GREEN ROOFS & ROOF GARDENS

FEATURES AND BENEFITS

1. Rainwater Run-off
2. Reduction of Dust and Smog Level
3. Noise Pollution Levels
4. Oxygen Levels
5. Longevity of Waterproofing System
6. Improved Thermal Performance
7. Heat Islands
8. Evapo-transpiration
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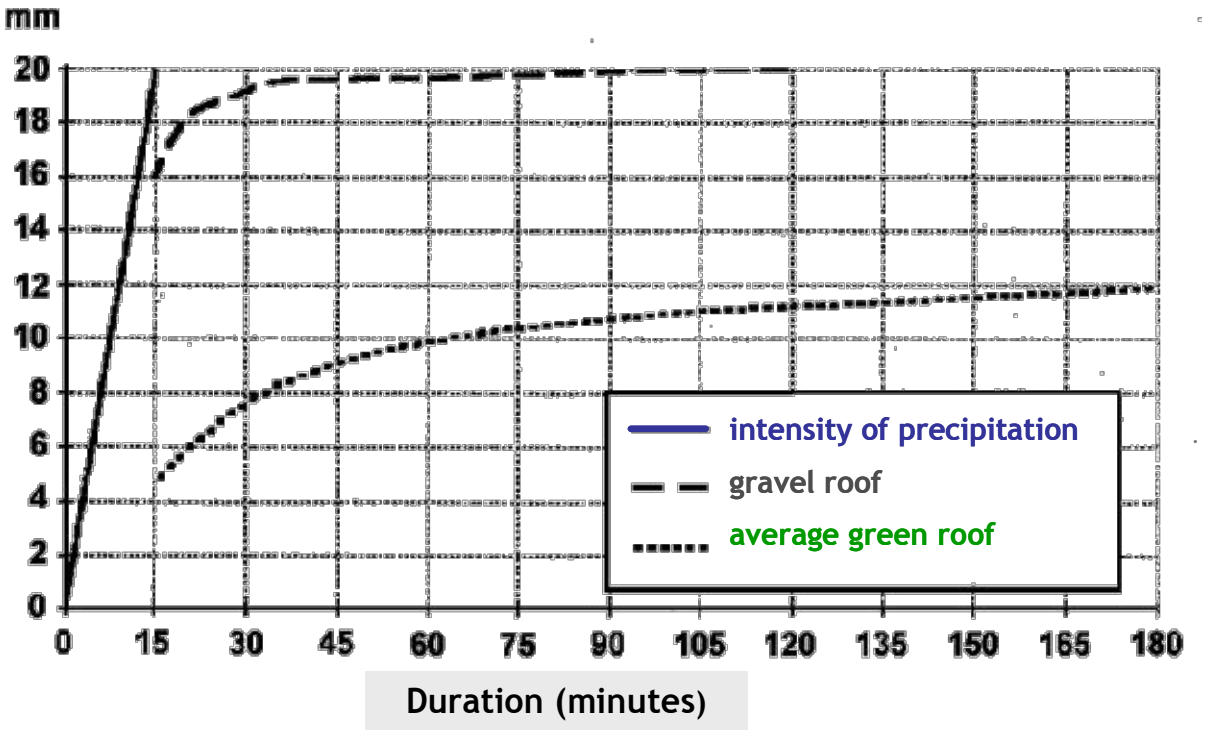
1. Rainwater Run-off

Rainwater run-off and flash flooding are becoming extremely high on the agenda of most Local and Water Authorities. In a typical residential development the area of impermeable surfaces range between 30 – 70%, while on commercial or industrial sites this figure can jump to 70 – 95% of the development areas.

The effect of these large areas of hard surfaces is that water run-off is rapid, which means that large scale drainage systems need to be developed in the immediate area or further down the system, to cope with the flash effect. The quality of this rainwater run-off is low and carries many pollutants that the treatment plants have to cope with. Green Roofs can lessen the effects considerably.



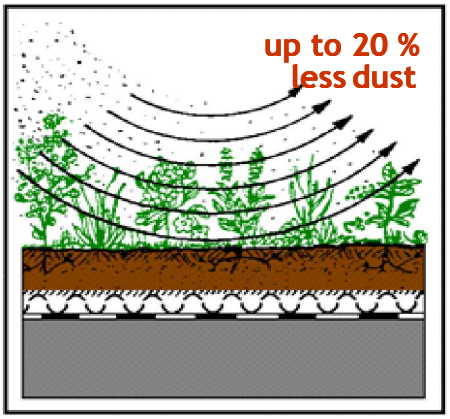
In tests carried out by Trent University in Nottingham the following figures were produced between a control roof and Green Roofs; the figures shown are expressed as the level of water absorption as a percentage of the unplanted control roof:-

100% of a 3 mm rainfall
80% of a 3 mm - 23 mm rainfall
73% for one period where 41 mm of rain fell over 47 hrs

The remaining water will run-off at a greatly reduced rate.

