

**THE DEPARTMENT OF  
ENVIRONMENTAL QUALITY**

**PRELIMINARY REPORT OF  
THE LOW IMPACT  
DEVELOPMENT ASSESSMENT  
TASK FORCE**

**TO THE GENERAL ASSEMBLY OF VIRGINIA**

**COMMONWEALTH OF VIRGINIA  
RICHMOND  
NOVEMBER 1, 2003**

November 1, 2003

## MEMORANDUM

TO: The Honorable Members of the General Assembly

RE: Preliminary Report of the Low Impact Development Task Force

Pursuant to House Bill 1953, passed by the 2003 session of the Virginia General Assembly, the Department of Environmental Quality has appointed, and facilitated discussions for, the Low Impact Development Assessment Task Force. As prescribed in this legislation, I would like to offer this Preliminary Report for your consideration. This report is available from the Department of Environmental Quality's (DEQ) website at: <http://www.deq.state.va.us/regulations/reports.html>. A hard copy can be obtained by calling Scott Kudlas, Water Policy Manager, at (804) 698-4456.

I would also like to commend the members of the Task Force for their time and dedication to this important work. As you will see in the Report, the Task Force met three times and considered a wide range of issues related to low impact development, or LID. LID holds much promise for advancing Virginia's efforts to manage stormwater runoff and protect our valuable water resources. It is a complicated issue, however, and deserves diligent consideration through a public process. The Task Force members represent the full range of stakeholders involved in LID and their hard work has resulted in much progress toward meeting the objectives of HB 1953 and furthering the use of the LID concept.

A final report will be developed by the Task Force in the coming year and delivered to you by November 1, 2004. This report will contain recommendations for a certification process, an outreach initiative, regulatory changes and a model ordinance as directed by the legislation. I appreciate your consideration of this preliminary report and look forward to a continuing dialogue on this important issue.

Sincerely,

Robert G. Burnley  
Director

## **Low Impact Development Task Force Members**

Ellen Gilinsky,  
Department of Environmental Quality

Jeff Perry,  
Virginia Municipal League

Jack Frye,  
Department of Conservation and  
Recreation

John Tippet,  
Friends of the Rappahannock

C. Scott Crafton,  
Chesapeake Bay Local Assistance  
Department

Doug Beisch,  
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Joe Lerch,  
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Helene Merkel,  
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Rachel Morris,  
Virginia Farm Bureau

Ken Smith,  
Virginia Department of  
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Bill Springer,  
Home Builders Association of  
Virginia

Linda Cole,  
Department of the Navy

Ron Hamm,  
Low Impact Development Coalition

Richard Street,  
Virginia Association of Soil and  
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Virginia Association of Counties

Bruce Williams,  
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## **Executive Summary**

This report introduces the concept of low impact development (LID) and some of its typical techniques and practices. The report also outlines the creation of the Low Impact Development Task Force (LID-TF) by HB 1953, and summarizes the first year activities of the Task Force. Finally, the report concludes with a listing of key findings and issues generated by the LID-TF and a generalized work plan for the second year for the Task Force. This listing should not be interpreted as a consensus product of the LID-TF; rather it is an interim identification of information about LID that requires further study and refinement. This additional work is necessary for the Task Force to be comfortable providing a more complete understanding of the most effective use of LID techniques and to facilitate the use of LID through the development of guidance, a model ordinance, and certification of LID practices.

In general, the LID-TF finds that implementation of the LID approach to stormwater management is still relatively uncommon in Virginia, but there is much interest in the concept and a number of efforts are currently underway at the state and local level to expand the use of LID. While not a panacea to some of the problems with conventional stormwater management approaches, under certain site conditions LID approaches may offer benefits as an alternative technology for stormwater management. Given these potential benefits the proper circumstances for the use of LID should be identified and promoted; however, caution is required to ensure that this effort does not conflict with existing stormwater management programs or create an expectation that LID approaches alone can offer a comprehensive approach for stormwater management and watershed planning.

## **Introduction to Low Impact Development (LID)<sup>1</sup>**

Land development and construction can result in significant landscape alteration that can affect runoff and water quality. Soils are compacted by construction equipment and grading. Extensive areas of impervious surface replace trees and vegetation. Compacted soils cannot infiltrate water, as effectively and there is less vegetation to soak up, store, and evaporate water. Groundwater recharge is also reduced. The result is an increase in the volume of runoff (i.e. less water soaks into the ground and more runs off). Without sufficient stormwater management planning, this can degrade fish and wildlife habitat in the streams that receive runoff from developed areas. The quality of runoff may be altered, resulting in increases stream temperatures and in the amount of sediment and pollutants reaching receiving streams.

Traditional end-of-pipe stormwater management techniques have been designed to control larger and less frequent storm events, sometimes providing inadequate protection for the health of the watershed. Most traditional systems are designed to remove water from a site quickly and efficiently, limiting opportunities for filtering of pollutants, reducing the volume of runoff, or recharging groundwater. Other problems or perceived problems with conventional stormwater practices include health risks such as habitats for mosquitoes and other disease-carrying organisms, significant long-term maintenance costs, and safety risks.

The concept of low impact development, or LID, was developed in response to the shortcomings of conventional stormwater management technology. By incorporating a system of strategically placed smaller-scale distributed storm water management techniques, we can better replicate, replace or mimic the filtering, storage, and infiltration processes that are critical for maintaining the function of the watershed.

