

**To:** Interested Parties

**From:** Scott Millar, Administrator Sustainable Watersheds

**Subject:** Better Site Designs

**Date:** June 15, 2009

The purpose of this memo is to invite you or your designated representative to help evaluate existing development practices to more effectively manage stormwater runoff by using better and more cost effective planning and site design techniques. The intent is to seek input from an interdisciplinary stakeholder group to customize some existing national "Better Site Design" model development principles for RI. The national practices will be used as a starting point. DEM and CRMC are looking for people to represent all interested stakeholders, including but not limited to planners, builders, site designers, environmentalists, public works, and public safety officials. Approximately 4-5 meetings are anticipated and you will be asked to comment on draft site design and planning practices from your perspective. The results of this effort will be peer reviewed practices that will be published in a guidance manual, that communities can incorporate in their applicable ordinances to reduce stormwater development impacts.

This project is part of a larger effort by DEM and CRMC to update and revise the existing *Rhode Island Stormwater and Installation Standards Manual* to comply with the Smart Development for a Cleaner Bay Act (R.I.G.L § 45-61.2), which requires DEM and CRMC to amend the existing RI Stormwater Manual to use Low Impact Development (LID) techniques as the primary method of stormwater control. To review a draft of the revised stormwater manual go to:

<http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/t4guide/desman.htm>

The objective in LID is to mimic predevelopment hydrology by using site planning and design techniques that infiltrate, filter, store, evaporate and detain runoff as close as possible to the point where precipitation reaches the ground on a site. LID has three steps. The first is to avoid the impacts from new development, by guiding growth away from the areas on a site that that should be protected to reduce disturbances to predevelopment hydrology. The second step is to reduce impacts from development by minimizing impervious cover such as roads and parking lots. The last step is to manage the unavoidable impacts from development with LID treatment practices. The first two steps will require some changes to community site planning and design practices to achieve LID effectively. DEM and CRMC has hired Horsley and Witten Inc., a planning and engineering consultant, to develop the better community site design practices as well as the updated stormwater manual.

If you choose to participate, your first assignment is to review and comment on the attached outline for the proposed guidance manual. In particular let us know if any additional topics should be addressed. Also attached is a draft introduction as well as an example practice description to give you an idea of the level of detail anticipated for the manual. ***Please respond by July 15 with any comments and to let us know if you want to participate.***

Contact me at 222-4700 ext 4419 or [scott.millar@dem.ri.gov](mailto:scott.millar@dem.ri.gov) for any questions, comments and to volunteer to serve on the advisory committee. Thank you for your anticipated cooperation.

## **Final Outline for Community LID Guidance Manual**

**Introduction:** Reinforces the Avoid, Reduce and Manage message and stresses that the first two of these practices are addressed in the guidance manual. Presents information on where applicants can find existing documents on RI-specific guidance on methods for conservation development (e.g., South County Manual), buffers, flood plain management, etc. Lays out need for local ordinance reform as the basis for most LID implementation for the following:

- Conservation Development;
- Resource Buffer Standards;
- Site Clearing and Grading Standards;
- Roadway Standards;
- Parking Requirements;
- Compact Development;
- LID Landscaping; and
- Special Use Ordinances

### **Methods for Avoiding Impacts:**

Context (introduce methods-Conservation Subdivision, Resource Buffer Standards, Site Clearing)

#### **Practice #1:**

Conservation Subdivision Design (CSD):

Recommended Practice and Perceptions and Realities

Benefits of CSD

Suggested Resources for more information

#### **Practice #2:**

Resource Buffer Standards:

Recommended Practice and Perceptions and Realities

Benefits Buffer Standards

Suggested Resources for more information

#### **Practice #3:**

Site Clearing and Grading Standards:

Recommended Practice and Perceptions and Realities for the following:

Standards for Limits of Disturbance

Standards for Canopy Preservation

Limitations on pre-development clearing practices

Flexible lot configurations including setbacks and frontages

Soils-based Zoning Restrictions

Benefits of standards associated with clearing activities  
Suggested Resources for more information

**Methods for Reducing the Impacts:**

Context (introduce methods- roadway standards, parking, site grading, LID landscaping)

**Practice #4:**

Roadway Design Standards:

Recommended Practice and Perceptions and Realities for the following:

- ROW width
- Travel way width
- Cul-de-sacs
- Driveways
- Curbing requirements
- Sideways
- Geometry (radii, intersection layout)

