

Low Impact Development can help protect our watershed



Low impact development mimics natural hydrology.

Low impact development (LID) is a stormwater management approach that seeks to manage rainfall through a more natural, ecosystem-based approach. LID mimics what nature does, striving to maintain or replicate natural water flow, or hydrology, according to the Environmental Protection Agency (EPA). The primary goal should be, wherever possible, to retain water where it falls, according to landscape sustainability experts James Patchett and Gerould Wilhelm with Conservation Design Forum (CDF).

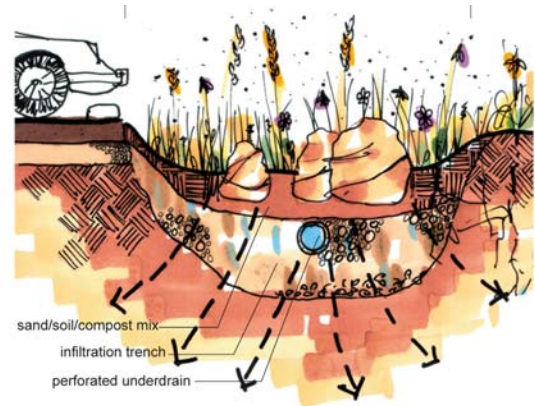
LID's use is relatively new and not widespread. It was pioneered in Prince George's County, Md. in the 1980s and 1990s, according to the EPA and the nonprofit organization Low Impact Development Center (LID Center). LID seeks to better integrate the built environment with the natural environment and is based on the following, according to the LID Center:

- Environmental conservation.
- Techniques to minimize stormwater impact, such as reducing the amount of impervious surfaces, which are surfaces that water cannot penetrate such as concrete or roofs.
- Stormwater flow that is slowed using the landscape.
- Integrated techniques to reduce and cleanse runoff.
- Measures to reduce pollution runoff.

Examples of LID structures and techniques include:

- Planting bioretention areas – planted areas that hold water and slowly absorb or release it – including rain gardens and grass or vegetation swales.
- Reducing impervious surfaces such as roads, parking lots and roofs.
- Installing permeable pavement so water can pass through it.

- Using vegetated roofs and rooftop rainwater collection systems.
- Including soil amendments so water seeps into soil better.
- Using innovative building foundations to minimize compacting soil.



Cross section of a bioswale. Photo from Conservation Design Forum.

Low impact development helps improve stormwater quality and quantity.

An integrated system of LID improves stormwater quality and lowers runoff quantity. Improved stormwater runoff not only helps meet federal regulations but also helps make us better stewards of the environment.

- LID can help control and remove pollutants from runoff, according to many sources including the national LID manual produced by Prince Georges County, Md., a national leader in LID development.
 - The EPA says common runoff pollutants include pesticides, bacteria, animal and human waste, oil, grease, toxic chemicals, heavy metals, sediment and debris.
- Bioretention areas treat the first ½ inch and up to 2 inches of stormwater, which contain the most pollutants, according to the EPA.

Porous concrete, porous pavement in a parking lot, and vegetated swales with native plants. Photos from Conservation Design Forum



- LID generally reduces runoff volume and can also help decrease the need for “end of pipe” more traditional methods of stormwater management, according to Prince Georges County and the EPA.

An integrated, customized LID system should closely mimic a watershed’s natural water quality process. The result is a landscape that “generates less surface runoff, less pollution, less erosion and less overall damage to lakes, streams and coastal waters,” according to the LID Center’s Web site.

Low impact development can help reach watershed goals.

Generally, LID is more cost effective and lower in maintenance than conventional, structural stormwater measures, but it may not be the complete solution for a watershed, the EPA and LID Center say. The potential benefits and limitations of LID include effectiveness and reliability, maintenance and costs.

Effectiveness, Reliability and Maintenance

The EPA says the use of LID may not completely replace the need for conventional stormwater controls.

- A hybrid approach may be needed to reduce liability and provide a sense of safety, according to the EPA and LID Center.
- Even with LID, conventional structures may be needed to achieve a watershed’s objectives and meets its needs, according to the EPA. Individual watersheds must study hydrology, growth, individual site conditions and many more factors.

Concerns have been raised about public safety and maintenance of LIDs, according to the City of Chicago.

- LID proponents advocate that creatively designed LID can potentially control 10- and 100-year storm runoff through restoring the built area’s natural rainfall-runoff relationship. Each site and watershed must be individually evaluated, Prince Georges County and the LID Center say.

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Maintenance, on one level, is left to property owners and developers at specific LID sites. However, a multi-system LID site should have built-in redundancies to lower the chance of failure – the chance of flooding – according to the LID Center.

- Site design is paramount to reliability. Maintenance agreements among developers, individual property owners and government regulators may be needed to ensure safety and reliability, Prince Georges County and the LID Center say.
- Many types of LIDs are self-perpetuating, easily repairable or function on their own as natural areas, the LID center says. Many require only regular landscaping maintenance, according to Prince Georges County.
- Other systems need more maintenance. For example, soil subject to significant runoff with pollutants will eventually lose its ability to absorb pollutants. The EPA says this could occur as soon 5 – 10 years after construction, must be monitored annually and soil periodically replaced.

Costs

LID generally costs less than traditional stormwater “end of pipe” approaches and structures, in which sites are developed to quickly move stormwater away from a development.

- Many LID techniques can reduce construction costs and long-term maintenance costs, according to many sources such as the City of Chicago.
- Case studies show a 25 to 30 percent reduction in development and maintenance costs and stormwater fees for residential developments that use LID techniques. This savings is through reductions in clearing, grading, pipes, ponds, inlets, curbs and paving, the LID Center says.

Sources:

- Photos from City of Chicago’s Guide to Stormwater Best Management Practices, www.cdfinc.com/CDF_Resources/Chicago%20GuideTo%20Stormwater%20BMPs.pdf
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- Environmental Protection Agency (EPA), www.EPA.gov Low Impact Development EPA-841-B-00-005, October 2000, www.EPA.gov
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- Low Impact Development Center Inc., a non-profit 501 (c)(3) organization dedicated to research, development, and training for water resource and natural resource protection issues, www.lowimpactdevelopment.org
- Prince Georges County, Maryland, the nation’s leader in LID development, www.co.pg.md.us and www.lowimpactdevelopment.org/ftp/LID_National_Manual.pdf



Low Impact Development can help protect our watershed.



Wildflower-vegetated swale near Walnut Creek, Sarpy County.



Cover: Midwest National Park Service Headquarters in Omaha. A normally dry detention pond captures roof stormwater runoff and slowly releases it.