

What is a green roof?

A green roof is a vegetated landscape system installed on a roof structure or building structure. Green roofs are made up of a series of layers; starting with a waterproofing layer, drainage layer, filter fabric layer, growing substrate layer and a vegetation layer.

There are three main categories for green roofs: extensive, intensive and elevated landscape/on structure.



Types of green roofs

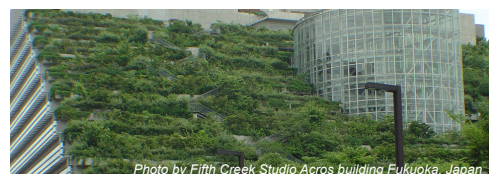
Extensive

Lightweight system with substrate depth of 150mm or less, and typically non-trafficable access due to thin substrate and structural capacity.



Intensive

This is the most common with a substrate more than 150mm and usually less than 550mm. These roofs are trafficable and often include paving, insulation and have good stormwater management opportunities.



Elevated landscape/on structure

These landscapes have a substrate of 500mm or greater and create a new ground plane or surface. This gives the greatest potential for insulation, stormwater management and biodiversity, similar to existing ground surface.



Benefits of green roofs

- Stormwater management, improve runoff quality and reduce runoff
- Thermal insulation improvement
- Air quality improvement
- Urban heat island effect reduction
- Increased open space
- Evapotranspiration increased by combination of vegetation and soil
- Urban wildlife habitat increase
- Food production opportunities (urban agriculture)
- Increased pollination of crops and other important plants
- Maintain atmosphere composition (CO₂/O₂ balance)
- Noise reduction
- Visual amenity and urban design
- Creating micro climates for buildings and urban canyons

Stormwater management

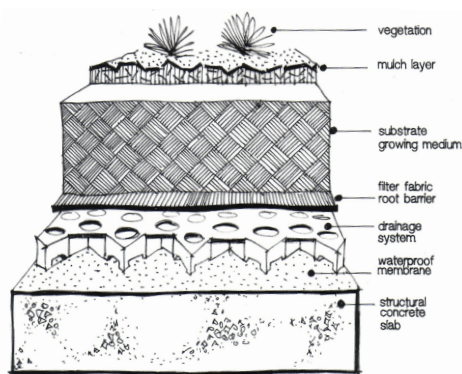
- Green roofs absorb and retain water, thus can be an effective strategy for the management of urban stormwater.
- Green roofs can delay the time to onset and peak flow and reduce the overall volume by the substrate/layers of the system. A study by University of Auckland (Voyde 2009) found 72% of cumulative rainfall volume was retained and 92% reduction of peak flow.
- A study by University of South Australia (Razzaghamanesh 2012) showed that runoff water quality was suitable for irrigation and non-potable use. Also the study showed that an extensive roof was more efficient at removing nitrogen and phosphorus than an intensive (deep) roof.



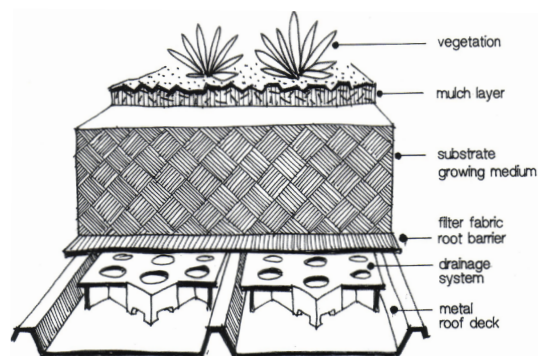
Photo by Fifth Creek Studio Peggy Notebaert Natural museum, Chicago

Construction System

All green roofs are made up of a series of layers as shown below.



New construction



Diagrams by Fifth Creek Studio

Retrofit over metal roofs

Structural Consideration

All loads on the roof need to be considered in the structural capacity of the structure including the saturated weight of the green roof system and plants (dead load), as well as the usage, such as people and activities (live load).

Typical saturated weights:

| System depth | Weight/m ² |
|--------------|-----------------------|
| 100mm | 140kg |
| 200mm | 190kg |
| 300mm | 285kg |
| Material | |
| Mulch | 12kg |
| Grasses | 15kg |
| Plants | 20kg |

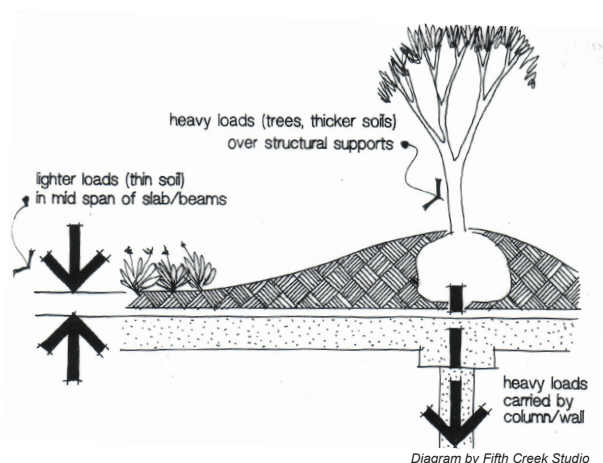


Diagram by Fifth Creek Studio