

## Solutions at a Glance: GREEN SPACE FACTORS PROVIDE OPTIONS

*“In the true nature of things, if we rightly consider, every green tree is far more glorious than if it were made of gold and silver.” – Martin Luther*



**A green space factor system was implemented as part of the Quality Program developed jointly by the City**

Sweden a contract between the City and real estate developers with property in Western Harbor specified a number of green factors, from which the developers could choose. From an a la carte menu which included plant beds, foliage on walls (creepers and climbing plants), green roofs (mostly moss-stonecrop Sedum carpets), bodies of water, large trees and bushes and smaller items such as bat boxes, developers could put

together enough points to meet the agreed upon quantitative standards. In developing its Green Space program Malmö relied extensively on Berlin, which had a successful and comprehensive green factor program in place called the Biotope Area Factor (BAF).

Like the Quality Program developed by Malmö, the BAF program explicitly states what the ecological minimum standards are

### The Challenge

Cities are comprised of hard surfaces, and hard surfaces prevent nature from doing its job of refreshing and renewing the environment. A high degree of soil sealing causes rapid runoff of rainfall into the sewage system, which prevents replenishment of groundwater, and destroys plant and animal habitat. It also causes excessive warming. Ever get blisters by running barefoot across a parking lot on a hot summer day?

### The Solution

Site related standards to insure as much foliage as possible can be become part of the building permit process. In Malmö,

Surface Type Description	Weighting Factor
Sealed - Surface is impermeable to air and water and has no plant growth (concrete, asphalt, slabs with a solid sub-base)	0.0
Partially Sealed – Surface is permeable to water and air and has no plant growth (clinker brick, mosaic paving, slabs with a sand or gravel sub-base)	0.3
Semi-open – Surface permeable to water and air; infiltration; plant growth (gravel with grass coverage, wood-block paving, honeycomb brick with grass)	0.5
Surfaces with vegetation, unconnected to soil below, such as underground garages with less than 80 cm of soil covering	0.5
Surfaces with vegetation that have no connection to soil below but with more than 80 cm of soil covering	0.7
Surfaces with vegetation, connected to soil below available for development of flora and fauna	1.0
Rainwater infiltration per m <sup>2</sup> of roof area over surfaces with existing vegetation	0.2
Greenery covering walls and outer walls with no windows; actual height up to 10 m	0.5
Green roof	0.7

**Green Space Factors – Surface types not mentioned can be calculated as long as they have a positive effect on the ecosystem**

for structural changes and new development. It pertains to all forms of urban use - residential, commercial and infrastructural. All potential green areas, including courtyards, roofs and walls are included in the BAF. The BAF provides real estate developers, architects, and landscape architects with clear but flexible guidelines regarding the portion of a plot of land that must be planted or provide other functions for the ecosystem. The BAF formula is:  $BAF = \text{Ecologically Effective Surface Areas} / \text{Total Land Area}$ . In this calculation, the individual parts of a plot of land are weighted according to their "ecological value." The target BAF ranges from 0.30 to 0.60 depending on the type and size of property to be developed, and whether it is a new development or an extension to an existing development.

Using the BAF Formula

The following example demonstrates how the BAF is calculated. A 479 m<sup>2</sup> parcel of

Surface Type and Area	BAF Factor	Points
140 m <sup>2</sup> Asphalt	0.0	0 m <sup>2</sup>
59 m <sup>2</sup> gravel with grass coverage	0.5	30 m <sup>2</sup>
1 m <sup>2</sup> open soil	1.0	1 m <sup>2</sup>
<i>Total</i>		31

land has a building with a footprint of 279 m<sup>2</sup>, leaving 200 m<sup>2</sup> of other space. The project contains a courtyard, which is mainly covered with asphalt. There is some gravel with grass coverage on the periphery, and a

tree stands in a soil bed that measures about 1 m<sup>2</sup>.

Using the BAF formula of the Ecologically Effective Surface Areas/Total Land Area, we get  $31/479 = 0.06$ . However, the BAF target for a property such as this is 0.3. Reducing the area covered by asphalt and significantly expanding the area covered by vegetation can realize 140.5 points for this plot of land. This time, the BAF is  $140.5/479$ , which hits the target of 0.3.

Surface Type and Area	BAF Factor	Points
115 m <sup>2</sup> covered by vegetation	1.0	115 m <sup>2</sup>
85 m <sup>2</sup> mosaic paving	0.3	25.5 m <sup>2</sup>
<i>Total</i>		140.5

The beauty of the BAF concept is that it specifies a target that developers must reach but doesn't prescribe how they must reach it. Instead, developers know up front what the possibilities are and how many points each choice will provide. This gives them and the professionals who work for them a myriad of options, which they can use however they want.

The 2004 Urban Sustainability Study Group to Sweden and Denmark

In March 2004, a group of architects, engineers, developers and others from Seattle, Washington and Portland, Oregon went to Sweden and

Denmark to look at advanced urban sustainability projects.

During this trip, they visited the Western Harbor development in Malmö, Sweden where Green Space Factors were used to insure that foliage and water features were included in the design.

Resources

Much of the information for this article was provided by the Senate Department of Urban Development in Berlin, and can be found at:

[http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/index\\_en.shtml](http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/index_en.shtml)

*Produced by Patricia Chase, International Sustainable Solutions ([www.i-sustain.com](http://www.i-sustain.com)). International Sustainable Solutions encourages the implementation of sustainability practices and products by facilitating the sharing of knowledge and the creation of market opportunities.*

*Education sponsorship provided by Catapult Community Developers, CH2M Hill, Gregory Broderick Smith Real Estate, Magnusson Klemencic Associates, Nitze Stagen, ZGF Partnership and Vulcan Inc.*

