space that reconnect urban residents and office workers with nature, improve the quality of life and increase their productivity. A rooftop garden effectively reclaims the land taken by the building that it is built on, providing important refuges for wildlife. Airborne particles, pollutants, CO₂ and toxins are filtered from the atmosphere by vegetation on a Rooftop Landscape, which in turn breathes oxygen into the air, resulting in a reduction in your carbon footprint.”



The greened roof of the Chicago City Hall.

Justin Witten added, "Rooftop Landscapes slowly absorb and retain heat from the sun and release it when the ambient air cools thereby reducing the heating and cooling demands within the building. In places like sunny South Africa, where air-conditioning impacts heavily on electricity usage, roof gardens can considerably reduce energy consumption. Having a living garden on your roof also cools the surrounding air. By breathing out the retained water, they can cool the roof and surrounding air significantly. This microclimate can significantly reduce adverse "urban heat island" weather patterns. In addition, the combination of soil, plants and trapped layers of air within a rooftop garden act as a noise insulation barrier, absorbing and reflecting sound waves."

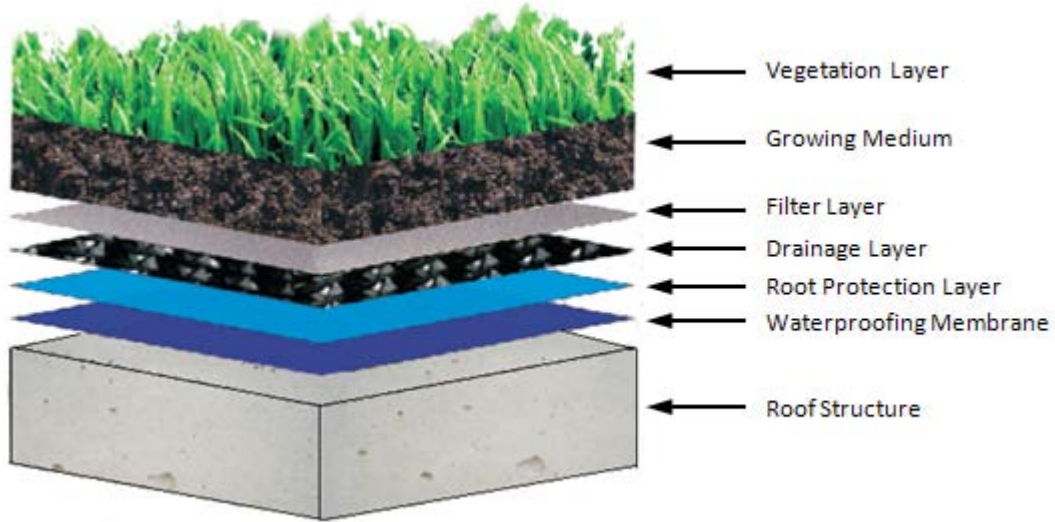
He added, "A rooftop garden will significantly reduce the rate and volume of rainfall leaving the roof, thereby reducing flash floods during storms and minimizing storm drain requirements. We try to be innovative all the time, so we now offer integration of all our roofgardens with a greywater recycling system, so that we can harvest rainfall from your roof and use the water in the building. The various layers of a Rooftop Landscape act like a rainwater collection tank which naturally filters the rainwater." Justin Sam highlighted the financial implications of rooftop landscaping, "While the installation of a green roof requires a larger initial investment up front than a typical non-planted roof, a green roof will last 3-4 times longer than a conventional roof. A Rooftop Landscape can greatly reduce the surface temperature of the roofing waterproofing membrane significantly, while protecting the surface of the roof membrane from exposure to UV rays and adverse weather conditions such as rain and hail.

In addition, as a Rooftop Landscape will last indefinitely, an installation will add to the value of the property."

DESIGN OF A ROOFTOP LANDSCAPE SYSTEM

Justin Witten explains how Rooftop Landscapes designed their system, "South Africa does not have a national standard with regards to Green Roof Design. Consequently, we've designed our system in accordance with the worldwide industry-leading German FLL (Research Society for Landscape Development and Design) Standard. Decades of research and experience in these technologies have shown that simply laying soil over a roof and planting plants is not a long-term solution and can cause damage to the roof structure and waterproofing membrane."

Justin Sam stated, "A well-designed rooftop garden has to take into account four main functions. Firstly, it must retain sufficient moisture for the plants. Secondly, excess water must be allowed to drain freely so that water does not sit on your roof and oversaturate the soil, drowning the plant roots. Thirdly, it must be as lightweight as possible to minimise stresses on the building structural members. Lastly, it must protect the roof structure and waterproofing membrane from the aggressive plant roots. Thus, a living roof is a long-term investment. We ensure a trouble-free garden on your roof for decades through responsive design engineering and stringent standards of installation and maintenance."