LID has successfully been incorporated into many local government stormwater management programs in the Chesapeake Bay region and throughout the United States. The Virginia Stormwater Management and Erosion and Sediment Control regulations allow for the use of LID techniques and practices. The use of LID is being promoted by the Virginia Department of Conservation (VDCR) and the Chesapeake Bay Local Assistance Department (CBLAD) as an alternative and supplement to existing stormwater programs. DEQ and the U.S. Army Corps of Engineers (Corps) are promoting the use of LID as a means to avoid and minimize impacts to surface waters and to mitigate for water quality impacts due to development.

The type and amount of conservation practices that can be used in an LID design are up to the local community. LID landscaping features, such as bioretention

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<sup>1</sup> The information in this section comes primarily from an LID brochure prepared jointly by the Friends of the Rappahannock and the Low Impact Development Center with funds provided by the US EPA Chesapeake Bay Program and the National Fish and Wildlife Foundation.

areas, green roofs, soil amendments, or revegetation can make developments as a whole more attractive and increase the appeal of individual properties as well. Simple restrictive covenants or homeowners agreements may help to ensure that features are properly maintained.

Examples of LID practices include the following.

#### Conservation of natural site assets

Site planning with low impact development (LID) techniques begins with developing strategies to conserve the natural hydrologic assets and functions of a site. LID site conservation techniques include (but are not limited to) directing development away from sensitive environmental areas, preserving native vegetation and soils, maintaining existing drainage courses, and minimizing the extent of impervious areas.

#### Directing runoff through natural areas

Natural wooded areas are extremely effective groundwater recharge areas. The best way to recharge wetlands and drinking water aquifers is through these vegetated areas. An LID plan creates opportunities to retain as much runoff as possible on site. Stormwater is filtered and infiltrated into the ground by directing runoff away from impervious areas and engineered drainage systems and into areas of natural vegetation.

#### Small-scale distributed stormwater controls

LID uses a decentralized stormwater management system of small-scale controls that are located near the sources of runoff generation. These controls are designed to store, infiltrate, filter and release runoff the way natural areas do. Because LID features are small, a variety of opportunities can be found on a site to filter pollutants and control the volume and peak runoff rates of stormwater.

#### Customized site design

LID requires the designer, developer, and reviewer to work closely together to insure that the site design and construction plans protect the hydrologic functions and assets of the property. The designer must incorporate the overall watershed and basin planning strategies into the site design to ensure that the overall watershed protection objectives are met.

#### Maintenance

The following excerpt from the executive summary of Low Impact Development (LID): A Literature Review (prepared by USEPA and the Low Impact



Development Center) accurately characterizes the maintenance issues related to LID techniques:

Maintenance issues can be more complicated than for conventional stormwater controls because the LID measures reside on private property. In most instances, homeowners agree to only the first year of maintenance. Homeowner associations could be a mechanism for providing long-term maintenance to these areas. Generally, bioretention facilities require replacement of dead or diseased vegetation, mulching as needed, and replacement of soils after 5-10 years. Grass swales require periodic mowing and removal of sediments. Maintenance of permeable pavements requires annual high-powered vacuuming of the area to remove sediments.

## **LID-TF Activities to Date**

The Low Impact Development Task Force (LID-TF) was established by HB 1953 (2003 GA)<sup>2</sup>. The purpose was for the Commonwealth to promote a more complete understanding of the most effective use of low impact development techniques and to facilitate the use of LID through the development of guidance, a model ordinance, and certification of LID practices.

HB 1953 requires the Director of the Department of Environmental Quality to appoint a Low Impact Development Assessment Task Force. The LID-TF must include representation from the Department of Conservation and Recreation, the Chesapeake Bay Local Assistance Department, the Chesapeake Bay Foundation, the Virginia Farm Bureau Federation, the Home Builders Association of Virginia, the Low Impact Development Coalition, the Virginia Association of Counties, the Virginia Municipal League, and three citizen members not affiliated with the organizations designated above.

The LID-TF is tasked with the following: 1) develop a LID certification process; 2) develop guidance to promote effective LID; 3) recommend changes to existing statutes and regulations to facilitate use of LID; and 4) develop a model ordinance for local use. The LID-TF is required to submit a preliminary report to the Director of the Department of Environmental Quality (DEQ) by 10/1/03 and a final report by 10/1/04. The Director of DEQ must submit his report to the General Assembly by November 1 of each year in which he received a report. The LID-TF shall continue in existence until it has submitted its final report.

The LID-TF was appointed in early May 2003 and held four meetings to gather information for the development of this preliminary report. The LID-TF held meetings on June 17<sup>th</sup>, July 24<sup>th</sup>, and August 20<sup>th</sup>. A meeting planned for September 18<sup>th</sup> was cancelled.

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<sup>2</sup> See Appendix A for a copy of the actual bill text.

Meeting of June 17, 2003 (See agenda in Appendix B)

The LID-TF heard a presentation by John Tippett, Executive Director of the Friends of the Rappahannock, on his organization's LID tutorial and toolkit compact disk (CD). This CD-Rom includes examples of local ordinances from the Town of Warsaw and Stafford County. He told the group that the goal of LID was to return post-development hydrology to pre-development conditions; current Storm Water Management (SWM) controls typically do not address increases in total runoff volume. He emphasized two key concepts: 1) LID allows flows to be diffuse and unconcentrated; and 2) LID distributes source control by using smaller scale systems that are widely distributed over the site. He continued that LID has the potential for reducing costs but steps must be taken up front to realize these reductions. He said an important consideration is that LID techniques function best when brought online after a site is stabilized because fine sediments can clog systems. He stated that more research needs to be done on pollutant loading efficiencies of various techniques and some efforts were underway by his group and DCR. Mr. Tippett continued by summarizing the benefits and drawbacks of LID techniques. He concluded by outlining five issues for how to make LID work:

- 1) development of a common definition,
- 2) standardize review guidelines,
- 3) remove roadblocks in local codes,
- 4) technical training in the techniques, and
- 5) the creation of incentives and regulations for LID use.

