# Questions and Answers

## Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices

This question-and-answer sheet provides additional information about EPA's report *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, EPA publication number 841-F-07-006, December 2007.

**Q: What is low impact development (LID)?**
**A:** LID comprises a set of site design approaches and small-scale stormwater management practices that are designed to reduce runoff and associated pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water.

**Q: Why is LID important?**
**A:** LID is needed to reduce the water quality impacts caused by land development and construction. Roofs, pavement, and other impervious surfaces displace vegetation and blanket the soil, causing less stormwater to soak into the ground and more to run off the land surface. Small tributaries and even larger streams cannot accommodate the increased water volume and flow that occur immediately following rainfall and snowmelt events, leading to eroded streambanks, incised channels, streams choked with sediment, destroyed aquatic life and aquatic habitat, and increased flooding and property damage. In addition, stormwater carries a broad mix of toxic chemicals, bacteria, sediments, fertilizers, oil and grease to nearby streams.

Traditional development and stormwater management approaches are usually not designed to address all of these water quality concerns. Instead, many storm drainage systems are designed to remove water from the site as quickly as possible. Use of LID in stormwater management results in flow and pollutant reduction needed to reduce the impacts on our receiving streams.

**Q: How does LID work?**
**A:** LID is based on the premise that a natural approach to stormwater management is best. In forests and other natural areas, most rainfall percolates through the soil, is absorbed by vegetation, or evaporates to the atmosphere. LID is a means of enabling developed areas to simulate nature to preserve predevelopment flow conditions.

When the natural landscape is replaced with roads, parking lots, roofs, and other impervious surfaces, rainfall can no longer soak into the ground. This results in a tremendous increase in polluted runoff. Rather than employing the traditional stormwater management approach that uses miles of costly pipes and acres of stormwater ponds to deal with this additional runoff, LID uses natural vegetation and small-scale treatment systems to treat and infiltrate stormwater runoff close to where it originates. Reducing the amount of stormwater runoff generated in the first place reduces impacts on streams carrying stormwater.

**Q: How does LID relate to green infrastructure?**
**A:** The term LID is one of many used to describe the practices and techniques employed to provide advanced stormwater management; green infrastructure, conservation design, and sustainable stormwater management are other common terms. However labeled, each of the identified practices seeks to maintain and use vegetation and open space, optimize natural hydrologic processes to reduce stormwater

volumes and discharge rates, and use multiple treatment mechanisms to remove a large range of pollutants.

**Q: Can LID apply to redevelopment and infill development?**
**A:** LID approaches can be used to reduce the impacts of development and redevelopment activities on water resources. In the case of new development, LID is typically used to achieve or pursue the goal of maintaining or closely replicating the predevelopment hydrology of the site. In areas where development has already occurred, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing development on the affected receiving waters.

**Q: What was the range of cost savings seen in the case studies?**
**A:** The case studies presented in this report show that LID practices can be both fiscally and environmentally beneficial to communities. Site-specific factors influence project outcomes, but in general, for projects where open space was preserved and cluster development designs were employed, infrastructure costs were lower. In most cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

**Q: What types of LID practices are considered in this report?**
**A:** This report examined projects that included bioretention, cluster building, reduced impervious area, swales, permeable pavement, vegetated landscaping, wetlands, and green roofs. Note that typical, real-world LID designs usually incorporate more than one type of the aforementioned practices or techniques to provide integrated treatment of runoff from a site.

**Q: Why did EPA produce this report?**
**A:** LID as a stormwater management approach is still relatively new, and quantitative data on the costs and benefits of LID are just beginning to emerge. EPA researched and assembled 17 case studies that examine cost savings and additional costs associated with low impact designs compared to traditional stormwater management designs. These case studies indicate that cost savings can be realized, as described above.

**Q: How can I use this report?**
**A:** This report can serve as a primer to those new to the field of low impact site design because it provides background information about the benefits of LID along with case studies showing cost comparisons between traditional stormwater management and LID designs.

For developers and planners interested in implementing or promoting LID projects in the community, this report provides a breakdown of site development costs for both traditional and low impact scenarios, which can be useful when presenting new designs to stakeholder groups who are not familiar with the costs and benefits of LID.

**Q: Where can I get more information?**
**A:** You can find more information at EPA's Green Infrastructure Web site at: www.epa.gov/npdes/greeninfrastructure and at EPA's LID Web site: www.epa.gov/nps/lid.