

TECHNICAL *Update*

* SPECIAL EXPANDED EDITION *

Low Impact Development in a Nutshell

Williamsburg
Environmental Group

October 2003

Recent efforts are underway at governing agencies at the Federal, State and Local level to encourage and incentivize the use of Low Impact Development (LID) design techniques. The United States Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (DEQ) are working in coordination with other Virginia environmental agencies and localities to develop guidelines for the consideration of LID techniques during the wetland permitting process. These agencies envision that the application of LID techniques may result in further avoidance and minimization of impacts to jurisdictional wetlands and stream channels. State agencies involved in the application of stormwater management criteria (including the Chesapeake Bay Local Assistance Department and the Department of Conservation and Recreation) are also working to encourage the application of better site design techniques and the use of integrated management practices. State efforts, to date, have primarily focused on facilitating the implementation of LID, rather than requiring it. Efforts are also underway at numerous local government entities throughout Virginia to re-evaluate

conventional stormwater management and development approaches to consider, encourage, or require low impact alternatives.

What is LID?

Low Impact Development means many different things to many different people. A generalized definition is that LID is a site-specific system of design and development techniques that can serve as an alternative to conventional stormwater quality and quantity control methods. The ultimate goal of LID is to provide better stormwater control and management by utilizing innovative site design techniques to reduce the generation of stormwater runoff and by utilizing small-scale stormwater practices distributed throughout a site to reduce the reliance on structural stormwater controls. Stormwater practices (conventionally called Best Management Practices, or BMPs) applied in this distributed small-scale fashion are commonly referred to as Integrated Management Practices (IMPs), as they are integrated into the developed landscape.

An LID approach to site development can be viewed as having two major components; 1) the evaluation and modification of the site design to

Special points of interest:

- Background on LID
- List of LID/IMP treatment practices
- Physical and planning constraints on LID
- Benefits of LID

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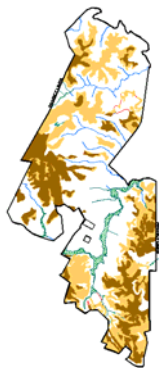
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Land Panning

“Significant benefits in the form of groundwater recharge and stormwater volume reductions can be achieved even without full-scale implementation of IMPs.”



Overall IMP Suitability

minimize the generation of runoff, and 2) the use of small-scale distributed management practices to provide treatment for runoff and reduce the reliance on conventional controls. LID site design components may include the reduction of and disconnection of impervious cover, the use of functional landscape areas, maximizing stormwater runoff flow paths, the use of natural or naturalized vegetated conveyances rather than artificial conveyances, depressional storage, and the placement of improvements in areas where stormwater runoff generation can be minimized. LID IMP treatment practices may include the use of engineered swales, bioretention/biofiltration practices (rain gardens), infiltration practices, pocket wetlands, levels spreaders, hydrologically functional buffers and other naturalized practices generally capitalizing on the infiltration/filtration capacity of natural vegetated systems.

Why LID?

Conventional stormwater management approaches have focused primarily on the attenuation of peak flows to pre-development levels for certain design storms (2-year, 10-year, etc.) and in the treatment of stormwater runoff to maintain pre-development non-point source pollution loads. In many cases, this conventional approach has proven less than adequate at providing a sufficient level of protection for stream channels and aquatic resources. LID design techniques strive to better replicate pre-development conditions by addressing the time it takes for stormwater to concentrate and be conveyed to the streams (time of

concentration), and by addressing the increased volume of runoff generated by smaller storm events as a result of development. The application of LID techniques can often provide better protection of aquatic resources by replacing the hydrologic buffering capabilities of those natural landscape components that are lost to development. Due to this ability to replace those watershed functions, LID practices have been incorporated by WEG as a component of compensatory mitigation plans approved by the USACE and the DEQ. The ability to avoid and minimize impacts through the use of LID, and the ability to use LID practices as a part of mitigation planning can result in cost savings to partially offset increased costs associated with distributed stormwater controls.

When LID?