DEQ staff led discussion regarding several definitions for LID and recommended that the LID-TF adopt the statutory definition with some minor additions. The LID-TF supported the following language:

“Low Impact Development (LID) is a site-specific system of design and development techniques that can serve as an effective, low-cost alternative to existing stormwater and water quality control methods and that will reduce the creation of storm runoff and pollution and potentially reduce the need to treat or mitigate water pollution. Low-impact development programs control runoff discharge, volume, frequency and quality in order to mimic predevelopment runoff conditions through a variety of small-scale site design techniques.”

A presentation was made by Bruce Williams with the U.S. Army Corps of Engineers on the development of a LID memorandum of understanding to be signed by the Corps and the Secretary of Natural Resources concerning how LID can be implemented within the framework of federal and state regulatory programs.

DEQ staff discussed potential contents for a draft preliminary and final report outline and topics to be covered in future meetings of the LID-TF. The outline and meeting plan were modified and adopted.

Meeting of July 24, 2003 (See agenda in Appendix C)

The LID-TF heard a number of presentations to gather information on the nature and extent of LID activities currently taking place in Virginia. Speakers included: Jack Frye, DCR; Barry Fitz-James, VACO; Martha Little, CBLAD; Jeff Perry, Henrico County; Joe Battiata, VDOT; Brian Henshaw, NSVRC; Helene Merkel, Horne Engineering; Richard Street, SWCDs; Linda Cole, Navy; and Bill Springer, HBAV.

Mr. Williams updated the Task Force on the Corps activities with LID, including the results of a meeting held June 23<sup>rd</sup> to discuss the draft LID MOU.

Meeting of August 20, 2003 (See agenda in Appendix D)

The LID-TF received a presentation from Dr. Paul Koch of the Low Impact Development Center on the following topics: 1) demonstration of calculation spreadsheet developed for Milwaukee, showing how LID features affect the runoff hydrograph; 2) explanation of the "terraced retention" design concept; and 3) demonstration of how off-the-shelf simulation software can be used in LID design.

The LID-TF brainstormed regarding the development of the preliminary report and how to proceed to complete the remaining tasks included in the legislative charge.

Meeting of September 18, 2003

The LID-TF did not meet due to Hurricane Isabel.

## **Preliminary Findings**

In evaluating the information received by the LID-TF to date, some key findings are emerging that can serve as the basis for additional work. These preliminary findings include:

- Although implementation of the LID approach to stormwater management is still relatively uncommon in Virginia, there is much interest in the concept and a number of efforts are currently underway to expand the use of LID.
- A significant amount of work has been done in some other states and at the national level to refine and advance the concept of LID. As a result, there are a number of analytical reports, publications, ordinances and outreach

materials that can be used as reference for completion of the tasks identified in HB 1953.

- In order to facilitate the effective application of LID techniques in Virginia, a number of real or perceived barriers to its use must be removed and incentives may need to be offered.
- LID techniques may offer benefits as an alternative technology for stormwater management, but they do not offer a comprehensive approach for stormwater management and watershed planning.
- While the expanded use of LID should be promoted, caution is required to ensure that this effort does not conflict with existing stormwater management programs that currently offer a high level of water quality protection.

## **Preliminary Issues Identified**

What follows are issues identified by LID-TF members and interested parties regarding impediments and potential incentives for achieving greater use of LID concepts in the development process.

### Impediments/obstacles

There are currently obstacles and impediments that create challenges to greater use of LID concepts. Based upon presentations from a variety of perspectives associated with the development process, there does not appear to be a single root cause to these impediments. However, there was a recurrent theme within the comments by task force members that there is resistance to change by individuals representing all parties of the development process, whether they are developers or regulators. There seemed to be an overall consensus that part of a larger strategy to address these impediments is through an active educational campaign that would be broadly targeted. The following impediments were identified by LID-TF members or interested parties:

- Many practices are used in both LID and conventional stormwater management. This creates a lack of understanding as to what low-impact development is. (Some erroneously believe that a few rain gardens or a little open space constitute a LID stormwater management plan.)
- There is a lack of reference to LID in State codes. Formal guidance has not been developed on using LID practices to comply with the requirements of existing state and local stormwater management and erosion and sediment control programs (MS-19, 2 and 10-year storm control, Chesapeake Bay Act water quality standards, etc.). There is a concern whether LID practices

alone will provide adequate flooding and erosion protection during large storm events.

- LID does not meet or address current state stormwater management adequate outfall criteria.
- Using a LID approach for stormwater management will be difficult if LID practices are not allowed in road right-of-ways. A perception is that VDOT needs to establish formal policies and standards regarding the placement of LID practices in road right-of-ways.
- The perception of the LID-TF is that LID is not yet integrated within each of the relevant agency programs (e.g., CBLAD, DEQ, DCR, VDOT) and that fragmentation exist within various departments within the same agency causing an inconsistent playing field for those attempting to use LID.
- Local governments and others have a concern about allowing the use of LID due to uncertainty regarding the long-term maintenance of LID practices and would like to proceed cautiously, particularly those that are used on individual single-family lots.
- As with many new concepts, some members are concerned that careful consideration be given to potential unintended consequences of actively promoting and providing incentives for LID approaches.
- Maintenance of LID structures (as previously mentioned) can be an issue due to complexity of structures versus traditional stormwater management techniques. Another key component is responsibility in terms of scheduled maintenance and liability.

