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The Sustainable Sites Rating System

Landscaping really counts.

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Comments

By Margaret Buranen

Developments and projects that involve landscaping have a new rating system by which they can merit credits for sustainable measures. The revised version of the Sustainable Sites Initiative (SSI) rating system—known as SITES v2—was released in fall 2013.

The new rating system is a joint endeavor of the American Society of Landscape Architects (ASLA), the US Botanic Garden, and the Lady Bird Johnson Wildflower Center at the University of Texas. It is the culmination of several years of work.

Why a landscape rating system? Why the need for attention to landscaping and quantifying its benefits?

"While carbon-neutral performance remains the holy grail for green buildings, sustainable landscapes move beyond a do-no-harm approach," says Nancy Somerville, ASLA executive vice president and CEO. "Landscapes sequester carbon, clean the air and water, increase energy efficiency, restore habitats, and ultimately give back through significant economic, social, and environmental benefits never fully measured until now."

"The SITES guidelines provide a way to quantify the sustainability of designed landscapes," says Elizabeth Guthrie, manager of ASLA's Professional Practices Program and ASLA liaison to SSI. "They are an essential tool for landscape architects and others who plan, design, construct, operate, and maintain landscapes."

Evan Mather, RLA, principal at AHBE Landscape Architects of Culver City, CA, terms SITES "a performance metric for challenging us as a profession to look at projects in a sustainable light." He notes, "LEED is for architects. SITES is our benchmark for creating sustainable landscaping." Leadership in Energy and Environmental Design, or LEED, is the rating system of the US Green Building Council.

"SITES is the first rating system that's site-driven, site-emphasizing. For landscape architects, civil engineers, and other designers outside of building structures, it's quite powerful," says Andrew Willrodt, P.E., LEED BD&C, managing principal at Fuscoe Engineering in Los Angeles.

Since June 2010, as part of the Sustainable Sites Initiative, pilot projects have been testing the 2009 rating system created by leading sustainability experts, scientists, and design professionals. The diverse projects represent various types, sizes, and locations as well as budgets.

The 2009 rating system includes 15 prerequisites and 51 additional, flexible credits to choose from that add up to 250 points. The credits address areas such as soil restoration, use of recycled materials, and land maintenance approaches. Certification levels include one through four stars, which are awarded to projects that achieve 40, 50, 60, or 80% of the 250 points.

Speaking before the official release of version 2 of the SITES rating system, Guthrie says that the new version would "streamline the certification process yet still capture the rigor of stormwater management. It will include the management of precipitation onsite as a baseline requisite and encourage projects to go beyond for additional points."

Changes based on feedback from the pilot projects and public comments will make the newer guidelines easier to navigate and documentation easier in places. Guthrie adds, "There will be direct references to LEED credits where applicable."

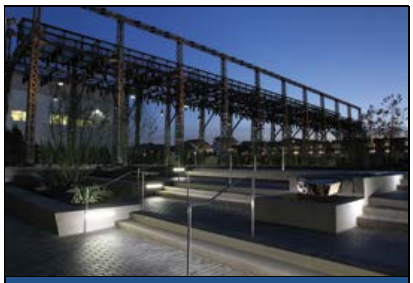

Photo Credit: Burbank Water and Power

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Twenty-three pilot projects have achieved certification to date, under the 2009 guidelines. Other projects will wait to be certified under the version 2 guidelines.

Certified pilot projects range from private homes to national park sites. Among the newest pilot projects certified are Scenic Hudson Long Dock Park in Beacon, NY; George “Doc” Cavalliere Park in Scottsdale, AZ; and the National Renewable Energy Laboratory Research Support Facility in Golden, CO.

Renovating a Power Plant

One of the most interesting of the certified pilot projects is the Burbank Water and Power (BWP) plant renovation in Burbank, CA. The 3.2-acre site is still a working power plant, but its appearance is vastly different from what it used to be. A visitor notices greenery before he sees cold steel structures.

AHBE Landscape Architects of Culver City, CA, and Fuscoe Engineers of Irvine and Los Angeles, CA, were principal outside firms on the project. They worked with Ronald Davis, BWP general manager, and Michael Thompson, BWP principal civil engineer.

The BWP EcoCampus project transformed the utility company’s Magnolia Power Plant site from an industrial complex bristling with hardware into a regenerative green campus. What was once an inhospitable space for people is now inviting to them.

