



Crafting Landscapes on South African Green Rooftops and Balconies

Rooftop Landscaping allows a property owner to transform a sloped or flat rooftop space into a grassland vista, a sunbather's retreat, a haven for butterflies or a family herb garden.



Figure 1. A Rooftop Landscape Creates an Impression above all Acacia tree

Architects in South Africa are faced with the challenging task of designing sustainable buildings that utilise energy, water and other resources efficiently, protect occupant health and well-being and reduce waste and pollution. Green roofing, the practice of covering the upper surfaces of building envelopes in living vegetation is one passive solar design strategy that can fulfil all of these goals, if implemented correctly. While gardening on a rooftop may sound like the latest greenwashing fad, it is not entirely a new idea: it is well-known that roofs in Scandinavia were traditionally covered in bark and sod since prehistory [1]. Rooftop Landscapes, a specialist manufacturer and constructor of green roofs, designs and constructs solutions for landscaping roofs and balconies in South Africa. Their modern version incorporates the latest in soil engineering products, lightweight growing media and irrigation technology. It comprises, from the rooftop up, an approved waterproofing membrane, specially designed to withstand root damage, layers of drainage and filtration media, a soil-based growing medium, and a layer of vegetation.

Types of Rooftop Landscapes



Figure 2. An Indigenuous Meadow-styled Rooftop Landscape

The type of vegetation that can be planted on a green roof depend on the depth and properties of the of growing medium. Intensive Rooftop Landscapes have a growing medium depth of 200 mm or more and replicate ground-level gardens on concrete roofs. They are able to sustain large plants and even trees. Extensive Rooftop Landscapes are typically covered with low-growing plants. These roof gardens have a growing medium depth of less than 200 mm.

For instant greening, Rooftop Landscapes' pre-planted modular solutions offer the coverage of a lush green roof, with minimal weights, such that they may be retrofitted onto existing roofs without structural reinforcement.



Figure 3. A rooftop gravel planter Creates a unique décor element



Benefits of Rooftop Landscaping

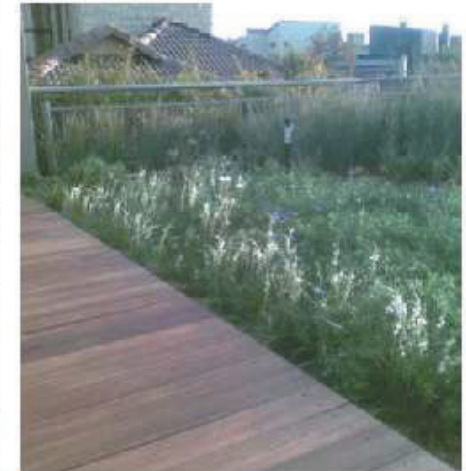


Figure 4. A swathe of winter blooms

Apart from the obvious aesthetic benefits of Rooftop Landscaping, rooftop vegetation inhales carbon dioxide, necessary for the photosynthesis process. Plants are extremely efficient at exhaling water that they have absorbed through their roots through the pores in their leaves. Airborne particles and pollutants are also trapped by plants [2].

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. Accurately predict the thermal effects of Rooftop Landscaping requires the correct understanding of the mechanisms of radiative, convective and conductive heat transfer [3]. Rooftop Landscapes' engineering team is able to perform simulations to predict the effects of green roofs on a building's thermal performance.

A Rooftop Landscape will significantly reduce the rate and volume of rainfall leaving the roof, thereby alleviating the risk of flash floods during storms and minimising stormwater drainage and storage requirements. In Johannesburg, the task of capturing the maximum available rainwater for later use is particularly challenging, owing to our heavy thunderstorms of short duration. Rooftop Landscapes is able to integrate their green roofs with greywater systems. A Rooftop Landscape provides a first level of filtration for rainwater.

While the installation of a green roof requires a larger initial investment up front than a typical non-planted roof, the life of the waterproofing membrane is increased significantly.



Alternative building methods

Landscaping rooftops greatly reduces the surface temperature of waterproofing membranes, while protecting it from ultraviolet radiation, rain and hail, thereby increasing their life. From an urban farming perspective, our sunny skies and rooftops are ideal for capturing sunlight.