#### Potential incentives

The LID-TF gathered information on potential incentives for applying LID techniques. LID-TF members and interested parties identified a number of potential incentives that they believe could result in greater use of LID approaches. It is important to note that all members of the LID-TF may not agree that each potential incentive on this list is appropriate (reaching greater consensus on these issues will be a part of the work for next year.) In some cases, these incentives would require additional regulatory or legislative action on the part of the General Assembly, and state and local governments, to be successfully implemented. The list of potential incentives include:

- grants
- tax credits
- regulatory options under VPDES MS4 permits

- better technical guidance through a manual and LID plan review checklist.
- removal of impediments in regulatory permitting of distributed/decentralized SWM techniques so long as minimum water quality standards are maintained
- training for permit staff in review of plans proposing LID techniques via workshops and seminars, and a manual
- use of Integrated Management Plans (IMPs) as mitigation for, or a component of mitigation for 1<sup>st</sup> order ephemeral/intermittent stream impacts
- allow local waivers of flood control in non-essential areas for partial IMP implementation (i.e. eliminating 10-year attenuation requirements, or 50/10 attenuation requirements for discharges to major tributaries where localized flooding is not a concern)
- development of a non-structural practices guide such that site development engineers have any easy methodology of accounting for implementation of these IMPs
- funding for demonstration projects of various LID technologies in different regions of VA
- stormwater management credits (e.g., reduction of conventional BMP storage volumes) for developers that use LID practices
- provide waivers of certain zoning and subdivision ordinance requirements (e.g., waiver of curb and gutter) for LID projects
- allow the planting areas in LID stormwater practices to be credited towards parking lot landscaping requirements
- allow pervious paving blocks and other similar materials (i.e., exempt concrete or asphalt paving) for travel lanes, driveways and parking bays in LID sites
- stormwater utility user fee credits for properties with LID practices (i.e., new development, retrofits)
- promote greater use of Government by Example at local, state, and federal levels
- use the existing Virginia Environmental Excellence Program with its recognition and potential regulatory incentives, as a framework for promoting LID to businesses, universities, local governments, federal facilities and any other entities that are responsible long-term for a particular site
- encourage incorporation of LID techniques into government and industry Environmental Management Systems (EMSs) as a way of managing their property
- integrate landscaping into planning and development at the local level
- Require property owners and developers to grant easements to local jurisdictions for maintenance and care of LID facilities. Such an arrangement removes the burden to individual property owners by transferring it to public entities with the resources necessary to maintain and ensure ongoing compliance

This list reflects a collection of suggestions from the Task Force members and does not represent a consensus of the LID-TF until further discussion can take place during the next phase of this project.

Issues identified but requiring further work by the Task Force

The LID-TF recognized the need to more closely evaluate and discuss the issues that follow. Additional work is needed on these issues in order to complete the required final work products.

- The focus on "what constitutes LID" should be driven by the question of what is "achieved hydrologically" – rather than what practices are used. The operative questions should be:
  1. Is the volume of pre-development infiltration replicated?
  2. Is time of concentration replicated?
  3. Is peak runoff rate replicated for the design storm?
- Many practices are used in both LID and conventional stormwater management. Therefore, developing and promoting a certified list of practices must be carefully scrutinized, particularly given the sensitivity of some LID practices to site specific conditions, and may not be the best way to promote greater use of LID concepts.
- LID approaches should not be thought of as a replacement for conventional stormwater management. Rather, LID is a method of reducing the reliance on conventional stormwater management practices, when site conditions warrant.
- Greater use of LID approaches could be achieved through better identification of how LID meets the requirements of existing state and local regulatory requirements such as the MS-19 standard of the Erosion and Sediment Control Law and the water quality standards of the Chesapeake Bay Preservation Act.
- The relative merits of state standardization versus local option regarding the development of design requirements and specifications for LID implementation needs further resolution by the LID-TF.
- Local governments have a concern about the work of the LID-TF evolving into something that will compete with, or mandate replacement of, existing locally developed programs.
- Local governments have a concern about the ability of developers to appropriately use LID concepts in their site designs.

## **Plan for Completing Work**

The LID-TF decided to continue meeting monthly through November 2003 and to reconvene again monthly after the 2004 General Assembly session. In addition, the LID-TF stated an interest in gathering additional information for potential recommendations on the following topics:

- compile existing research on LID techniques, maintenance, and reliability;
- evaluate implementation/demonstration opportunities using government by example;
- acquire and assess usefulness of any groundwater recharge standards that may already have been developed;
- review existing local ordinance language to determine applicability for potential model ordinance;
- examine opportunities to integrate LID practices into state programs, particularly the MS-19 storm water standard;
- evaluate role that Leadership in Energy and Environmental Design (LEED) certification may be able to play in advancing use of LID concepts;
- assess educational opportunities; and
- potential funding sources.



## **Appendix A: HB 1953**

**VIRGINIA ACTS OF ASSEMBLY -- CHAPTER**

*An Act to amend the Code of Virginia by adding a section numbered 10.1-1186.5, relating to low impact development.*

[H 1953]

Approved

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered [10.1-1186.5](#) as follows:

*§ [10.1-1186.5](#). Creation of the Low Impact Development Assessment Task Force.*

*A. The Director of the Department shall appoint a Low Impact Development Assessment Task Force. The task force shall operate as an entity within the Department. The task force shall have 11 members appointed by the Director and shall include a representative of the Department of Conservation and Recreation, of the Chesapeake Bay Local Assistance Department, the Chesapeake Bay Foundation, the Virginia Farm Bureau Federation, the Home Builders Association of Virginia, the Low Impact Development Coalition, the Virginia Association of Counties, the Virginia Municipal League, and three citizen members not affiliated with the organizations designated in this subsection.*

