

Roof gardens: the devil's in the detail

Installing a roof garden is nothing like having an ordinary garden in the backyard; it can be a very technical process.

By Ntsako Khosa



Image courtesy of National Geographic Voices

■ *The Chicago Botanic Garden's Green Roof Garden.*

There are several aspects to consider when installing a roof garden.

Location, building suitability and accessibility are all things that must be carefully thought-out before even thinking about which plants to use.

“There are several factors to consider when determining if a building’s roof is suitable as a green roof,” says Jaco Ferreira,

green renewable technologies manager from MRC Group. Many buildings aren’t built to support the additional load that comes from a roof garden. “The roof should be assessed and certified for the additional load by a structural engineer,” he says.

Although green roofs have been around for many years, they have only recently received attention from local environmental

organisations such as the Green Building Council of South Africa (GBCSA), which stipulates that a specific percentage of the building must have vegetation to achieve a green rating. This, of course, forms part of the entire green rating tool for the building to achieve a green rating.

“With new buildings, the installation of a green roof should be considered and



■ A green roof overlooking Pretoria CBD.

planned during the integrated design phase. Factors to consider include the sun, wind loading, dead loading and shear forces, waterproofing, drainage, fire, irrigation, safety and access,” says Ferreira.

A reinforced concrete roof structure must be waterproofed before a garden can be created on top of it, according to waterproofing experts Penetron.

Other considerations include accessibility, structural considerations, roof type and slope, safety and accessibility, types of green roof systems as well as diverse types of drainage materials and technologies. A thorough process of installation is required to ensure the garden has longevity and benefits both the building and its occupants.

Benefits of a roof garden

Clive Greenstone from Green Roof Designs says that urban greening in the form of green roofs and rooftop gardens offers multiple benefits for the human and environmental components of urban systems.

“It includes urban agriculture (food sovereignty), herbal medicinal plant cultivation, aesthetic bio-diverse landscapes and psychological values. From an environmental approach, urban

greening offers improvements such as reducing the urban heat island effect (which is a result of replacing the natural landscape with hard, non-porous surfaces found in most cities), storm water attenuation and run off reduction as well as increased spaces for bio-diverse landscapes and habitats,” he says.

Ferreira states that a roof garden can be an environmental management tool. “Green roofs contribute to both the building’s environmental welfare as well as the surrounding environments probably more than any other building system or technology available to architects, developers and urban planners wishing to address urban environmental challenges. It can be a sustainable urban drainage system (SUDS),” he says. He also mentions that it has been used by cities across the globe as a valuable tool to counter these challenges. The benefits of roof gardens work towards mitigating the effects of climate change on cities.

But the benefits of a roof garden aren’t just environmental. “Green roofs attenuate and filter rainwater therefore ensuring that storm water is released into the system gradually, this protects the building and municipal storm water infrastructure,” he says.

Green roofs increase the area’s biodiversity and introduce new species, which supports bird and insects. In addition, green roof surfaces stay cool during hot summer days and keep the ambient temperature cooler than the surrounding area and traditional roof types. “The cumulative effect of this combats the urban heat island effect where dark impervious surfaces heat up and retain heat. Essentially green roofs replace the ecological footprint that was lost due to urbanisation and development,” he says.

Green roofs also offer numerous benefits for buildings such as increased amenity space, protection of the waterproofing membrane and insulating the building in summer and winter. “Recent surveys have shown that buildings that incorporate green roofs and living walls may increase the value of the property by as much as 25%. Green roofs also offer the opportunity to practice rooftop farming and so contribute to food security and potential job creation,” Ferreira says.

Installing a roof garden

The kind of vegetation that is placed on a roof depends on what your requirements are. The plant types that are specified for green roofs can be motivated by



Image courtesy of MRC Group

■ *Genus Succulents are great plants to have on a roof garden.*

performance, biodiversity, climate or microclimate specific reasons.

“Vegetables will be fine but require about 20cm of soil and more watering and maintenance,” says Greenstone. A green roof only requires between 2cm and 10cm of soil. For green roofs, plants are treated en-masse and are low growing making them more ecological. “There is a greater selection of plant species from the Genus Succulents (water storage plants),” Greenstone adds.

Erich Mulder from Green Squared explains a pre-grow process that occurs inside the roof planter, which is done three to four months prior to installation. Growing the plants in a customised roof planter makes installation easier. “The planters are installed directly onto the high-density polyethylene (HDPE) layer,” he says.

Depending on the design objective this determines what growing medium is used, the depth of the growing medium (this also affects the weight), irrigation required, fire hazards, waterproofing, root barriers, maintenance and so on. “In many cases one or more of these factors dictate or prohibit which plants can be used,” Ferreira says.