Figure 5. Herbs, fruit and vegetables enjoying bright rooftop sunlight

In dense urban environments, Rooftop Landscapes replace hard surfaces of steel and concrete with lush vegetation, improving their quality of life and increasing their productivity. Occupants also benefit from improved noise insulation.

Irrigation and Maintenance



Figure 6. Rooftop Landscapes are fully irrigated with hidden drip irrigation lines, as can be seen above

Where required, Rooftop landscapes are installed with efficient sub-surface irrigation systems that ensure that plants are watered precisely when required. An automated irrigation timer system takes the hassle of irrigation off the mind of the property owner by ensuring that plants get just the right amount of water delivered directly at their roots. The irrigation system conserves water by minimising evaporation and runoff. This is an important aspect to consider in SA, characterized

by extremely variable rainfall (both geographically and over time) [4]. Drip irrigation can save up to 50%, compared to conventional irrigation systems.



Figure 7. Purple and white lavender varieties thriving on a Rooftop Landscape

References:

1. http://en.wikipedia.org/wiki/Sod_roof
2. Capon, B. Botany for Gardeners. Timber Press, Inc., 2005.
3. Moran, M. J., Shapiro, H. N. Fundamentals of Engineering Thermodynamics. John Wiley and Sons, 1990.
4. http://awsassets.wff.org.za/downloads/facts_brochure_mockup_04_b.pdf

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Pioneers of Green Rooftops

Rooftop Landscapes, a constructor of green roofs in South Africa, was established in 2010. As a specialist green roof implementer in South Africa, it handles all aspects of the green roof design and construction process, from conception to completion.

"Rooftop Landscapes' aim has always been to add our own levels of sophistication, innovation, integrity and professionalism, grounded in experience, to the worldwide movement of greening buildings. Our engineering capabilities keep us at the forefront of continuous research and development of green roof manufacturing technologies and construction techniques, and allow us to customise solutions for any application. Our creative flair allows us to add fresh energy and ideas to the art of landscaping, to create green roofs that are aesthetically pleasing and appropriate to the context of the building's architecture", states Justin Sam.

Rooftop Landscapes is an approved contractor for world-leading drip irrigation and rainwater harvesting systems. Its maintenance team provides full maintenance support in Gauteng, Cape Town and Durban. Together with its sister company, Vertical Landscapes, Rooftop Landscapes offer a complete solution in greening building surfaces.

For more information, contact Justin Witten (079 571 8333) or Justin Sam (073 486 6288) or visit www.rooftoplandscapes.co.za.

SISONKE DISTRICT OFFICE: A MECHANICAL AND ELECTRICAL PERSPECTIVE

SSA Consulting Engineers, who are currently celebrating their 25th year in operation, are Mechanical and Electrical Engineers, Maintenance Managers and Building Efficiency Consultants. SSA are members of Consulting Engineers South Africa and the Green Building Council.

On the Sisonke District Office project, SSA worked with the Architect from the planning stage to integrate the Mechanical and Electrical systems into the building design, using passive environmental solutions wherever possible.

The building is designed to utilise passive cooling and thermal storage. This does not require air-conditioning and uses an energy efficient heat pump driven under-floor heating system. The system is designed to allow the heat pump to operate during the day (when the most heat is available), to optimise the Co-efficient of Performance (COP), thus minimising the energy requirements. Heat is stored in the building mass, maintaining a comfortable indoor temperature – even during the cold snap in August, when it was snowing outside!

Rainwater is harvested from the workshop and garage roofs, stored in tanks and recycled for flushing the toilets, thus reducing the building's Municipal water requirements. Provision has also been made to harvest rainwater from the green roof should this be required in future.

An energy efficient lighting system was achieved, in conjunction with the Architect, by utilising high reflectance paint on the walls and ceilings and T5 fluorescent luminaires with high efficiency optics (which make sure that as much as possible of the light emitted by the lamps leaves the actual light fitting). Motion sensors are installed throughout the building to minimise unnecessary lighting in unoccupied areas.

To reduce the cabling and cabling required, a Voice Over Internet Protocol (VOIP) solution was installed. This involves combining the telephone and computer networks into a single system. An additional advantage is that the Department of Public Works will save considerably on telephony costs, and in particular when Inter-Department calls are made to other centres such as the Pietermaritzburg Head Office.

SSA have completed the Electrical and Mechanical design for a second Green Building in the precinct, using the same principles while incorporating the experience gained on this building.



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