The showpiece of the new utility campus is its Centennial Courtyard, a green space that once contained a decommissioned electrical substation. Part of the industrial structure of that substation still stands, kept out of the landfill. It looks like a piece of modern sculpture and functions as a large trellis, now entwined with a wide variety of attractive vines, including grape and potato. The structure creates shade, providing an outdoor meeting place for employees and an interesting view of nature interacting with industrial materials.

Photo Credit: Burbank Water and Power
Centennial Courtyard before vegetation was added

Oak and sycamore trees grow in the area. Mather and AHBE designer Kiku Kurahashi used native plants, but not exclusively.

“It’s our interpretation of an oak woodland landscape in an urban environment,” explains Mather.

In 2011, BWP transformed the east side of Lake Street between Olive Avenue and Magnolia Boulevard into one of the longest green streets in southern California. The company wanted to meet mandated stormwater quality requirements, not lose any parking spaces, and create an appealing streetscape.

Five different stormwater techniques were incorporated into the new green version of Lake Street. These measures include permeable pavers with gravel reservoir beneath to allow surface water to infiltrate.

Curb bump-outs and filtration planters at open spaces along the street both contain native plants including iris, crepe myrtle, and carex. They slow runoff and allow it to infiltrate.

The fourth and fifth measures are for trees. They allow more trees to be used for aesthetics and stormwater management because they increase the trees’ survival rate in the urban setting and dry climate. The Silva Cell System for trees creates an underground frame that can bear traffic loads, protecting trees from damage by vehicles and pedestrians. It gives trees more root space so that they can grow larger. The Kristar Tree Pod System is a supportive tree box. It filters out ultra-fine and dissolved pollutants from runoff.

Bill Mace, P.E., assistant general manager of Burbank Water and Power, says that what makes these five stormwater features impressive is that the space available for them was only an 8-foot-wide sidewalk, but they run for three full city blocks, or 1,200 linear feet.

These five stormwater capture systems work together to help BWP achieve zero runoff status. All stormwater that falls on the campus is percolated back into the aquifer, especially significant in an area with a dry climate.

An unused utility tunnel—about 100 yards long—was converted into another stormwater feature. This phytoextraction canal handles runoff from the surrounding Centennial Courtyard. Its primary plant is achillea.

“Selected vegetation and soil layers clean the water, and it can infiltrate through the perforated bottom of the canal to eventually percolate down to underground aquifers,” explains Mace. “Any overflow is redirected to two large underground concrete silos, with perforations at the bottom, to allow water to filter to underground aquifers over time.”

All irrigation of the landscaping property is done with recycled water. All campus area lighting was changed to LED.

Other sustainable features include a photovoltaic array with a rainwater catchment system, a solar-powered fountain pump, and salvaged and repurposed concrete and gravel. Three green roofs save $14,000 annually in energy costs.

Located within the city of Burbank, the project site is completely surrounded by industrial sites. Asphalt and concrete surfaces previously covered the site and there was no vegetation.

Burbank has a hot, dry Mediterranean climate. The annual average precipitation is only 17.49 inches. Given these conditions, creating a sustainable landscape here was challenging.

In 2002, BWP installed an innovative recycled water treatment system within its onsite power plants. This system reduced BWP's use of potable water by as much as 100,000 gallons a day. This water treatment system takes reclaimed wastewater (previously discharged into a storm drain after being cleaned at the sewage treatment plant) through a series of micro-filtration, reverse osmosis, and demineralization processes. The result is demineralized water pure enough for use in BWP's power plants.

This water is used throughout the facility's combustion turbine generator, heat recovery steam generator, steam turbine generator, cooling towers, a zero liquid discharge system, and the control and services building and stack.

After the water is utilized for all operational needs, the closed-system treatment process still leaves the BWP EcoCampus with an excess of non-potable water.

Photovoltaic panels generate electricity and provide shade within a surface parking area. A solar powered pump runs a water feature.

The EcoCampus is composed of several projects within the Magnolia Power Plant site, each of which had separate design teams. Combining the series of projects made earning SITES credits possible, and each project contributed a unique aspect to the accreditation.

Mather says that the submitting the documentation for SITES certification was not his idea, but a collective idea of the entire staff. "We thought this would be the perfect project to try," he says. "We're the only working industrial site that's certified."

Local codes, zoning, and regulatory requirements helped lay a foundation for some of the sustainable techniques implemented. For example, the National Pollutant Discharge Elimination System permit requires a baseline level for stormwater management.