*B. The task force shall (i) develop a certification process for low impact development techniques in achieving quantifiable pollution prevention or abatement results, (ii) develop such other guidance for local governments and the general public as necessary to promote a more complete understanding of the most effective use of low impact development techniques, (iii) recommend changes to existing statutes and regulations to facilitate the use of low impact development techniques, and (iv) develop a model ordinance for use by local governments.*

*C. The task force shall submit a preliminary report to the Director by October 1, 2003, and a final report to the Director by October 1, 2004. The Director shall report to the General Assembly on the activities and recommendations of the task force by November 1 of each year in which he receives a report.*

*D. For purposes of this section, "low impact development" means a site-specific system of design and development techniques that can serve as an effective, low-cost alternative to existing stormwater and water quality control methods and that will reduce the creation of storm runoff and pollution and potentially reduce the need to treat or mitigate water pollution.*

2. That the provisions of this act shall be effective until submission of the final report.

**Appendix B: Summary of LID-TF Meeting of June 17, 2003**

Low Impact Development Task Force  
Meeting Summary of June 17, 2003  
1:30 PM – 4:00 PM

Attendance:

Low Impact Development Task Force Members:

John Tippet, Friends of the Rappahannock  
Ellen Gilinsky, DEQ  
Martha Little, CBLAD (for Scott Crafton)  
Joe Lerch, CBF  
Ron Hamm, LID Coalition  
Jack Frye, DCR  
Rachel Morris, VFBB  
Bill Springer, HBAV  
Linda Cole, Department of the Navy  
Barry Fitz-James, VACO (Stafford County)  
Richard Street, VA SWCDs  
Doug Beisch, WEG  
Jeff Perry, VML (Henrico County)  
Bruce Williams, U.S. Army Corps of Engineers  
Helene Merkel, Horne Engineering  
Joe Battiata, VDOT (for Ken Smith)

Technical staff:

Shep Moon, DEQ  
Kathy Frahm, DEQ  
Sharon Baxter, DEQ  
Burt Tuxford, DEQ  
Larry Gavan, DCR  
Jim Givens, VDOT

Interested Parties:

Carla Harris, VACO (Loudoun County)  
Jeffery Watts, VFA  
Kate Quinlan, VML  
Mark Flynn, VML  
Ellen Scarff, HBAV  
Brian Henshaw, NSVRC  
Cindy Taylor, Suffolk  
Russ Baxter, Secretary of Natural Resources

Summary of the Meeting:

Kathy Frahm welcomed everyone to the first meeting of the Low Impact Development Task Force (LID-TF). The members and others in attendance introduced themselves and stated their interest in LID. Ron Hamm discussed the purpose of the HB 1953 (2003 GA). He stated that the purpose was to get localities together on how they would view and approve LID projects as a

compliance tool in their programs. He said that he felt that it was important for the state to endorse LID principles and practices and to establish some consistency across the state in how localities evaluate LID for approval.

HB 1953 requires the LID-TF to 1) develop a LID certification Process; 2) develop guidance to promote effective LID; 3) recommend changes to existing statutes and regulations to facilitate use of LID; and 4) develop a model ordinance for local use. The LID-TF is required to submit a preliminary report to the Director of DEQ by 10/1/03 and a final report by 10/1/04.

John Tippet, Executive Director of the Friends of the Rappahannock, made a presentation on his organization's LID tutorial and toolkit CD. This CDROM includes examples of local ordinances from Warsaw and Stafford County. He told the group that the goal of LID was to get hydrology back to pre-development conditions because current Stormwater Management (SWM) controls actually increase the volume of water being discharged over a longer period of time at an increased frequency. He emphasized two key concepts: LID allows flows to be diffuse and unconcentrated; and 2) LID distributes source control by using smaller scale systems that are widely distributed over the site. He continued that LID has the potential for reducing costs but steps must be taken up front to realize these reductions. He said that an important consideration is that LID techniques function best when brought online after a site is stabilized because fine sediments can clog systems. He stated that more research needs to be done on pollutant loading efficiencies of various techniques and some efforts were underway by his group and DCR.

A discussion ensued regarding who should be responsible for inspections and maintenance of LID projects. Jeff Perry indicated that standing water can be a problem for localities due to concerns about West Nile virus. He felt that there is a need to educate people on how LID doesn't contribute to this problem.

Larry Gavan, of DCR, expressed his experience that LID methods actually require less maintenance than for conventional approaches. He said that except for pruning of vegetation, LID methods are generally self-maintaining.

Mr. Tippet continued by summarizing the benefits and drawbacks of LID techniques. He concluded by outlining five issues for how to make LID work: 1) development of a common definition, 2) standardize review guidelines, 3) remove roadblocks in local codes, 4) technical training in the techniques, and 5) the creation of incentives and regulations for LID use.

Shep Moon moved on to the next agenda item. He discussed several definitions for LID and recommended that the LID-TF adopt the statutory definition with some minor additions. The LID-TF supported the following language:

“Low Impact Development (LID) is a site-specific system of design and development techniques that can serve as an effective, low-cost alternative to existing stormwater and water quality control methods and that will reduce the creation of storm runoff and pollution and potentially reduce the need to treat or mitigate water pollution. Low-impact development programs control runoff discharge, volume, frequency and quality in order to mimic predevelopment runoff conditions through a variety of small-scale site design techniques.”

Bruce Williams with the U.S. Army Corps of Engineers followed with a presentation on the development of a LID memorandum of understanding.

Kathy Frahm discussed the contents of a draft report outline and topics to be covered in future meetings of the LID-TF. The outline and meeting plan were adopted as modified.

Additional discussion followed, including a concern raised by Jeff Perry regarding his concern that the work of the LID-TF not significantly impact existing local programs.