Rooftop Landscapes incorporate a system of layers of engineered linings

He added, “The engineered system of our product comprises a waterproofing layer that prevents water from entering the roof structure. Depending on the application, we waterproof the roof by either laying single-ply polymer sheeting on the roof and heat seaming the joints or we coat the roof with a liquid rubber coating. Above the waterproofing, the root protection barrier protects the waterproofing of the roof from penetration by plant roots. The drainage layer ensures that surplus water is safely drained away to gutters. We use a high-strength, cusped, high-density polyethylene (HDPE) sheet for this layer. An effective drainage system ensures that the growing medium does not get saturated, thereby keeping the plant roots healthy. The filter layer, made of polypropylene or polyester fabric prevents soil particles from entering the drainage layer and obstructing the water flow. The growing medium consists of a lightweight mixture of soil, water absorbing flakes and other materials and ensures that the vegetation is provided with sufficient water and nutrients, The vegetation layer may range from turf to vegetable and fruit plants to trees, depending on the type of roof that the garden is planted on. We regularly call on our horticultural consultants who recommend the best plants suitable for your roof.”



Modular Installation of a rooftop garden

TYPES OF ROOFTOP GARDENS

The layers required for a functional Rooftop Landscape may be installed as a built-in-place system, with each layer simply installed one at a time, or in the form of interlocking modular planter trays. Rooftop Landscapes also manufactures various edgings, accessories and maintenance inspection ports.



Built-in Place Installation of a rooftop garden

The choice of rooftop landscape type relates to the type of plants that can be grown on the roof. The choice is limited by the load that the roof can withstand.

- Intensive Rooftop Landscapes replicate ground level gardens on roofs. Typically, these roof gardens have a growing medium depth of 200 mm or more. The weight requirements for intensive green roofs are such that they are normally installed over concrete roof decks. Such roof gardens typically require a level of maintenance comparable to that of a similar ground-level garden.

- Extensive roof gardens are typically covered with low-growing plants. These roof gardens have a growing medium depth of less than 200 mm. They usually require less maintenance than intensive roof gardens.
- Biodiverse roof gardens recreate pre-existing ground ecosystems. These are constructed in a similar way to the other types of green roofs, but are designed with specific biodiversity objectives in mind, such as maximising biodiversity or providing a habitat for a specific species. To maximise biodiversity, a wide range of growing mediums will normally be distributed around the roof surface (usually sourced from the local area). Biodiverse roof gardens emphasise evolution over design. Thus, very little maintenance is required. In most cases, these are either left alone to allow the germination of wind-blown seeds, or alternatively, seeds collected from the local area are scattered over the roof area. Over time an ecosystem of plants and animals will develop on the roof.



Intensive Roof Gardens



Extensive Roof Gardens



Biodiverse Roof Gardens

MAINTENANCE AND WARRANTY

Justin Witten explains the maintenance philosophy of the company: "All Rooftop Landscapes come with a renewable maintenance contract, which entitles our clients to a warranty on plant materials and green roof components. As every roof that we green is an advertisement of our capabilities, we insist on keeping the roof maintained to our standards. We determine the optimum maintenance and irrigation schedule, based on the plant selection and the environment. The need for maintenance can be reduced by selecting plant species suited to the local environment of the roof. When required, we install an automated drip irrigation system to water the plants when rainfall is insufficient."

The level of maintenance required depends on the local environment factors (rainfall, temperature, light), type of green roof installed (extensive, intensive or biodiverse) and on the client's plant preferences.

- Intensive green roofs will typically require the same levels of care and maintenance as a similar garden situated on the ground (weeding, addition of fertiliser, and irrigation).
- Extensive roofs tend to be designed with minimal maintenance in mind, once the green roof is established. Generally, after the initial establishment phase, most extensive green roofs only require maintenance a few times per year. Maintenance visits will include monitoring plants for bird and pest damage and address using natural control methods where required. An integrated drip irrigation system may be installed to water plants when rainfall drought exceeds 3-4 weeks.
- Biodiverse roofs are designed to be "left alone" to allow an ecosystem to evolve. However, some maintenance, typically involving the periodic removal of any plant species with aggressive roots that could damage the underlying drainage and waterproofing system, is usually required.

Brett Hargreave concluded, "While the basic engineering principles behind the design of our system are common to all of our products, we have to be flexible, so that we can tailor our solutions to our clients' preferences. We source all materials locally and do all of our own manufacturing. Because of this, we can come up with the most innovative solutions for our clients, whether they're looking to add a green décor element to the roof of their home, a rooftop haven on an office building for workers to relax and feel at home, or a fruit and vegetable garden on a hotel, where chefs can pick their own fresh produce."

More information is available on the company's website: www.rooftoplandscapes.co.za. Alternatively, call Justin Witten on 079 871 5333 or Justin Sam on 073 486 6288.

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