Space Limitations and Low Impact Development

LID Practices are Well-Suited for Small Spaces

LID Barrier Busters Fact Sheet Series

Low impact development (LID) practices, also referred to as green infrastructure, are designed to infiltrate, evaporate, filter, capture and facilitate the beneficial use of stormwater. These practices can enhance the aesthetic value of the site and reduce capacity needs in costly underground conveyance systems and treatment systems. Common LID practices include green roofs, rain gardens, sidewalk planters, curb extensions, street trees, permeable pavements and cisterns.

People often think LID practices are best suited for new development in large open spaces, possibly because the first publicized LID projects were suburban housing developments or conservation landscape designs. However, LID practices can be used almost anywhere, and small urban spaces are often the perfect places.

FAQ

Don't LID practices require a lot of space?

Barrier Busted!

Multi-purpose LID practices can be used in small spaces such as sidewalks and parking areas.

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

Meeting the Challenge of Small Spaces

Available space in many urban areas is limited; fortunately, the versatility of LID practices allows them to be integrated into existing urban landscape features and infrastructure to create multifunctional areas. Siting opportunities for LID include rooftops, parking lots, plazas, parks, and public right-of-way spaces such as streets and sidewalks. LID designs are easily adaptable to most spaces and can be used on greenfield, infill and redevelopment projects. Many communities are retrofitting existing rights-of-way with LID because the practices can be tailored to each site.

This bioretention cell was retrofitted into the right-of-way to capture stormwater from the street.

When selecting appropriate sites and choosing LID practices, planners and designers should consider existing and adjacent uses of the site, soil conditions, buried utilities, drainage challenges, and maintenance needs. They should also consider non-stormwater management-related goals, such as improving aesthetics, mitigating the urban heat island effect, creating wildlife habitat, increasing pedestrian safety, and promoting urban renewal. The strategic application of LID in tight urban spaces can help achieve these goals.

Benches provide public seating while also discouraging damaging foot traffic through the stormwater bioretention cell.

Benefits of LID in Small Spaces

- Bioretention practices can be placed in or next to rights-of-way in conjunction with traffic-calming practices such as curb extensions, chicanes (intentional build-outs within driving lanes) or traffic circles. Such practices can be designed to filter and retain stormwater and create safer, friendlier roadways for vehicles and pedestrians. If space allows, sidewalk planters or above-ground container boxes can be incorporated into public spaces such as along thoroughfares or in plazas and other open spaces.
- Permeable pavements such as porous asphalt, pervious concrete and interlocking pavers can be used instead of conventional pavements and are appropriate for use in most places where infiltrated

Stormwater runoff flows through roadside curb cuts into a sidewalk bioretention planter.

A permeable-paver parking lot allows stormwater to infiltrate while preserving parking spots.

runoff will not pose a problem. All or part of a paved surface can be permeable. Permeable pavements excel at reducing ice build-up, which can improve safety. These surfaces can be tinted in different colors and/or arranged in aesthetically pleasing designs.

- Green roofs are favored by many designers because the practice doesn't take up space at ground level. Green roofs can be designed to cover all or part of a rooftop, can serve as a visual amenity, and can provide wildlife habitat and accessible green space for building users.
- Trees can be planted alongside streets, in parking lot planter boxes and in open spaces. Tree species should be selected for planting based on the available space and the desired height and thickness of canopy. Trees create more livable and attractive communities while also absorbing water, providing shade, reducing cooling costs, mitigating urban heat island effects and filtering air pollutants.
- Rainwater harvesting practices can be placed anywhere a cistern will fit (e.g., on rooftops, in basements, next to buildings, buried underground). With the right designs and equipment, captured roof runoff can be used for irrigation, evaporative cooling systems, toilet flushing, non-potable wash water and landscaped water features. The capture and use of rainwater can reduce potable water management costs, energy use, stream erosion, pollutant loadings and combined sewer overflows.

LID in Action: Small Spaces, Big Impact

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Roof runoff enters bioretention flow-through planters for treatment and short-term storage.

Louis Cook, Philadelphia Water Dept.

A porous play surface made from recycled tires is surrounded by rain gardens and trees.

USEPA

A permeable interlocking concrete paver parking lane is adjacent to a sidewalk planter.

Louis Cook, Philadelphia Water Dept.

