

Maintenance of Low Impact Development

Communities Are Easily Managing LID Practices

LID Barrier Busters Fact Sheet Series

Communities contemplating “green” LID approaches may be concerned that maintenance costs will grow as a result of switching from traditional “grey” stormwater practices. While this may be true in some cases, in general LID practices have lower long-term life-cycle costs, perform better, and provide additional benefits such as improved aesthetics and enhanced property values. Communities that install traditional “grey” stormwater infrastructure (curbs, pipes, tanks, etc.) typically look only at the initial capital costs of installing the practices and do not evaluate the performance of the systems or fully account for operation and maintenance costs such as pond dredging and water quality inlet pumping and residuals disposal. In contrast, LID practices typically require a lower initial investment and more ongoing maintenance—especially in the early years as vegetation becomes established in bioretention areas. Once established, LID practices can often be maintained in the same manner as other landscaping elements that require mowing, weeding and debris removal (Figures 1 and 2). Note that permeable pavements require frequent vacuum sweeping to maintain water quality benefits, but can still result in cost savings by avoiding the land space and costs needed to build ponds, etc.

LID Can Be More Cost-Effective Over Time

When deciding whether to adopt LID practices on a wide scale, communities should consider life cycle costs and performance of traditional stormwater control practices versus LID. Grey infrastructure is typically designed to reduce flooding risk, but often does not adequately protect water quality and habitat. Incorporating LID practices provides many supplemental benefits, some of which are difficult to quantify, including improved aesthetics and community liveability, expanded recreational opportunities, increased property values and a cleaner environment. Adding LID practices can also reduce the amount of grey infrastructure needed to manage flooding and combined sewer overflows and avoid expensive capacity expansions. Various models and tools are available to help communities anticipate costs associated with various types of LID practices. Tools include:

Best Management Practices and LID Whole Life Cost Models

www.werf.org/bmpcost

To estimate life cycle costs for stormwater management, the Water Environment Research Foundation and EPA developed a set of spreadsheet tools to help users identify and combine capital costs and ongoing maintenance costs for stormwater best management practices (BMPs) and LID.

BMP-REALCOST

www.udfcd.org/downloads/software/BMP-REALCOST_v1.0.zip

This spreadsheet-based tool, developed by the Urban Drainage and Flood Control District in Denver, Colorado, analyzes the life cycle costs of BMPs for planning purposes. The tool incorporates the costs of construction, engineering, administration, land, maintenance and replacement of selected BMPs, including LID. The download includes a manual that describes its purpose and proper application.

FAQ

Aren't maintenance costs for LID still unknown?



Barrier Busted!

Results show that life cycle costs of LID are usually less than traditional practices.

EPA's LID Barrier Busters fact sheet series... helping to overcome misperceptions that can block adoption of LID in your community

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Figure 1. A worker removes sediment and debris from a curb-cut in a stormwater bump-out along a street in Portland, Oregon.

Photo by 2nd Lt. Looper, 8th TSC, U.S. Army Pacific



Figure 2. Soldiers with the U.S. Army in Hawaii help maintain a bio-retention area by trimming bushes and removing weeds.

Green Values® Calculator

<http://greenvalues.cnt.org/national/calculator.php>

Developed by the Center for Neighborhood Technology, this online tool guides users through a process to determine the performance, costs and benefits of LID/green infrastructure practices as compared to conventional stormwater management practices.

What Can Your Community Do to Ensure Maintenance of LID Practices?

As communities rely more on LID, they must adapt to managing practices that are dispersed across the landscape rather than aggregated in a few locations. Portland, Oregon, employs staff to oversee both the installation and maintenance of LID practices (Figure 3). The city hires landscaping companies to regularly check that the practices are functioning properly and to remove built-up debris and unwanted vegetation. The city also encourages community involvement, inviting residents to volunteer as Green Street Stewards to help watch over and maintain these sites on a daily basis—clearing debris after storms and watering plants in dry times (Figure 4). By providing a consistent city-wide maintenance program and engaging volunteers, Portland has adapted well to its changing stormwater management needs.