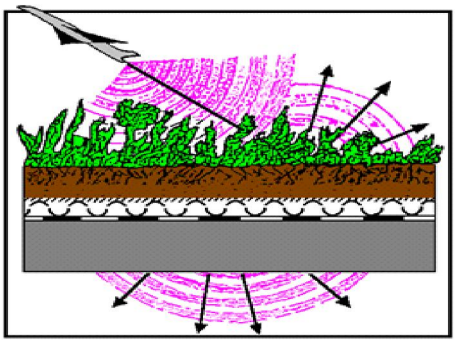
This has the effect of not only reducing the incidents of flash flooding and the knock on effects on the larger environment but also of reducing the numbers of down pipes required and therefore the amount of below ground drainage runs. This can have a significant cost saving if the building is built on complicated ground conditions.

2. Reduction of Dust and Smog Level



Airborne and waterborne particulates are absorbed by the vegetation on their surfaces and also on the wet inner surfaces of their cells. Some research has shown that inner city parklands planted with trees can reduce airborne pollution at ground level by up to 65%.**Error!**

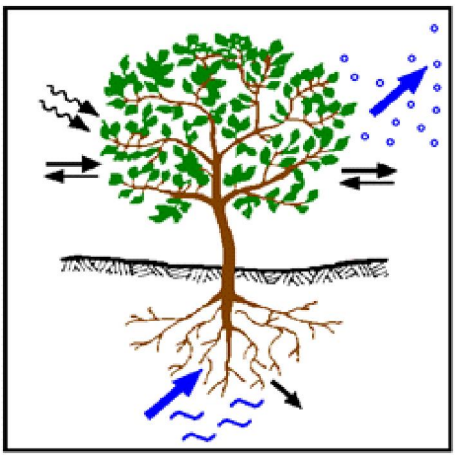
3. Noise Pollution Levels



Green Roofs will increase the sound insulation of properties by up to 3dB on reflected sound and 8dB by insulation. The key in this instance is dependent upon the densities of the roof build up; a newly planted roof with little vegetation and a small capacity for water retention will fair less well than an established roof with a high concentration of roots, leaf cover and a large capacity for water retention.

The choice of plants can also affect properties of sound insulation with some grasses producing white noise that counters further the effect of road noise.

4. Oxygen Levels



Plants create a micro-climate where the roofs are cooler and more humid and where carbon dioxide is absorbed and oxygen produced. This greatly improves the environment in the immediate area of the roof.

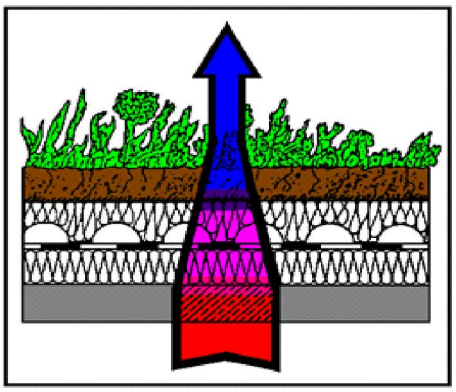
5. Longevity of Waterproofing System

The Green Roof build up protects the coverings from climatic extremes, UV and mechanical damage; this increases longevity of the waterproofing layers. Bituminous waterproofing products by nature will lose their elasticity and subsequently their waterproofing integrity and become brittle over long periods of time. The typical life expectancy of an engineered product is between 25 and 35 years. When the waterproofing membrane is removed from direct UV degradation and the thermal shift is slower and less extreme, the service life is increased accordingly. Case Studies exist on both bituminous membrane and asphalt roof gardens that are currently beyond 60 years. Normal maintenance is required for the exposed areas of waterproofing.

6. Improved Thermal Performance

While there are thermal benefits felt in both summer and winter, it is widely accepted that they are greatest in the summer months.

The combination of photosynthesis, evapo-transpiration (see below) and moisture evaporation from the soils limits the effects of solar radiation, reducing the surface air temperature outside the building.