Benefits of Better Roadway Design

Suggested Resources for more information

**Practice #5:**

Parking Design Standards:

Recommended Practice and Perceptions and Realities for the following:

- Parking Ratios
- Shared Parking
- Off-site allowances
- Isle and stall geometry
- Use of pervious pavements
- Parking lot landscaping

Benefits of Better Parking Standards

Suggested Resources for more information

**Practice #6:**

Compact Development:

Recommended Practice and Perceptions and Realities for the following:

- “By Right” Conservation Development
- Mixed Use Districts
- Limits on impervious cover

Benefits of Compact Development Design

Suggested Resources for more information

**Practice #7:**

LID Landscaping:

Recommended Practice and Perceptions and Realities for the following:

Retaining existing vegetation

Plant Selection

Cultivation standards

Benefits of LID Landscaping

Suggested Resources for more information

**Practice #8:**

Special Use Ordinances:

Erosion and sedimentation

Review and Inspection Fee ordinance

Stormwater Utility Districts

## Avoid the Impacts

The first step in the LID site planning and design process is to **avoid** or minimize disturbance of natural features. This includes the identification and preservation of natural areas that can be used in the protection of water resources. It is important to understand that limiting the hydrological modification of a site is just as important as stormwater treatment. LID is not limited to stormwater treatment practices such as swales, bioretention, or infiltration. Those practices are more effective than traditional curb and gutter treatment, but they are only part of the approach to achieving LID. The way land is developed to more effectively protect aquatic resources must also be changed. In the past, land was altered significantly to fit the style of development. To achieve LID it is important to start thinking about how to re-shape development to fit the land. This new approach to stormwater management focuses on the preservation and use of natural systems to achieve stormwater management objectives to the extent feasible. To the extent possible, developers should promote contact between runoff and pervious land surfaces. Technically, this is done by increasing time of concentration (the length of time required for runoff to concentrate and flow off site) and by reducing the curve number (a representation of the portion of stormwater that is available to runoff). An in-depth discussion of "time of concentration" and "curve number" is contained in Technical Release-55 (NRCS, 1986).

The specific objectives from *Minimum Standard 1 LID Site Planning and design Practices* that can be met by avoiding the impacts are as follows:

- Protect as much open space as possible to maintain pre-development hydrology and allow precipitation to naturally infiltrate the ground;
- Maximize the protection of natural drainage areas, streams, surface waters and wetlands;
- Minimize land disturbance including clearing and grading;
- Minimize soil compaction
- Minimize the decrease in "time of concentration" from pre-development to post development.

Undeveloped open space and native vegetated areas, natural terrain, riparian corridors, wetlands, floodplains and other important site features should be delineated and placed into permanent conservation areas, when possible. The upper layers of a natural area contain organic material, soil biota, vegetation and conditions favorable for storing and slowly conveying stormwater. The canopy of existing native trees and shrubs also provide a benefit by intercepting rain water before it hits the ground. Preserving as many

natural areas as possible, helps to maintain the pre-development hydrology and, reduce the volume of stormwater generated.

#### Natural Area Protection Advantages:

- Promotes evapotranspiration and infiltration to reduce need for treatment and peak volume control at end-of-pipe.
- Reduces generation of stormwater.
- Maximizes the protection of natural drainage areas, streams, surface waters and wetlands;
- Reduces safety and property-damage risks where flood hazard areas are incorporated into preservation.
- Maintains predevelopment hydrology, natural character and aesthetic features that can increase market value.
- Minimizes land disturbance including clearing and grading and reduces the compaction of soils.
- Minimizes the decrease in “time of concentration” from pre-development to post development.
- Establishes and maintains open space corridors.

The practices communities should adopt into their existing land use regulations to more effectively avoid the impacts and comply with LID site planning and design objectives are as follows:

Practice #1 Conservation Development

Practice#2 Compact Development

Practice #3 Setbacks from surface waters and wetlands

Practice #4 Flexible lot configurations and building envelopes

Practice #5 Limits of Disturbance

Practice #6 Tree canopy requirements

Practice #7 Landscaping standards

## **Practice # 1 Conservation Development**

### **Current Practice**

For years most Rhode Island communities have relied on conventional zoning and subdivision regulations to guide new growth. Rural and suburban towns adopted large lot zoning in an attempt to protect community character and limit density. However, there were unintended consequences of this development pattern that accelerated the loss of open space, resulted in negative impacts to natural resources, and increased stormwater runoff volumes and pollution. The community character of many towns was also irreversibly altered. Although many towns adopted cluster development, that concentrates density in one portion of the site in exchange for preserving open space elsewhere, there was no objective site analysis performed to determine what open space was most important to protect to maintain or avoid impacts to pre-development hydrology.