The next meeting of the LID-TF was scheduled for July 24<sup>th</sup> from 10 a.m. to 3 p.m. at the DEQ Piedmont Regional Office in Innsbrook. A request was made for Larry Coffman to speak at a future meeting.

## **Appendix C: Summary of LID-TF Meeting of July 24, 2003**

## Low Impact Development Task Force Meeting Summary July 24, 2003

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### Meeting Objectives:

- To provide LID-TF members a chance to present or discuss their own Low Impact Development (LID) efforts or experiences
- To begin gathering information on challenges or impediments to current LID activities
- To determine the needs of the LID-TF for additional presentations at future meetings
- To discuss and agree on a date for the next meeting of the LID-TF

### Attendance:

#### Task Force Members:

John Tippet, Friends of the Rappahannock	Martha Little, CBLAD
Joe Lerch, CBF	Ron Hamm, LID Coalition
Jack Frye, DCR	Rachel Morris, VFBF
Bill Springer, HBAV	Linda Cole, Navy
Barry Fitz-James, VACO (Stafford County)	Richard Street, SWCDs
Jeff Perry, VML (Henrico County)	Bruce Williams, USACE
Helene Merkel, Horne Engineering	Joe Battiata, VDOT (for Ken Smith)

#### Technical Staff & Interested Parties:

Scott Kudlas, DEQ	Shep Moon, DEQ
Larry Gavan, DCR	Sharon Baxter, DEQ
Ron Tuttle, Fairfax County Stormwater	Brian Henshaw, NSVRC
Rodney Sobin, DEQ	Denise Thompson, VML
Ellen Scarff, HBAV	David Powers, Timmons Group
Joan Salvati, Chesterfield County	Jeffrey Watts, VFA
Burt Tuxford, DEQ	Carla Harris, Loudoun County

### Speakers:

Jack Frye, DCR	Barry Fitz-James, VACO
Martha Little, CBLAD	Jeff Perry, Henrico County
Joe Battiata, VDOT	Brian Henshaw, NSVRC
Helene Merkel, Horne Engineering	Richard Street, SWCDs
Linda Cole, Navy	Bill Springer, HBAV

### Handouts:

- Dennen, R. "Project's goal: Less pollution in waterways." Fredericksburg.com Available online: <http://www.freelancestar.com> (July 9, 2003).
- Boorstein, M. "Fredericksburg tries natural filtering of storm water." Washington Post. Available online: <http://www.washingtonpost.com> (July 6, 2003).



- Witte, G. "Virginia school leads area into green movement." Washington Post. Available online: <http://www.washingtonpost.com> (July 21, 2003).
- 2003 Chesapeake Bay Small Watershed Grants
- Low Impact Development Annotated Website Review
- The Northern Shenandoah Valley Urban Regional Manual for Low Impact Site Design (A supplement to the Virginia Stormwater Management Handbook) (Handout from Brian Henshaw, NSVRC).
- Merkel, H. Low Impact Development and its application at Army installations. Handout of powerpoint presentation by H. Merkel.
- 2003 Virginia DCR Chesapeake Bay Watershed Grants: Low Impact Development and Innovative Urban BMP Projects (Handout from Jack Frye, DCR).
- Tippet, J. Low Impact Development . . . A Tutorial and Toolkit. CD-ROM Version 1.0 handed out by John Tippet, Friends of the Rappahannock).

**Summary:**

**Jack Frye, Department of Conservation & Recreation**

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Mr. Frye summarized LID activities by the Department of Conservation and Recreation. Frye mentioned that although DCR does not have a specific program, LID practices could be integrated into other DCR activities. He then organized his talk based on 5 categories of importance for LID including: financial support; technical guidance; regional approaches; technical training/tools; and awareness/public education. Numerous specific examples were discussed. DCR hopes to offer an advanced planner reviewer course next year, integrating more LID practices into curricula compared to the current course offering. DCR feels maintenance/retrofit issues should be addressed sooner rather than later, and citizen/homeowner education is essential.

**Comments:**

- The DCR/Friends of the Rappahannock Low Impact Development CD-ROM was passed out for review
- Interest in possibly integrating LID techniques on state capitol grounds and at the Governor's mansion

**Martha Little, Chesapeake Bay Local Assistance Department**

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Martha Little discussed how LID fits into the Bay Act requirements, in particular how LID can help meet the general performance criteria and stormwater management requirements in the Chesapeake Bay Preservation Area Management Regulations. She discussed several projects that the Department has undertaken to delve deeper into the relationship between Better Site Design and the Bay Act and most recently to look at the impediments to implementing LID and site design tools at the local level. An analysis of two case studies of Virginia localities demonstrated how impediments in local codes, VDOT standards and regulations and general perceptions were preventing the

implementation of many LID tools. Martha mentioned that the Department plans to continue this work and to analyze even further how to overcome some of the identified impediments. She emphasized the interest the Department has in working with other agencies and in participating in the task force. Ms. Little mentioned that William & Mary is interested in putting on a green roof. It was also mentioned by W&M staff that available grant funds are often difficult to find and would like to see a single site for all state agency grants.

**Comments:**

- Discussion centered primarily on “by-right.” Localities have until July 2004 to update codes.
- LID technology can be used even in very urban areas. Committee agrees, but there was concern over financial availability.