Because these systems can be costly, convincing a client to increase the treatment capacity to meet SITES standards was more achievable. In addition, the use of a native, drought-tolerant plant palette is required under local landscape ordinances and water use requirements such as Assembly Bill 1881.

BWP will follow the SITES-generated maintenance plan to maintain the site and ensure its long-term sustainability. The company will also be monitoring the project and making public its findings. Monitoring will be done for the amount of nonpotable water to be sure there is enough to irrigate the landscaping, and soil will be tested annually for quality.

One major challenge to the project was that the site had to remain as a working power plant. This created many constraints in terms of space.

"The lattice frame structure had concrete grade beams just below the surface," says Willrodt. "Working drainage pavers constructed with the beam elements made such a shallow area to work in, limited vertical space."

Knowing that the courtyard would get "high pedestrian use required sensitivity to the gravity of the area," he adds.

On such a large industrial, impervious site, "the soils were not ideal," notes Mather. And on an old industrial site "going in, there was not a lot of good base information. We had to adapt to some things later."

One example was discovering an existing well on the site. "We're using reclaimed water for irrigation, but we can't reclaim water within 50 feet of the well. So we said we would use potable water in that area.

"But," Mather continues, "we had a mandate from forward-thinking Ron Davis [BWP general manager] to use recycled water everywhere. So we created a concrete-bottomed planter within the radius of the well. This prevented reclaimed water from infiltrating around the well."

Getting that "bathtub with plantings to look no different than the plantings next to it in the ground was a challenge," he adds.

The BWP EcoCampus was created to promote both environmental and social health. It does so by giving employees a pleasant natural setting for relaxation, using nature's ways to improve water quality and recharge ground aquifers, and referencing the site's history.

One of the main successes of the design is its ability to act as a model for sustainability and as an educational tool for the public. It provides tangible examples of how local residents and commercial property owners can better use energy and water to help the environment.

Visitors who tour the EcoCampus are asked to take a survey afterward. The survey gives them the opportunity to review what they've learned about sustainability and see how they might implement green infrastructure at their homes and businesses.

"People ask why we put the money into this EcoCampus, but if you're building for the future, you have to build quality," says Joe Flores, BWP conservation and communications manager. "The proof [of wise expenditure] is in the rates you charge. Over the last 10 years our rates have gone from among the highest to the lowest."

This statistic is even more impressive because BWP has no water rights. The utility has to purchase all the water it sells to customers.

Willrodt commends “BWP’s willingness and fortitude to do the project in a sustainable way. We hear chatter about people wanting to make a project sustainable, but not everyone is willing to spend the money to do it. BWP was.”

Campus Improvements

Another SITES-certified pilot project also features innovative stormwater management. This $11 million project, completed in 2011, was actually a combination of two much-needed improvements at Grand Valley State University (GVSU) in Allendale, MI.

“The project was dreamed up by the university several years earlier,” says Kerri Miller, P.E., LEED AP BD&C, vice president at Fishbeck, Thompson, Carr and Huber in Grand Rapids, MI, civil engineers for the project. “It finally got funding just when SSI came up. We broached the idea of applying, and they agreed.”

The project combines new athletic facilities and stormwater management for much of the campus. It includes a multi-sport, multi-field athletic complex with playing surfaces and support facilities for GVSU’s intramural, club, and varsity sports teams.

The athletics complex project’s location was adjacent to a significant stormwater management project that GVSU was undertaking. It made sense to combine the two projects to increase the opportunity to achieve SITES certification.

Putting the projects together allowed better use of the university’s land. It also saved GVSU money on the costs of site planning, earthmoving, landscaping, and stormwater measures.

GVSU was founded in 1960, and its enrollment grew rapidly. As the campus expanded, so did its impervious surfaces, and stormwater was handled on a project-by-project basis. The region averages almost 33 inches of rain annually.

Photo Credit: GVSU
The stormwater complex is sized to manage runoff from the south campus.

The university campus is located in the lower west portion of Michigan, developed on land previously used for farming and consisting of predominately clay soils. It is within a half mile of the Grand River and sits approximately 80 feet above the river elevation.

The developed campus is relatively flat land with a series of heavily wooded, steep ravines between campus and the river’s edge. Erosion inevitably occurred along these ravines as stormwater runoff increased from the expanding campus.

The Grand River is a major tributary that drains into Lake Michigan. This project was significant in controlling sediment, as part of a multi-state effort to improve water quality in the Great Lakes.