### **Recommended Practice**

Conservation development is a creative site design technique that allows a community to work collaboratively with developers to accommodate growth while avoiding impacts to natural resources and community character. It also preserves 50% or more of the land as meaningful open space in perpetuity. Conservation development is a compact or cluster form of development. ( Figure\_\_ include illustrations from CD manual Kenyon Farm) The way conservation development is done in Rhode Island is different than cluster development and the way most states do conservation subdivisions. In Rhode Island, an objective site analysis is used to determine where on a given parcel of land development is most suitable, and conversely where development must be avoided to preserve sensitive natural resources, including wetlands, hydric soils, surface waters, areas subject to storm flowage and associated naturally vegetated buffers. Conservation development provides the flexibility necessary to locate growth where it is most appropriate and makes it easier to maintain pre-development hydrology. For further information regarding conservation development refer to the *Rhode Island Conservation Development Manual* (DEM 2003).

Currently 9 towns in RI have adopted conservation development with 11 more towns that have either drafted an ordinance or have initiated the process. All applicable rural and suburban communities should adopt conservation development to avoid subsequent impacts from new growth and maintain their community character.

## **Benefits of Conservation Development**

### Stormwater

It has been documented that conservation development can significantly reduce impervious surfaces, runoff volume, pollutant loadings, site disturbance, soil erosion and development costs when compared to conventional development ( Center for Watershed 2000). *(insert tables from page 95 Better Site Design CWP to show reductions in impervious cover, phosphorus and nitrogen loads from CD vs conventional development)* Moreover, conservation development actually preserves meaningful open space and community character as a trade off from development. A key advantage to conservation development is the establishment of new lot lines out of areas that should be protected to avoid the impacts to water quality such as surface waters, riparian buffers, wetlands and hydric soils. When lots comprise these sensitive areas, property owners have been known to inadvertently encroach upon and adversely impact these resources.

### Economic

A Rhode Island study documented that conservation developments had a 40% reduction in construction costs, homes sold 47% faster and property values were 17% higher than comparable homes in a conventional development( Mohammed 2006 ). Studies done in Maryland and Massachusetts found similar economic benefits for conservation development. Most of the cost savings are due to the reduction of roads and structural stormwater conveyance systems. The marketability of homes in a conservation development is also high since the homes are adjacent to permanently protected open space.

## **Perceptions and Realities About Conservation Development**

Despite the many benefits of conservation development, there are misconceptions that have limited its use. Some developers are reluctant to use conservation development due to the perception that smaller lot sizes are less marketable. Some communities have not adopted conservation development since they feel smaller lots don't blend into their rural character. Others are concerned that smaller lots will yield less tax revenue than conventional larger lots.

*Use table from page 96 from better site design. Use numbers 1,3, 4, 5  
Also add: Conservation developments are perceived to yield less property taxes Fact.  
CD house lots yield as much if not greater tax returns than conventional lots.*

### **Case Study:**

*We can select a completed cd from RI. I have one from Richmond but it hasn't been built yet. The cd saved about a mile of road and preserved over 70% open space.*

## **Suggested Resources**

*Rhode Island Conservation Development Guidance Manual (RI DEM 2003)*

*Rhode Island Conservation Design DVD (RIDEM 2008)* Contains GIS coverages for RI that can be used on a home PC without any knowledge of GIS. It allows the user to prepare custom site analysis maps for any location in RI

*Rhode Island Conservation Easement Guidance Manual( RIDEM and NBNERR 2009)*  
This manual explains how to prepare a conservation easement that complies with RI law to help insure open space preserved by a conservation development will be preserved in perpetuity.