**Joe Battiata, Virginia Department of Transportation**

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Mr. Battiata began by saying that VDOT is not against LID, rather they are unable to treat the road right-of-way as a “site” similar to residential or commercial subdivisions. LID strategies call for manipulation of the development site for the purpose of slowing runoff. The public right-of-way must be engineered for safety and long term utility. VDOT requests that any Task Force recommendations to the legislature or directly to VDOT be specific. VDOT is willing to work with the Task Force or local governments regarding specific requests; however, many comments relating to LID and VDOT are generalizations regarding required street widths and stormwater structures within the right-of-way. He mentioned a potential public health concern over water in ditches and a possible link with West Nile Virus if road-side ditches and swales are to be used to hold stormwater. VDOT is involved in two pilot projects, a swale in Hampton Roads and a Prince William County LID retrofit.

**Comments:**

- Concerns/discussions over who will inspect LID projects
- VDOT is concerned that with a mandated smaller cul-de-sac radius, emergency vehicles, snowplows, and school buses would not have access – these requirements serve as the basis for most local subdivision street standards.
- Task Force members suggested to have Larry Coffman come to speak on LID

**Helene Merkel, Horne Engineering**

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Ms. Merkel described the Army’s new rating system called SPiRiT, the Sustainable Project Rating Tool. LID applies to numerous SPiRiT categories. Ms. Merkel described four projects, Fort Meade, Maryland, Fort Lee, Virginia, the Army Research Lab, and Fort Belvoir Post Exchange retrofit.

**Comments:**

- The Army is required to have an integrated natural resources management plan. Suggested requiring these for non-army projects, and including LID.
- Local government representative suggested including LID in the local comprehensive plan.
- Ameri-corps, College/Graduate students were suggested as helpful volunteers for LID projects

**Linda Cole, Naval Facilities Engineering Command, Norfolk**

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Ms. Cole presented the Washington Naval Yard as a demonstration example of the Navy's involvement in LID. The Navy has a Unified Facilities Criteria Manual (*to be emailed*) that discusses LID, its importance, basic design and how to incorporate LID into Naval facility design. Phase II of the naval project is to have LID included into municipal storm water management plans. Ms. Cole stressed the importance of education and awareness.

**Comments:**

- Beginning December 31, 2005 environmental management must be established for all Department of Defense sites.
- Mentioned that there has been some interest in linking security with environmental protection (i.e.: an embassy design surrounded by a bioretention pond; and a green roof on a facility in Culpepper.

**Barry Fitz-James, Stafford County**

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Stafford County has revised some zoning and subdivision ordinances to include LID. Included are ordinance changes to allow SWM facilities on private lots, changing requirements for curb/gutter from 30,000 to 10,000 sq. ft. A checklist is still not available for LID requirements on a site. Impediments were discussed, including education, compliance with state code, and maintenance agreements with homeowners. Stafford County would like to see specific mention of LID in Virginia State Code.

**Comments:**

- There may be problems in the future with communities that have developed guidelines for LID before state legislation or good technical advice. It was recommended that state direction is needed.
- Stafford County now plans on creating a workshop based on specific LID calculations

**Jeff Perry, Henrico County**

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Henrico County has developed an environmental fund that developers contribute to, and has also extended the CBPA buffer. Henrico feels their program is working effectively and is concerned about the implications of LID. There is also

concern that a General Assembly mandate will allow developers to require homebuilders to bear the burden and not follow Henrico County requirements.

**Comments:**

- It was suggested by Chesterfield county to integrate land use, LID and buffers
- A common thread should be hydrology
- Suggested that a small working group for feedback from emergency squad members, site planners, etc. would be beneficial.

**Brian Henshaw, Northern Shenandoah Valley Regional Commission**

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NSVRC held a workshop last July looking at LID and identifying all involved stakeholders. They concluded that major stakeholders are local government, engineers, watershed planners and developers. A manual will be created for Low Impact Site Design via a steering committee of stakeholders. The manual is scheduled for completion next year.

**Richard Street, Soil and Water Conservation District**

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SWCDs have been involved in creating local workshops for homeowner's associations, engineers and developers to discuss LID. Involved individuals are particularly interested in the calculations—specifically how to implement LID on their properties. Mr. Street discussed the importance of educating homeowner's associations on the importance of LID and to possibly integrate LID practices into public schools. SWCD is currently involved in developing software for LID with specific calculations. Mr. Street mentioned legislators want a current list of what localities in Virginia are doing with respect to LID and offered his researched list as a handout at the meeting.

**Comments:**

- It was suggested that Mr. Street's list be reviewed before offering to the legislature.
- Virginia Tech to possibly provide a listing and relevant listing of rain garden plants
- Suggested homework assignment of negative aspects (impediments) of LID.

**Bill Springer, Home Builders Association of Virginia**

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Mr. Springer mentioned that New Jersey is also looking at LID, and they are using Prince George's county as an example.

**Comments:** Bruce Williams, USACE

- Possible incentives for developers who utilize LID?
- Would like to give permittees some kind of incentive or credit

**HOMEWORK:** Due to Scott Kudlas **Thursday, August 7, 2003**

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- Impediments/Barriers to use of LID
- List of identified practices

- Potential Incentives

## **Appendix D: Summary of LID-TF Meeting of August 20, 2003**

## **Low Impact Development Task Force Meeting Summary: August 20, 2003**

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### **Meeting Objectives:**

- To receive information from Dr. Paul Koch on project-based technical issues
- To complete discussion of issues/challenges/barriers to the use of LID practices for inclusion into Interim Report
- To complete discussion of potential incentives or ways to promote LID use for inclusion into Interim Report
- To complete discussion of what needs to be addressed to ensure LID is useful for inclusion into Interim Report
- To discuss and agree on a date for the next meeting of the LID-TF
- To discuss assistance in drafting Interim Report

### **Attendance:**

#### Task Force Members:

Martha Little, CBLAD  
Jeff Perry, VML (Henrico County)  
Joe Lerch, CBF  
Barry Fitz-James, VACO (Stafford County)

