A Sustainability Primer • LEED for Landfills • TIFs: Part 2

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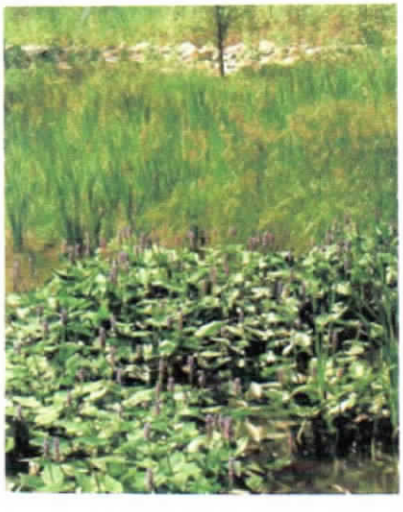
Toward Regenerative Design: The Sustainable Development of Brownfields

By Jennifer A. Senick, M.A., Anthony Sblendorio, CLA, and Clinton J. Andrews, Ph.D.

In recent years, the developer community has taken a huge step toward acceptance of sustainable development. The concept of sustainability is becoming integral in changing development patterns, personal habits and government regulations, as well as in raising awareness about the effects that our behaviors have on the natural environment. Concurrently, the Bruntland Report's definition of sustainability[1] has become widely accepted, if not very operational.

As a result, change agents worldwide have defined sustainable development in various more specific terms. These include: 1) the three-prong social-economic-environmental balancing act popularized by Agenda 21 (United Nations Conference on Environment and Development, 1992); 2) the science-based Natural Step definition, resulting from expert consideration of the requirements for preserving habitat function; 3) the 10 Melbourne Principles emphasizing self-determination and empowerment; 4) the 23 Ahwahnee Principles emphasizing New Urbanist design preferences; 5) the nine Hannover Principles guiding biocompatible building design; and several others.



Similarly, there has been a proliferation of programs to guide sustainable design. These include the U.S. Green Building Council's LEED standard and numerous place-based green building programs. McGraw-Hill Construction Analytics expects green building construction to exceed $12 billion in 2007.

And yet, we could and should go farther. To judge by a multitude of conferences on the topic, the search for the holy grail of sustainable development may be found in an equation that sums up existing development techniques (e.g., brownfield remediation and green building) and yields more than the sum of its parts. Illustrative synergies include green roofs to reduce stormwater run-off over contaminated or previously contaminated land; the treatment of stormwater run-off with biofiltration methods; extracting methane from a former landfill for use in a co-located building; and improving downtown air quality by reducing both air pollution emissions and the urban heat island.

Some innovators are even more ambitious. According to Anthony Sblendorio, principal and founder of Back to Nature, Inc., an ecological design and development company, the necessary next step is to move beyond sustaining natural resources and systems that currently exist and move towards regenerating those systems and resources that are unhealthy, unproductive and depleted. While a typical brownfield remediation project certainly leaves the site in better condition than it was found, it does not necessarily recreate a natural ecosystem. Regenerative design uses natural systems as its model to help integrate natural and manufactured systems, and to ensure that they remain healthy, productive and viable in the long term.

Regenerative Design - The Willow School

One of Back to Nature's hallmark projects, The Willow School in Bedminster Township, New Jersey, is a prime example of regenerative design. The LEED Gold Certified building is the first LEED-rated independent school in the country and the second LEED certified building in New Jersey. But the school itself, and the way it was envisioned and brought to fruition, goes far beyond green building. The design team for the building and site included the school's founders, Gretchen and Mark Biedron, as well as educators, environmental experts and other experts. This disparate but complementary team developed the unique and integrated educational, environmental and infrastructure systems for this highly functional institution.

The school's wastewater system highlights the regenerative nature of the building and site design. Rain water is harvested from the roof in order to reduce demand from the

municipal water system and to prevent runoff from the roof and other impervious surfaces.

The water is collected in a cistern located beneath the parking lot and used to flush the school's toilets.

From there, wastewater is treated in a natural Constructed Wetlands Septic System, the first approved in New Jersey in over a decade. The results are the same, if not better, than those associated with conventional septic systems.

The plants and microorganisms in the wetland treat the water and return recreational-quality water to the ground. The system uses no chemicals, far less energy than mechanical septic systems, and returns the collected rainwater to the aquifer almost directly where it fell. The system is a purposeful adaptation of natural wetlands, which are part of our natural water systems and have a tremendous positive effect on water quality.

Another feature which provides infrastructure support as well as educational opportunities is the stormwater management system. The township was concerned about how the construction of the school would affect the quality of the surface and ground water, soil sponge, wetlands, and wildlife habitat. Many of these concerns were addressed with the wastewater wetland system, as well as a purposefully constructed natural stormwater management system.

The rainwater harvesting roof system complements a system of bioswales, which are connected to a constructed wetland that acts as a stormwater detention system. This is a natural version of the mechanical systems, which consist of concrete channels and tunnels cutting through the landscape leading to a discharge point, though the bioswales and constructed wetlands have distinct advantages. They have a great capacity for absorbing water and are planted with the proper vegetation to slow water flow, reduce erosion, clean any polluted runoff, and then return it to the ground. They also provide environmentally and educationally valuable wildlife habitat.

By applying regenerative design principles to the water systems at the Willow School, Back to Nature was able to improve groundwater recharge and groundwater quality, provide habitat for wildlife, and provide beautiful and educational features for the school children.

All of this was accomplished while avoiding the construction of chemical and mechanical systems that are disruptive to natural systems. The school is now a model for regenerative design across New Jersey and beyond.

Regenerating Brownfields

The Willow School shows that a good design can help regenerate a degraded environment, replenish social capital and enhance functionality. In a brownfield context, these are huge challenges.

Too often, brownfield redevelopers are satisfied merely to achieve functionality while relocating environmental and social problems. While there needs to be a behavioral shift, adding these issues into the equation begs both technical and economic questions. What is the appropriate natural (or social) system to regenerate on any given brownfield? What is the economic cost or value of doing so?

To date, very little emphasis has been placed on valuing the return, or result, of such ecological-based development. Basic logic and irrefutable evidence of global climate change suggest that it has a high value, but standard formulas for measuring this do not exist. The Rutgers Center for Green Building and similar organizations are now quantifying these benefits using surveys of building occupants, life-cycle environmental analysis and life-cycle cost analysis. Over time, with the benefit of more well-designed studies, it will become possible to estimate statistically the value of ecological-based design. This, in turn, will provide the "hard data" that investors, property insurers, mortgage lenders, and the rest of Wall Street needs to provide sufficient capital for these projects. **BFN**

[1] The World Commission on Environment and Development (the Brundtland Commission, 1987) defined "sustainable development" as "meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs."

Jennifer A. Senick, M.A., is executive director of Rutgers Center for Green Building in New Brunswick, N.J.; Anthony Sblendorio, CLA, is a principal of Back to Nature, Inc., in Oldwick, N.J.; Clinton J. Andrews, Ph.D., is director of the Urban Planning Program at Rutgers University.