GVSU has changed to managing collected runoff on a regional basis rather than using its old project-by-project approach. The stormwater complex is sized to manage runoff from a large area of south campus.

“They had bucked the historic drainage patterns on the campus site,” says Miller. “Part of the drainage had gone to the west [before development]. The campus developed north to south and sent stormwater through pipes to the east.”

The university aims to restore the historic drainage patterns for the entire campus. It wants to reduce the total runoff levels to those of predevelopment conditions.

The location was chosen because it is within the fall zone of a large TV tower. Buildings and parking lots cannot be constructed in a fall zone. Leaving it open to develop into a stormwater management complex is a great use of the area. It also keeps stormwater needs from taking land that is needed for buildings.

Stormwater is routed via piping networks to a forebay for initial capture, detention, and sedimentation. Runoff overflows the forebay into multiple cells with varied habitat and water depths, constructed at progressively lower elevations.

Diverse native wetland plant communities were planted in the cells. Habitat structures were installed to further diversify wildlife habitat and encourage more animals to reside there.

The project team needed to design proper drainage systems for the recreation fields to ensure maximum playing time on these surfaces for sports. The design solution included a panel pipe herringbone under the drain system under the fields to capture stormwater. The stormwater management complex needed to be sized to create adequate storage volumes for runoff, encourage evaporation and plant uptake, and create viable ecosystems for habitat.

To minimize exporting soils offsite, the design included balancing the cut and fill volumes of dirt. More than 180,000 cubic yards of clay soils had to be excavated and compacted within the project boundary. Heavy rains during construction added to the site’s challenges.

"It was such a massive project. We had concerns from the cost perspective and for not exporting a lot of soil," says Miller. "We were constantly balancing how much soil we were digging out with how much to build up for the athletic fields. A lot of grading was ongoing throughout the project."

Another concern was that "we not create a maintenance nightmare. We wanted the project to be aesthetically pleasing, but easy to maintain," says Miller. "It was a long process, [making sure] a lot of people with their [different] interests were consulted."

Monitoring programs are being facilitated by geography and biology faculty and students to study various species of wildlife and plant life. Stormwater runoff quality and quantity is also being monitored.

Miller says the design team initially thought some natural sciences professors who used the area for field research might object to the stormwater complex. They would think, understandably, that it might interfere with their research or disrupt the habitat.

One GVSU professor has been studying migratory patterns of bluebirds for over 20 years. He not only didn't object, but was supportive of the project. He has since reported that the expanded habitat has attracted more bluebirds than he has ever seen in the area.

"The project created a wonderful system," says Miller. "It encouraged different habitats and was done in a way to encourage recreation. It tells an overall story of how to manage stormwater well rather than let it be a burden."

Looking Ahead

What will SITES do for stormwater projects? Mather says, "It will give us a way to create performance metrics and allow us to gauge [the success of] what we're doing."

"I hope it will create more awareness of the different effects of stormwater, of some negative effects of not managing it well, so it becomes more of a resource rather than a burden," says Miller.

There are several sustainability rating systems for construction and design projects. They vary in how many credits are possible for stormwater management.

The Greenroads Rating System rates roadway design and construction projects for sustainability best practices on four levels. It has been tested on more than 120 projects. Its goal is to improve construction design and decisions related to sustainability practices.

The Institute for Sustainable Infrastructure (ISI) was founded by the American Council of Engineering Companies, the American Public Works Association, and the American Society of Civil Engineers. ISI has developed a sustainability rating system for civil infrastructure called Envision. Projects can be scored for community, environmental, and economic benefits according to 60 sustainability credits.

The US Green Building Council's LEED rating system is probably the best known of the systems that rate sustainable practice. It focuses on sustainable practices related to structures.

Photo Credit: GVSU
Wetlands at GVSU

The LEED for Neighborhoods Rating System has a focus beyond individual structures. Its category of Rainwater Management awards up to four points for using a stormwater plan that retains onsite, through infiltration, evapotranspiration, and/or reuse, at least 80% of the rainfall.

While it has understandably taken several years for SITES to progress from an idea to a tested, relevant system, the need is there. Green infrastructure is no longer a nice idea that's too expensive or untried to implement.

With Cleveland, Atlanta, Cincinnati, and other cities using it to meet demands of consent decrees, green infrastructure is recognized as a valid stormwater management approach. Now stormwater professionals can use the SITES rating system to show clients and taxpayers—in detail—exactly how cost and energy efficient green infrastructure and good site design are.

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