



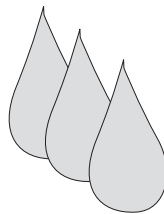
# Stormwater Management

## Three Profiles of County-Based Initiatives

National Association of Counties  
County Services Department Best Practices Series

# Stormwater Management

## Three Profiles of County-Based Initiatives



County Services Department Best Practices Series

The National Association of Counties  
Washington, DC

March, 2001

## *About the National Association of Counties*

Founded in 1935, the National Association of Counties (NACo), is the only national organization in the country that represents county governments. With headquarters on Capitol Hill in Washington, DC, NACo's primary mission is to ensure that the county government message is heard and understood in the White House and the halls of Congress. NACo's purpose and objectives are to:

- Serve as a liaison with other levels of government;
- Improve public understanding of counties;
- Act as a national advocate for counties; and,
- Help counties find innovative methods for meeting the challenges they face.

Through its research arm, the National Association of Counties Research Foundation, NACo provides county officials with a wealth of expertise and services in a broad range of subject areas, including job training, environmental programs, human services, welfare-to-work initiatives, housing, county governance, and community infrastructure.

For more information about the Association, or to request copies of this report, please contact:

The National Association of Counties  
440 First Street, NW  
Washington, DC 20001  
tele: 202/393-6226  
fax: 202/393-2630  
web: [www.naco.org](http://www.naco.org)



This document is being published and distributed through the NACo Nonpoint Source Pollution Prevention Project. The guide was written and compiled by James Davenport, edited by Bart Lawrence of Harrington-Hughes and Associates, with additional assistance from Abby Friedman and Naomi Friedman. NACo wishes to thank the contributors who wrote the profiles and provided graphics presented in this report. NACo also thanks U.S. Environmental Protection Agency/Nonpoint Source Pollution Prevention Branch (EPA) for its advice and financial support. This publication was developed under a cooperative agreement between EPA and NACo. The opinions in this publication are those of the contributors, and do not necessarily reflect the views of the EPA or NACo.

# Foreword

**A** key objective of county government is the protection of public health and welfare. One component of this charge is the protection of valuable water resources. Though “end-of-the-pipe” pollution control and treatment strategies have preserved surface and ground water for many years, new strategies are needed to tackle diffuse and pervasive sources of water pollution such as stormwater runoff.

As the government closest to the people and to many of these pollution sources, county elected officials and their staffs are increasingly being called upon to help minimize water quality impacts due to stormwater runoff. Indeed, many county officials have substantial opportunity to help prevent or minimize stormwater runoff whether through regulatory measures such as local land-use controls and health ordinances, or more voluntary measures such as a public education program.



Jane Hague  
President of NACo  
Member, King County Metropolitan Council  
King County, Washington

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# Executive Summary

## Stormwater Runoff and Its Impact on the Environment

Since the passage of the Clean Water Act in 1972, the United States has made some progress in cleaning up the nation's waters through controlling pollution from industries and sewage treatment plants that discharge effluent into lakes and rivers through one distinct pipe or outfall. Today, further attention is being directed to pollution that originates from more diffuse sources, not from one pipe, commonly referred to as nonpoint source pollution. Stormwater runoff, rainwater that picks up contaminants and debris as it washes over streets and parking lots during storms or heavy rains, is a major source of nonpoint pollution to our nation's water bodies.

The most recent survey conducted by EPA "The National Water Quality Inventory" reports that stormwater runoff is the leading source of impairments to surveyed estuaries, areas where fresh water and saltwater mix, and the third largest source of water quality impairments to surveyed lakes.

Natural landscapes such as forests, wetlands, and grasslands, trap rainwater and snowmelt and allow them to slowly filter into the ground. Runoff tends to reach receiving waters gradually.

In contrast, when too much of the natural surface of a site is covered by non-absorbent (impervious) surfaces such as roads, parking lots, and buildings, runoff does not slowly percolate into the ground. Therefore, during a storm, water remains above the surface

and runs off very quickly and in large amounts through the storm drains and then into nearby lakes and rivers.