Some municipalities rely on property owners or homeowners' associations to maintain the LID practices that are on private property. Before installing a LID practice, a municipality or developer should establish clear ownership of the practice and designate operation and maintenance responsibilities clearly through a written agreement. To formalize this approach, some municipalities have established ordinances requiring BMP maintenance (see <http://water.epa.gov/polwaste/nps/stormwater.cfm>). Focusing LID on public rights-of-way can help ensure that maintenance occurs.

Education can improve maintenance of LID practices. In 2007 the North Carolina State University Cooperative Extension Service developed a 1.5-day stormwater BMP inspection and maintenance training program—since then, more than 1,250 local government officials, design professionals and landscape maintenance practitioners from across the United States have taken part (see www.bae.ncsu.edu/topic/lid/). For access to the most recent information on LID maintenance available, check www.epa.gov/nps/lid and www.epa.gov/greeninfrastructure.



Figure 3. This stormwater planter is one of a suite of dispersed stormwater management practices that Portland, Oregon, city employees help to manage.

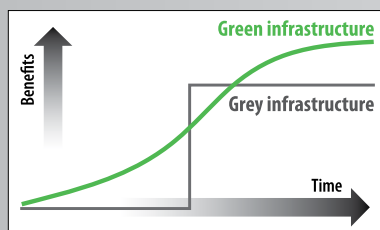


Figure 4. Volunteers with Portland's Green Street Stewards program care for a LID feature in their neighborhood by removing debris and weeding.

New York City's Green Strategy Will Pay Off Over Time

In 2010 New York City released a green infrastructure plan that outlines options for adding LID practices such as swales and green roofs to help reduce combined sewer overflows (CSO) and protect water quality. Modeling and data analyses conducted during plan development showed that operating and maintaining the green infrastructure elements of the plan (the "Green Strategy") is higher in the initial years as these controls are built quickly, while operating and maintaining the grey infrastructure (the "Grey Strategy") will be higher in the long run as large tanks, tunnels and expansion costs come online over time.

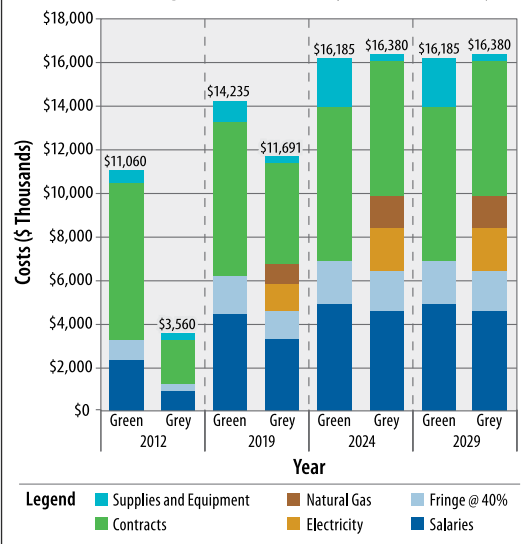
By 2024, New York City would pay about \$200,000 less annually to operate and maintain the Green Strategy as compared to the Grey Strategy. Over a 20-year period, the New York Department of Environmental Protection estimates



The water quality and sustainability benefits provided by green infrastructure would begin to accrue immediately, unlike the benefits of the grey infrastructure, which would be realized at the end of a decades-long design and construction period.

that the Green Strategy will reduce CSO volumes by nearly 2 billion gallons more than could be achieved by the Grey Strategy. In total, the Green Strategy would cost approximately \$5.3 billion, about \$1.5 billion less than the \$6.8 billion required for the Grey Strategy. Plus, the Green Strategy provides additional valuable benefits not provided by the Grey Strategy, including improved neighborhood aesthetics, lower summer temperatures, reduced energy use, cleaner air and water, and increased property values.

Operation and Maintenance Costs of Two Stormwater Control Strategies in New York City (Green Versus Grey)



An analysis of the life cycle costs showed that the Green Strategy would cost less to maintain over time because of high fuel costs (required by pumps, etc.) associated with maintaining grey infrastructure.