*Conservation Development Frequently Asked Questions (RI DEM 2006)*

# LOW IMPACT DEVELOPMENT GUIDANCE FOR LOCAL COMMUNITIES

## 1.0 Introduction

This manual was written as a companion piece to the recently revised *Rhode Island Stormwater Design and Installation Standards Manual* (the Stormwater Manual). The Stormwater Manual was updated to comply with Rhode Island General Law, Section 45, Chapter 61.2, entitled “The Smart Development for a Cleaner Bay Act of 2007” (hereafter, the Bay Act of 2007). The Bay Act states that “stormwater, when not properly controlled and treated, causes pollution of the waters of the state...” and “development often results in increased stormwater runoff by increasing the size and number of paved and other impervious surfaces...” The Bay Act of 2007 required DEM and CRMC to amend the 1993 Stormwater Design and Installation Standards Manual to:

- a) Maintain groundwater recharge to predevelopment levels;
- b) Maintain post-development peak discharge rates to not exceed pre-development rates; and
- c) Use low impact development (LID) techniques as the primary method of stormwater control to the maximum extent practicable.

To effectively manage the impacts of stormwater and prevent adverse impacts to water quality, habitat and flood storage capacity, as well as meet the requirements of the Bay Act of 2007, CRMC and DEM updated the 1993 manual to reflect current science and engineering practice concerning stormwater management and to incorporate LID methods throughout. The revised stormwater manual provides guidance for stormwater management on new development and redevelopment projects and, most importantly, incorporates LID as the “industry standard” for all sites, representing a fundamental shift in how development projects are planned and designed.

The Stormwater Manual establishes eleven required minimum stormwater management standards for development and redevelopment projects. The first minimum standard is compliance with LID site planning and design practices. This standard is as follows:

*LID planning processes and practices must be used to the maximum extent practicable in order to reduce the generation of the water runoff volume for both new and redevelopment projects. All development proposals must include a completed Concept Design checklist (Appendix G) and Concept Site Plan for review by the applicable regulatory authority that shows compliance with this standard. If full compliance is not provided, an applicant must document why key steps in the process could not be met and what is proposed as mitigation. The objective of the LID Planning and Practices standard is to provide a process by which LID is considered at an early stage in the planning process such that stormwater impacts are prevented rather than mitigated for.*

Minimum Standard 1 establishes a process for measuring compliance with appropriate LID site design and requires that the site planning process is formally documented and shall address at least the following objectives:

- (1) Protect as much open space as possible to maintain pre-development hydrology and allow precipitation to naturally infiltrate the ground;
- (2) Minimize impervious surfaces;
- (3) Break up or disconnect the flow of runoff over impervious surfaces;
- (4) Maximize the protection of natural drainage areas, streams, surface waters, and wetlands;
- (5) Minimize the decrease in the "time of concentration" from pre-construction to post construction, where "time of concentration" means the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;
- (6) Minimize land disturbance including clearing and grading;
- (7) Minimize soil compaction;
- (8) Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- (9) Infiltrate precipitation as close as possible to the point it reaches the ground using vegetated conveyance and treatment systems; and
- (10) Provide source controls to prevent or minimize the use or exposure of pollutants into stormwater runoff at the site in order to prevent or minimize the release of those pollutants into stormwater runoff.

These objectives must be formally documented according to the Stormwater Management Plan checklist included in Appendix A of the Stormwater Manual, using the LID methods described below. Site design should be done in unison with the design and layout of stormwater and wastewater infrastructure in attaining management and land use goals. The LID site planning and design objectives can be split into three main categories:

1. Avoid the Impacts – Preserve and where possible restore natural features;
2. Reduce the Impacts – Reduce Impervious Cover and
3. Manage the Impacts – Design site specific runoff reduction, treatment and source controls.

Municipal land use authority is directly involved with avoiding and reducing the impacts. Managing the impacts that are unavoidable is primarily done through structural engineering design of LID stormwater treatment systems. The Stormwater Manual contains very specific design criteria for structural stormwater best management practices.

The purpose of this manual is to provide communities the specific guidance they need to revise their applicable land use regulations to avoid and minimize the impacts of stormwater runoff and to effectively comply with the Storm Water manual's minimum standard 1: LID Site Planning and Design Practices.

The chapters that follow in this manual will examine many of the common local regulatory topics and how they can be revised to accommodate LID as well as reduce municipal service costs, and preserve community character. The majority of these chapters are structured to first discuss the conventional approaches to these techniques and the common problems that occur in land use regulations today. These introductory sections are then followed by discussions of strategies that can be used to provide more innovative options to development and, where possible, examples of concrete standards that can be considered for Zoning Ordinance or Land Development Regulations. Case studies and references have also been provided where examples can serve as models or provide specific insights to Rhode Island communities.