## Why Should Counties Care?

A large area of impervious surface not only increases the quantity of the water that washes into local rivers and lakes, but also the variety and amount of pollutants as well. Sediment from development and new construction; oil, grease, and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; road salts; and heavy metals are examples of pollutants that can be generated.

When runoff enters storm drains, it carries many of these pollutants with it. In older cities, this polluted runoff is often released directly into the water without any treatment. Increased pollutant loads can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe.

Citizens often look to their local elected officials to address the difficult problem of identifying individual sources of the contamination and debris washed into local rivers and streams through stormwater runoff. Many counties, especially smaller rural counties, need additional staff and technical resources to handle complex problems such as identifying and then addressing potential causes of contamination through stormwater runoff.

In addition, many counties are now obligated to meet requirements of EPA's Phase I NPDES' and the new

Phase II NPDES Stormwater Regulations.<sup>2</sup> This means that many more county governments will be required to implement best management practices<sup>3</sup> to reduce pollutants in urban stormwater.

## What Can Counties Do?

Because stormwater runoff is so pervasive, solutions to this problem involve a broad range of players including elected officials, planners, environmental specialists, farmers, and developers. County governments can have a role by encouraging developers, either through county accepted guidelines or established zoning ordinances, to implement design techniques on newly developed sites that minimize stormwater runoff from those sites. In fact, counties can manage stormwater through various tools and techniques such as alternative development strategies, conservation site design, innovative funding programs, education and outreach to local homeowners, and pollution prevention programs.

This document profiles three examples of county leadership

working with other stakeholders to develop stormwater management programs. The unique feature of each profile is that they focus on a specific innovative strategy that was implemented to reduce stormwater runoff. They include:

- **Regulatory Initiative**—Grand Traverse County, Michigan: Soil Erosion and Stormwater Runoff Ordinance.
- **Voluntary Initiative**—Prince George's County, Maryland: Low-Impact Development.
- **Funding Initiative**—Prince William County, Virginia: Stormwater Management Fee.

Each profile describes the impetus that led to action, background information plus key county agencies that were involved, and lessons learned. In addition, they focus on how the county and other stakeholders were able to finance these various strategies to meet the assorted regulatory requirements. These profiles can serve as prototypes to other counties because they also offer advice for county officials on

how these stormwater management programs can be successful in other counties.

## Notes

<sup>1</sup>EPA's Clean Water Act requires wastewater dischargers to have a permit establishing pollution limits, and specifying monitoring and reporting requirements. National Pollutant Discharge Elimination System (NPDES) permits regulate household and industrial wastes that are collected in sewers and treated at municipal wastewater treatment plants.

Amendments to the Clean Water Act established a two-phased approach to addressing storm water discharges. Phase I, currently being implemented, requires permits for separate storm water systems serving large- and medium-sized communities (those with over 100,000 inhabitants), and for storm water discharges associated with industrial and construction activity involving at least five acres.

<sup>2</sup>Phase II, which is just recently being implemented, addresses the remaining storm water discharges. Ultimately, millions of potential permittees will be covered, including urban areas with populations under 100,000, smaller construction sites, and retail, commercial, and residential activities.

<sup>3</sup>A practice or combination of practices that are determined to be the most effective and practical (including technological, economic and institutional considerations) means of controlling point and nonpoint pollutant levels compatible with environmental quality goals.



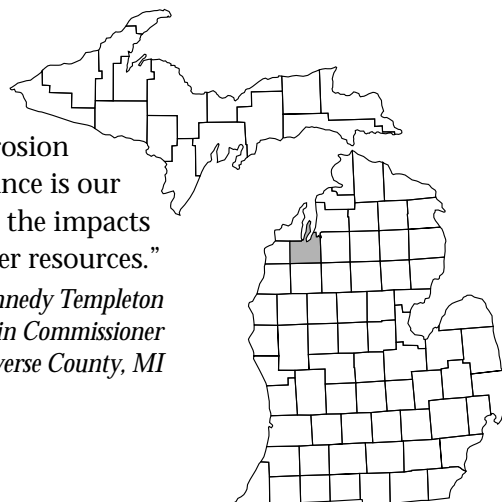
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# Soil Erosion and Stormwater Runoff Control Ordinance

## Opening Statement

“The Grand Traverse County Soil Erosion and Stormwater Runoff Control Ordinance is our first line of defense in our battle against the impacts of urbanization on our high quality water resources.”