This stormwater curb bump-out intercepts stormwater runoff flowing down the street.

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A bioretention cell receives stormwater runoff through a curb cut and surface grate.

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Roof downspouts direct runoff water to rock swales between homes.

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A building's green roof captures rainfall, thereby reducing local runoff.

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Runoff flows into stormwater planters installed in the sidewalk adjacent to benches.

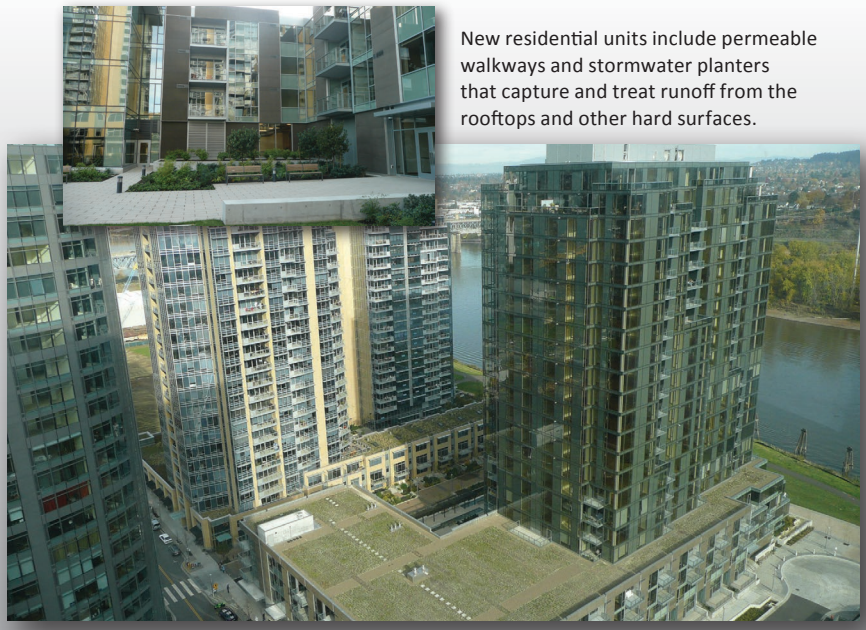
USEPA

A cistern collects rooftop runoff, which is used to water landscape areas around the building.

Portland South Waterfront District, Oregon

The south waterfront redevelopment project in Portland, Oregon, is being undertaken on a brownfield site and includes a mix of residential, retail, and office space. The project incorporates LID practices and other green elements throughout the 130-acre waterfront district to enhance livability of the neighborhood, encourage development, and manage stormwater to protect the health of the adjacent Willamette River.

A stormwater planter tucked along the edge of the roadway captures and treats street runoff while also providing an aesthetically pleasing green element within the urban waterfront district.



New residential units include permeable walkways and stormwater planters that capture and treat runoff from the rooftops and other hard surfaces.

This high-density, mixed-use development on the waterfront includes buildings with green roofs to capture rainfall and prevent stormwater runoff.

Albert M. Greenfield Elementary School, Philadelphia

Albert M. Greenfield Elementary School serves as a pilot site, testing how LID can reduce the number and volume of combined sewer overflows in Philadelphia, Pennsylvania. The school is within an urban corridor, and is bounded by busy streets. As a collaborative effort, a plan was created to transform the existing impervious schoolyard into a green space, complete with LID practices.

LID practices are incorporated into this Philadelphia schoolyard's permeable play surface and garden areas.

In 2010 the partners converted a portion of the hardscape into a porous rubber play area and directed the runoff from the remaining pavement to a woodland garden and a series of rain gardens installed along the playground's perimeter. Gardens are protected by innovative design features such as strategically placed nets/climbing structures (pictured)—an idea proposed by a student involved in the design process.

The school uses the outdoor space as a classroom area and has developed a curriculum that incorporates the stormwater practices as a learning module. Other educational amenities of this space include a weather station, photovoltaic solar array, herb garden and urban orchard.

This project offers green space for the students while capturing and infiltrating an estimated 97 percent of the annual runoff from the school yard. By working together, project partners are successfully sharing space to achieve mutual goals in a constrained urban setting.

Source: Michele Adams, President, Meliora Design, LLC; American Society of Landscape Architects; Schuylkill Action Network

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