

## Rooftop Tree Planter: Sustainability Benefits

The Rooftop Tree Planter developed by Pauley Landscapes Ltd will help architects, developers and specifiers achieve a number of key sustainability goals in all kinds of developments. The benefits of the planter are presented below in relation to the three pillars of sustainability; environment, society and economy. In addition, use of the planter contributes to meeting the requirements of a number of planning policy statements and best practice recommendations made by planning authorities and the Environment Agency.

### Environmental Benefits

#### *Carbon sink*

Mature trees act as a significant means of carbon sequestration. For every ton of new wood that grows, about 1.5 tons of CO<sub>2</sub> are removed from the air and 1.07 tons of life-giving oxygen are produced.<sup>1</sup>

#### *Climate Control*

Climate control is obtained by moderating the effects of sun, wind, and rain. Trees have demonstrated the ability to reduce heating and cooling costs and counteract the "heat island" effect in urban environments. Trees also act as shields against wind and snow. Dew and frost are less common under trees because less radiant energy is released from the soil in those areas at night. Urban areas with little vegetation can experience temperatures of up to seven degrees higher than those with tree cover. This translates into significantly higher energy costs to cool buildings. Properly planted trees can cut heating and cooling costs by as much as 12 percent and reduce overall power demand<sup>2</sup>. The larger the tree, the greater the cooling, therefore the roof planter enables design teams to maximise the positive climate effects of rooftop planting.

Trees, through their shade and transpiration, provide natural "low-tech" cooling that means less need for engineered solutions. The Arbor Day Foundation states that the overall effect of the shade created by planting a healthy tree is equivalent to 10 room-size air conditioners running 20 hours a day!<sup>3</sup>

#### *Air Quality*

Air quality can be improved through the use of trees, shrubs, and turf. Leaves filter the air we breathe by removing dust and other particulates. A mature tree absorbs between 55-110 kgs per year of small particles and gases, like carbon-dioxide, which are released into the air by automobiles and industrial facilities<sup>4</sup>. Leaves absorb carbon dioxide from the air to form carbohydrates that are used in the plant's structure and function. In this process, leaves also absorb other air pollutants—such as ozone, carbon monoxide, nitrogen oxide and sulphur dioxide, which cause respiratory problems—and give off oxygen. A single tree produces nearly three-quarters of the oxygen required for one person; and a canopy of trees in an urban environment can slash smog levels up to six percent<sup>5</sup>.

Large trees have a greater benefit in terms of reducing pollution than small trees.

#### *Water Conservation*

Trees help reduce storm water runoff, saving the high costs of drainage ditches, storm sewers, and other "engineered solutions" to storm water management. Trees intercept water, store some of it, and

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<sup>1</sup> USDA Forest Service: [http://www.treelink.org/docs/29\\_reasons.phtml](http://www.treelink.org/docs/29_reasons.phtml)

<sup>2</sup> Scenic America: <http://www.scenic.org/tree/environmental>

<sup>3</sup> US Department of Agriculture

<sup>4</sup> Scenic America: <http://www.scenic.org/tree/environmental>

<sup>5</sup> Scenic America: <http://www.scenic.org/tree/environmental>

reduce storm runoff and the possibility of flooding. As a source control mechanism in the Sustainable Urban Drainage System green roofs can help reduce flash floods as a consequence of intense rainfall events. This will become increasingly important as a consequence of climate change.

### *Biodiversity*

Trees provide a natural habitat that supports a wide variety of wildlife flora and fauna. Larger trees such as those supported by the rooftop tree planter will attract a greater variety of birds and other wildlife to the area.

### *Aesthetic Benefits*

City trees often serve several architectural and engineering functions. They provide privacy, emphasize views, or screen out objectionable views. They reduce glare and reflection. They provide background to and soften, complement, or enhance architecture. Trees also add colour and seasonal interest

### *Noise Pollution*

Noise pollution is an often overlooked problem. Excessive or unwanted sound has negative physical and psychological effects. Noise can come from many sources, especially roads and highways. Trees can play an important role in deadening unwanted noise. Sound waves are absorbed by a tree's leaves, branches, and twigs. Greenery provides 'white noise' reducing the effects of man-made sounds. The growing medium tends to block lower sound frequencies whilst the plants block higher frequencies.