*Maureen Kennedy Templeton  
Drain Commissioner  
Grand Traverse County, MI*



## **Demographics**

### **Population:**

Grand Traverse County  
72,072 (1996 estimate)

### **Type:**

Rural, Suburban

### **Region:**

U.S. Upper Mid-West

### **Key Contact:**

Maureen Kennedy  
Templeton  
Drain Commissioner  
Grand Traverse County  
Drain Commissioner's  
Office  
2325 Garfield Road N,  
Suite E  
Traverse City, MI 49684  
231/941-5112  
Fax 231/922-2756  
Mtemplet@  
co.grandtraverse.mi.us

## **Background**

Grand Traverse County is located in the northwest region of Michigan and is considered the economic center of the region. The region offers a substantial amount of multi-seasonal recreation and Grand Traverse County is no exception. The major attraction of the county is the Grand Traverse Bay and its tributaries for water dependent activities such as boating, bathing, and fishing.

In addition, the county and surrounding areas are becoming a major attraction for the retirement community. Waterfront vacant land values have doubled as a result of the booming tourism industry and the growth of the retirement community. The region's major retail centers are also located in the county including Traverse City downtown and Cherryland Mall. The new Grand Traverse Mall, completed in 1992 with 660,000 square feet, is 40 percent larger than the other two existing malls.

## **Impetus**

The Grand Traverse Bay watershed embraces almost a thousand square miles on the eastern shore of Lake Michigan. The bay and its various watersheds and streams are a valuable resource to the residents in Grand Traverse County. Throughout the 1980s and early 90s, such resources helped create a booming tourist industry for the county and also attracted an influx of retirees buying up waterfront properties. Additionally, two large mall developments were proposed that would substantially increase impervious surface cover within the county.

Although the county welcomed growth and prosperity, it came at a cost because it threatened the health of the high quality trout streams, inland lakes and the bay, the very things that attracted people to Grand Traverse County in the first place. Increased macrophyte outgrowth at the mouths of the bay tributaries indi-

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## Focus

In 1992, Grand Traverse County adopted the Soil Erosion and Stormwater Runoff Control Ordinance to protect local water bodies from nonpoint (diffuse) sources of pollution. The ordinance requires developers, builders, and homeowners to follow procedures that reduce soil erosion and stormwater runoff from a newly developed site both during and after construction. The Grand Traverse County Drain Commissioner, an elected county office in the state of Michigan, enforces the ordinance.

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cated declining watershed health. This was noted in a recent publication, "For here as in other parts of the country where growing human numbers and urban development stack up against once pristine waters, a high-quality resource is at imminent risk, and with it the economic future of the county [Grand Traverse County] and the entire region."<sup>1</sup>

The county initiated a watershed based resource management program with the objective of promoting water quality protection. This multitask approach intended to correct and control nonpoint source pollution through appropriate land use management techniques.<sup>2</sup>

One key component of the program was the county Soil Erosion and Stormwater Runoff Control Ordinance. The ordinance provided a foundation for water resource protection by requiring a reduction of site level impacts, such as earth disturbance and impervious surface coverage, for each new development in the county.

Initially, the county's Drain Commissioner (who previously served as the Soil and Erosion Inspector for the county) was elected to manage stormwater throughout Grand Traverse

County and to administer the State of Michigan Drain Code as well as the Michigan Soil Erosion and Sediment Control Act of 1972. Except for some general sediment control requirements in the 1972 bill, there were no specific local codes directing developers to implement best management practices for stormwater control (BMPs).

To address local concerns about the declining health of the watershed, the drain commissioner convened a meeting of county stakeholders, most of them local municipal officials. Speakers at this meeting discussed how to reduce stormwater runoff from new housing and commercial development. A majority of the 90 people that attended the meeting agreed to serve on a committee to develop stormwater management guidelines for Grand Traverse County. These guidelines eventually formed the basis for the county's new stormwater ordinance.