Doug Beisch, WEG  
Rachel Morris, VFBF  
Linda Cole, Nav Fac Eng Com  
Helene Merkel, Horne  
Engineering  
Bill Springer, HBAV  
Ellen Gilinsky, DEQ

Ron Hamm, LID Coalition  
Bruce Williams, USACE

#### Technical Staff & Interested Parties:

Scott Kudlas, DEQ  
Krista Trono, DEQ  
Joan Salvati, Chesterfield County  
Ron Tuttle, Fairfax County  
Douglas Pritchard, Chesterfield County  
Larry Land, VACO

Larry Gavan, DCR  
Rodney Sobin, DEQ  
Carla Harris, Lououn County  
Brian Henshaw, NSVRC  
Ellen Scarff, HBAV  
Cindy Taylor, VML (Suffolk)

### **Speaker(s):**

**Dr. Paul Koch, Low Impact Development Center**

### **Handouts:**

- Meeting Summary from July 24, 2003 meeting
- Paul Koch handed out his powerpoint presentation including, "Milwaukee LID Initiative" and "Tiered Retention for Peak Runoff Control."
- Low Impact Development-What We Do Now & Opportunities. (Handout from Larry Gavan, Department of Conservation & Recreation)
- Draft Report Outlines & Meeting Plans (Handout from Scott Kudlas)
- Spreadsheet of feedback from homework assignment due August 20, 2003

## **Summary:**

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The beginning of the meeting was spent commenting on the minutes from the July 24, 2003 meeting. An updated meeting summary from 07/24/03 is now available.

Dr. Paul Koch from the LID Center then offered a presentation in PowerPoint format. In the afternoon, the Task Force discussed the homework assignment due August 20 and suggested Scott Kudlas remove redundancies and compile a comprehensive document for TF review. Meeting attendees also reviewed the Interim Report Outline and offered suggestions as to what should be included.

### **Dr. Paul Koch, Low Impact Development Center**

Dr. Koch's presentation was broken into three parts. First, he demonstrated the spreadsheet developed for Milwaukee, showing how LID features affect the runoff hydrograph. The spreadsheet tries to answer the question of how to convince developers that use of LID will decrease peak flow and reduce the need for detention ponds at the output. Dr. Koch discussed five methods including hydrograph truncation, scalar multiplication, retention as reducing effective total precipitation depth that has fallen up to a time (t), retention as reducing effective total runoff at time (t), and curve number adjustment. Conclusions of the study show that different methods lead to significantly different results.

Next, the presentation focused on an explanation of a tiered retention for peak runoff control. Finally, Dr. Koch demonstrated how "off-the-shelf" simulation software can be used for LID. He used Extend Software to model how water flows through a single bioretention cell.

Dr. Koch also came prepared with some general questions and answers prepared by Larry Coffman of the LID Center. Questions included:

- Can LID reduce maintenance compared to conventional stormwater management?
- Can water quality be calculated with an acceptable degree of certainty?
- Is LID ready for the mainstream?
- Examples of current LID practices, including Maryland, Washington, Minnesota, Germany, Japan, Australia and potentially an Indonesian project.
- Are LID techniques favorable with respect to safety and liability concerns?
- Examples of public outreach, including websites and brochures. Dr. Koch also suggested "decorative monuments" for bioswales, raingardens to help identify LID practices.

### **Comments/Discussion:**

- Concern was expressed regarding tagging on LID after a conventional site design has been completed.



- Question of whether LID techniques are *weather* sensitive. (Dr. Koch- not much of a problem/difference. Water will still flow through a system in the winter)
- Maintenance-questions with this issue for Virginia/discussion of how it was addressed in the Milwaukee project.
- Discussion of whether water quality is properly addressed in Dr. Koch's models
- Mosquito concern with respect to standing water (Dr. Koch- not much of a concern—just ensure the draw-down is quick enough)

### **Discussion of the Homework, Recommendations for Interim Report**

1. Some changes were discussed for the language in the definition of LID
2. For the Interim Report, in the “What is LID” section, proposed to include:
  - Mimic hydrology
  - Low cost
  - Groundwater recharge/conservation/ “encourages” resource conservation
  - Potential land area savings
  - Aesthetics
  - Review John Tippett’s list (on the CD)
  - Innovations
3. “Current LID Activities”:
  - Suggestion to include pictures of LID practices
  - Summarize current research
  - Jurisdictional process promoting greater use
  - Use of a summary-appendix-chart
4. “Plans for Moving Forward”(Policy Level Recommendations):
  - Funding sources through grants (EPA?)
  - Government by Example-using LID practices on state sites
  - Evaluation of MS-19
  - Potential certification schemes (habitat concerns, etc)
  - Mention what LID does not address (ie: sprawl)
  - DCR to create supplement for nonstructural practices
  - C2K-LID, innovative SWM
5. **WHERE DO WE GO FROM HERE? (YEAR 2) with assignments:**
  - Corps/DEQ/DCR joint public notice to parties saying LID is new concept-get developer/localities feedback at the beginning. From there develop incentives, etc.
  - Government by example (Martha)
  - Recharge Standards (Bill & Doug)
  - Local ordinance language (Barry, Carla, Linda)
  - State & Local model ordinances: integrate LID practices (state-Martha, Larry, Rodney) (local-Joan, Joe)
  - MS-19 handbook (Larry & Doug B.)
  - LEEDS certification (Linda)
  - Research/Reliability (Ron & Linda)

- Education (Bruce)
- Public vs. private maintenance (Helene)
- Track SW streamlining effort (Larry)
- Funding (Helene)

### **Future Meetings**

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The Task Force voted to continue meeting monthly September-November and to reconvene after general assembly sessions.