Properly placed screens of trees and shrubs significantly decrease noise pollution along busy thoroughfares and intersections.

## **Social Benefits**

Trees add beauty and grace to any community setting. They make life more enjoyable, peaceful, relaxing, and offer a rich inheritance for future generations. Trees help us experience connections with our natural heritage and with our most deeply held spiritual and cultural values. They help to define character and promote a sense of place. The strong ties between people and trees are most evident in the resistance of community residents to removing trees.

In dense urban environments there is often a lack of green space for residents. Roof Gardens and roof top parks provide important green spaces to improve the quality of life for urban residents. Trees can provide community focal points – even in rooftop gardens.

Research indicates that trees help reduce stress in the workplace<sup>6</sup>. Trees can reduce stress and illness by providing psychological refreshment and a sense of well being through softening the built environment, creating character and a sense of place and permanence. Trees can release scents and aromas that elicit a positive emotional response, contributing to health and well being.

Police officers even believe that trees and landscaping can instill community pride and help cool tempers that sometimes erupt during long, hot summers!

Hospital patients have been shown to recover from surgery more quickly when their hospital room offered a view of trees<sup>7</sup>.

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<sup>6</sup> Scenic America: <http://www.scenic.org/tree/health>

<sup>7</sup> Trees Are Good: [http://www.treesaregood.com/treecare/tree\\_benefits.aspx](http://www.treesaregood.com/treecare/tree_benefits.aspx)

## Economic Benefits

During a 50-year life span, one tree will generate approximately £18,000 worth of oxygen, recycle £21,000 worth of water, and clean up £36,000 worth of air pollution or £75,000 total per tree without including any other values!<sup>8</sup>

Direct economic benefits are usually associated with energy costs. Air-conditioning costs are lower in a tree-shaded building. Heating costs are reduced when a building has a windbreak. Trees also afford physical protection to the fabric of the building. Green roofs have now been shown to double if not triple the life of waterproofing membranes beneath the green roof<sup>9</sup>.

Trees create a landscape which is attractive to industry and commerce, an environment where people want to live and work. Therefore, trees and shrubs properly placed and cared for on a residential or commercial lot can significantly increase property values (the presence of trees can increase the value of residential and commercial property by 5%-15%)<sup>10</sup>.

Trees increase in value from the time they are planted until they mature. Trees are a wise investment of funds because landscaped buildings are more valuable than non-landscaped buildings. The savings in energy costs and the increase in property value directly benefit building owners.

Trees can also provide a sustainable source of compost (leaf litter) for use in parks or other building planting.

## Meeting Planning Obligations

In planning terms, the use of the Rooftop Tree Planter would be consistent with a range of policy guidance, including:

- PPS1 Delivering Sustainable Development;
- PPG2 Green Belts;
- PPS3 Housing;
- PPS9 Biodiversity and geological conservation;
- PPG17 Planning for open space, sport and;
- PPS25 Development and Flood Risk.

The Rooftop Tree Planter can also contribute towards achieving higher scores in building assessment standards such as BREEAM, Code for Sustainable Homes and LEED, which are increasingly being required by Planning Authorities. This is mainly due to the potential improvements to building energy performance, site ecology and water attenuation offered by the planter.

The innovative and unusual nature of the Rooftop Tree Planter will also ensure any development stands out from the crowd and will be viewed as being at the forefront of new and improved sustainability solutions.

For further technical specification please contact: [design@pauleylandscapes.co.uk](mailto:design@pauleylandscapes.co.uk)

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<sup>8</sup> USDA Forest Services: [http://www.treelink.org/docs/29\\_reasons.phtml](http://www.treelink.org/docs/29_reasons.phtml)

<sup>9</sup> Living Roofs.org: <http://www.livingroofs.org/livingpages/benextendedlife.html>

<sup>10</sup> London Borough of Sutton: <http://www.sutton.gov.uk/index.aspx?articleid=4351>