While it may not be practicable for LID site design techniques and IMPs to provide for all of the stormwater management needs of a given site (e.g. flood control, treatment of larger storm events, significant detention requirements, etc.), it is often possible to incorporate certain LID techniques into a development site in a simple, cost-effective manner. As LID and IMPs are generally designed to serve as a first line of treatment for smaller and more frequent storm events, significant benefits in the form of groundwater recharge and stormwater volume reductions can be achieved even without full-scale implementation of IMPs. WEG has worked with a number of public and private sector clients, land planners and engineers to incorporate LID components

into overall stormwater management planning in an efficient and cost-effective manner. The cost of implementing LID practices can vary widely. Costs are dependent on the types of techniques applied, the extent of the application, and the general suitability of the site for implementing those practices.

Where LID?

The application of many design techniques and IMP types are highly dependent on physical and planning constraints including soils, slopes, depth to groundwater/bedrock, drainage area, and compatibility with the land plan. Other planning concerns such as community aesthetics, costs, and maintenance concerns may require careful consideration when applying LID practices. Often times, local governing bodies may have no pre-defined mechanism for allowing or crediting the application of LID techniques and practices. WEG has assisted many clients in analyzing the feasibility of implementing LID practices, in the development of stormwater treatment alternatives for a site incorporating LID practices, and in the analysis of LID techniques versus conventional techniques. We have assisted clients in

implementing some of the first LID projects in Virginia, in evaluating the costs and implications of LID, and in securing regulatory approvals for these projects at a Federal, State and Local level.

How LID?

WEG works with public and private sector developers, engineers, land planners and architects to provide a wide array of natural resource and water resources services. We can help you or your clients obtain a better understanding of how LID may be beneficial to your site. WEG can assist clients in developing stormwater management plans which incorporate the consideration of LID suitability, cost, and effectiveness. WEG has extensive experience in modeling, analyzing and planning the implementation of LID techniques, and in the design of integrated management practices. Our experience and familiarity with water resources engineering, stream geomorphology, environmental planning, landscape architecture, aquatic and terrestrial ecology, and regulatory processes allows us to bring together a wide array of disciplines to develop, refine and secure approvals for these innovative practices in a simple and cost-effective manner.



Typical Office Land Use Scenario Incorporating LID/IMPs.

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House Bill 1953, enacted by the Virginia legislature as Section 10.1-1186.5 of the Code of Virginia, has resulted in the appointment of an eleven member Low Impact Development Assessment Task Force to facilitate the implementation of LID by developing a certification process and guidance for LID, recommending changes to statutes and regulations, and by developing a model ordinance. WEG project manager Doug Beisch, P.E. is an appointed member of the Task Force and would be happy to answer questions about LID or the task force, relay the suggestions or insights of WEG partners and clients to the task force for consideration, or assist you in the consideration of LID techniques for your site. Doug can be reached in WEG's Williamsburg office at 757-220-6869, or via e-mail at dbeisch@wegnet.com. Professional staff experienced in LID are also available in WEG's Richmond office (804-267-3474) and WEG's Northern Virginia office (703-406-1390).



LID provides additional protection for headwater streams.



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WEG's experience with LID includes:

- Comprehensive Watershed Modeling including LID practices
- Evaluation of site-specific resource protection objectives and stormwater criteria
- LID Suitability/Cost Analysis & Concept Planning
- Development and Analysis of Innovative Stormwater Management Alternatives
- Development of LID plans for a wide array of land use types (e.g. office/commercial, Low-density residential, high-density residential, etc.)
- Hydrologic Analysis & Modeling
- Preparation of Development Guidelines incorporating LID
- Design of IMPs (schematic design and construction drawings)
- Monitoring and Reporting on the effectiveness of stormwater practices
- Local, State and Federal stormwater coordination analysis, design, and permitting

Williamsburg Environmental Group, Inc. provides specialized environmental services in the areas of ecology, environment/water resources planning, and regulatory support. Since 1990, WEG has provided quantified solutions to complex environmental issues working closely with our clients through the feasibility, planning, design, and construction phases of a project. WEG provides comprehensive environmental planning studies in the areas of water resources including stormwater management, water quality, water supply, floodplain hydraulics, and master drainage. Regulatory support is provided to clients involving Nationwide and Individual permits, along with assisting in the acquisition of local permits and approvals. WEG also performs Phase I Environmental Site Assessments for the public and private sector.