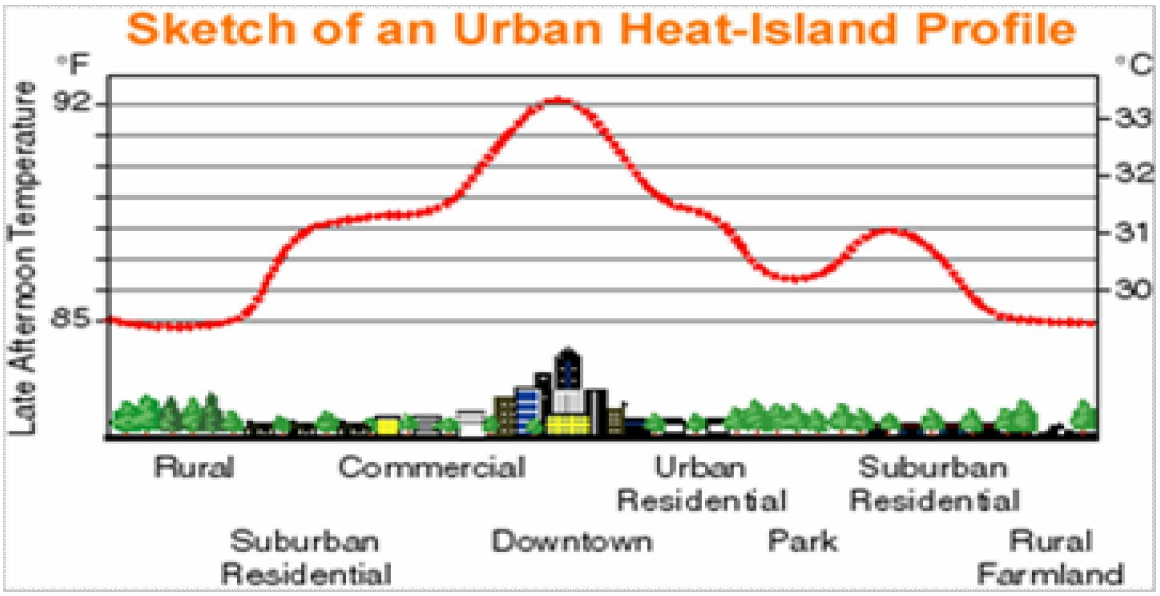
In winter the combination of the increased mass of the soil, the biological activity of the root zone of the planted area, which creates heat and the still layer of air or, boundary layer, reduces thermal heat loss. It should be noted, however, that a saturated layer of soil can greatly reduce the effects of all of the above.

7. Heat Islands

Loss of green spaces within cities and extensive use of concrete and asphalt and other hard roofing materials are creating heat islands. These materials absorb long wave radiation during the day and then emit it as shortwave radiation during the night. This has the effect of heating the city as there is no time for it to cool down before the start of the next day. Over a period of prolonged sunshine the air quality will suffer greatly as cooling breezes are prevented from entering the city by tall buildings and thermal conditions.

Information from thermal studies, carried out at Trent University in Nottingham, found that on a typical day where the ambient temperature was 18.4°C, a bare membrane roof had a surface temperature of 32°C. An identical roof covered with a thin layer plant system had a surface temperature of approximately 15°C.

In some cases, inner cities been have found to have ambient temperatures that can be up to 10F degrees higher that the surrounding areas and in some cases, the heat island effect is creating its own local weather patterns.



8. Evapo-transpiration

Evaporative water loss from the plant tissues is termed evapo-transpiration and occurs when converting water from a liquid into a gas. Plants use this process to prevent over heating and use the sun's energy to evaporate water from within their tissue rather than cause heat build up within them. The use of solar radiation used in this process would normally heat up the roof surface and increase internal temperatures.

9. Recycling of Materials

Many of the constituent parts of a Green Roof system are made up of recycled materials including plastics, rubber and brick rubble. These materials would all end up in land fill sites if they were not being re-used. The use of waste products such as lime kiln dust and volcanic shale, as the constituent base of the engineered substrate, is being tested at the Greenwich University and once testing is complete over a 5 year period we expect the go ahead in early 2008 to specify these materials. The sedum mat is recycled polyurethane foam, derived typically from the mattress and seating industry sector.

10. Wildlife Habitat

While it is accepted that Green Roofs cannot replace the natural environment for bio diversity, they do, however, make some provision for wildlife in urban settings.

The benefits include, but are not limited to, the removal of predators from the system, namely the domestic cat. They provide an undisturbed environment that can be designed to the specific needs of certain species; for example; bare areas of earth or short grasses for nesting. They also provide green stepping stones across the urban setting helping to link areas of green, such as parks, heaths and the out-lying suburbs.