He also says that the most efficient plant type for green roofs are indigenous succulent ground covers that provide all required benefits as they are water efficient, self-seeding, have shallow root systems and do not require intensive maintenance.

Locally there are no regulations, standards or guidelines on how to install a green roof, however, there are regulations for voluntary green-star related designs. Penetron says that these roofs shouldn’t leak therefore a drainage system must be installed.

Ferreira adds that there are comprehensive international standards. “These were developed over the past 30 years by industry associations, however they are designed specifically within the northern hemisphere context but can be applied in the local context by making changes that are suitable to our climate and available raw materials,” he says.

Many cities have introduced incentives and bylaws to ensure green roof implementation as a solution to existing challenges, as well as a proactive and preventative way to safeguard the

sustainability and resilience of cities, due to the enormous environmental and financial cost-saving benefits that green roofs offer.

Thorough research is necessary when installing a roof garden. Specifying the products that are used for the growing medium and waterproofing system is critical. Ferreira says this is where many green roofs have failed, which also sheds a bad light on green roofs as a solution. “Ensure that a thorough quality control process is in place and that each step in the installation is documented in detail so that problems can be easily solved if they arise,” he advises.

Like any other garden, a roof garden also requires some maintenance. A well designed green roof should be designed for minimal maintenance that also keeps long-term costs down. “This is achieved by using self-seeding succulent plants that have a low water and nutrient requirement. A correctly specified and designed system only requires expert maintenance a maximum of twice a year to ensure seasonal needs are met,” says Ferreira.

Unwanted weeds pose a serious challenge to green roof applications.

FEATURES



Image courtesy of MRC Group

■ Roof gardens have proven to be environmentally friendly.

“ Thorough research is necessary when installing a roof garden.”



Image courtesy of MRC Group


■ Installation of roof garden.

“Their seeds either arrive with contaminated nursery soils, plants, cuttings root systems compost and other organic growing mediums or they blow directly in from outside sources,” Greenstone says.

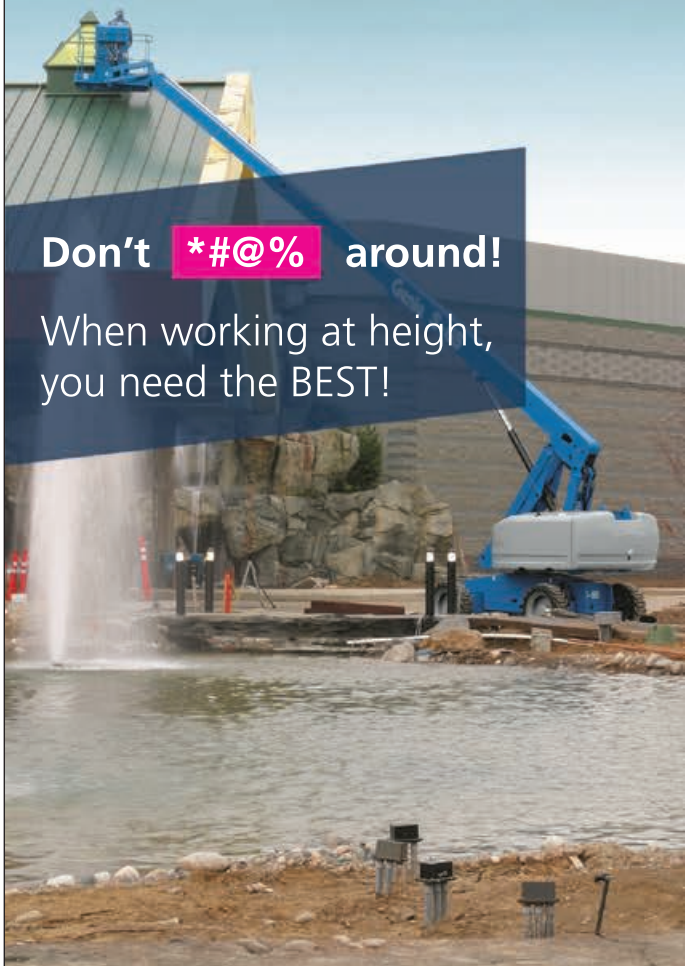
In addition, Greenstone adds that when the green roof is at an early stage of plant growth, the plant cover is limited and exposes areas of un-vegetated soils which allows weeds a chance to seed without any form of competition.

“A weekly weeding regime is essential primarily in the early stages of any green roof development. For instance, several Ficus species (chiefly tropical trees, shrubs and vines) are either blown in from outside sources or take root because of fig-eating birds that pass undigested seeds out while in flight or when they visit green roofs,” says Greenstone.

“If implemented correctly green roofs offer a win-win situation that is required for building resilient cities and counteracting the challenges that expanding cities face,” says Ferreira. 🌱




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