

Low Impact Development (LID) Principles

Land use measures often focus on broadly shaping land use in relation to natural resources. At the site level of design and analysis, an important technique to minimize runoff and downstream flooding and better manage drainage is to use LID principles of design. This includes using layout principles that preserve and protect natural features, reduce the discharge from impervious surfaces into surface waters, reduces sedimentation, and treats stormwater on-site for volume and contaminants. Where possible, natural features are used to store stormwater.

LID is a low cost and low environmental impact solution that concentrates on distributed/ decentralized stormwater management, mimicking predevelopment conditions and natural functions. LID solutions are watershed-specific. The objectives of LID Principles are:

- Runoff reduction
- Groundwater recharge
- Volume control
- Stream protection
- Water quality enhancement

The strategy of LID Principles is for cumulative benefits of maintaining and/or restoring watershed functions. The five basic steps include:

1. *Conservation of existing natural areas* through land use planning
 2. *Minimizing disturbance* - minimize clearing and grading, preserve permeable soils, use alternate surfaces, disconnect roof drains, minimize use of drain pipe
 3. *Strategic timing of stormwater release* – use open drainage, maximize flow over vegetated land before water enters stream or other channels, determine best use of detention time based on position in watershed to minimize peak flows
 4. *Integration of management practices: storage, detention, and infiltration* – use open drainage, depressions for storage and infiltrations (could be rain gardens), smaller pipes and culverts, rooftop storage
 5. *Preventing pollution in the watershed* - use erosion control and stormwater best management practices pre- and post-development, including good site housekeeping, chemical storage, spill control, and pavement sweeping
- LID principles should be incorporated into zoning, subdivision, and stormwater requirements to encourage development that protects the public health and safety benefits provided by natural systems, minimizes infrastructure costs, protects and increases property values, preserves important natural resources, and improves the quality of life. In addition, the most valuable landscape

elements such as frequently flooded wetlands in the upper reaches of the watershed, could be targeted for preservation through acquisition or dedication of property and development rights.

The toolbox of LID principles can include various measures such as: bioretention ponds and swales, street storage, porous and permeable pavements, perforated pipe swales, undersized street culverts, vegetated roofs, disconnection of central stormwater system, rain barrels or cisterns, soil amendments, planter boxes, soil preservation, and the preservation/restoration of natural ecosystems. The key to LID Principles is that it is comprehensive in regards to the entire watershed and that it is appropriate to the site.