The county gained wide support for the passage of the ordinance by involving key local township officials in its development and endorsement. This is important because, though counties in Michigan issue stormwater permits, the townships regulate land use activities that affect stormwa-

ter runoff. The county can successfully implement the ordinance if townships require, through zoning ordinances and planning commission/zoning board review, that each new development proposal consists of the appropriate stormwater permit issued by county. The county facilitated the involvement of representatives from the township planning bodies in the development of the ordinance and as a result, township officials endorsed the ordinance along with the county board in 1992. The county also held public hearings during the ordinance development process to educate community leaders and the general public on the needs and benefits of implementing such an ordinance to protect the bay and its tributaries.

## Description

The purpose of the county's ordinance is to "prevent the pollution, impairment, or destruction of a natural resource or the public trust in Grand Traverse County unless:

- there is no feasible or prudent alternative, and
- the activity is consistent with the promotion of the public health, safety, and welfare in light of the public's paramount concern for protection of its natural resources."<sup>3</sup>

The ordinance utilizes a preventive oriented strategy that encourages developers to implement site design techniques that reduce the amount of runoff generated by a storm event. This approach scales back the level of impervious surface area at the site minimizing stormwater runoff

and utilizing the landscape to naturally filter the runoff that does leave the development site. The side box details the specific objectives of the Grand Traverse County stormwater management approach.

Whenever land is developed in the county or altered in any way that would affect stormwater runoff, the owner must develop and submit a plan indicating how runoff will be detained. The ordinance requires permits for land surface changes and disturbances:

- within 500' of a lake or stream;
- of more than one acre in size;
- for all commercial development
- in all environmentally sensitive sites (which includes areas with greater than 10% slopes, clay soil areas, and property within 100 feet of a regulated wetland)

Both township and county officials are available to help landowners determine whether their site is environmentally sensitive and requires a permit.

## Results

Through the county's leadership, key township officials and community leaders were involved in the development of the county ordinance and its eventual passage. This not only led to general public support of the ordinance, but it established a good working relationship between the county and townships in implementing and enforcing the ordinance.

While there are no quantifiable measures yet available indicating the success of the ordinance, studies conducted in some of the tributaries leading into Grand Traverse

## *Grand Traverse County Soil Erosion and Stormwater Runoff Control Ordinance*

### Objectives

- ◆ To prevent accelerated soil erosion and to control stormwater runoff resulting from earth changes proposed within Grand Traverse County, both during and after construction.
- ◆ To assure that property owners control the volume and rate of stormwater runoff originating from their property so that surface water and groundwater quality is protected, soil erosion minimized, and flooding potential reduced.
- ◆ To preserve and use the natural drainage system for receiving and conveying stormwater runoff and to minimize the need to construct enclosed, below-grade storm drain systems.
- ◆ To preserve natural infiltration and the recharge of groundwater and to maintain subsurface flow which replenish lakes, streams and wetlands.
- ◆ To restrict stormwater runoff entering and leaving development sites to non-erosive velocities by requiring temporary and permanent soil erosion control measures.
- ◆ To assure that soil erosion control and stormwater runoff control systems are incorporated into site planning at an early stage in the planning and design process.
- ◆ To prevent unnecessary stripping of vegetation and loss of soils, especially adjacent to lakes, streams, watercourses, and wetlands.
- ◆ To prevent construction activity that may cause mass movement, slumping, or erosion of land surfaces.
- ◆ To eliminate the need for costly maintenance and repairs to roads, embankments, ditches, streams, lakes, wetlands, and stormwater control facilities that are the result of inadequate soil erosion and stormwater runoff control.
- ◆ To reduce long-term expenses and remedial projects which are caused by uncontrolled stormwater runoff and soil erosion.
- ◆ To encourage the design and construction of stormwater control systems which serve multiple purposes, including but not limited to flood prevention, water quality protection, wildlife habitat preservation, education, recreation, and wetlands protection.
- ◆ To reduce the detrimental impacts of stormwater flows on downstream communities.
- ◆ To allow for off-site stormwater control facilities and measures if proposals meet the requirements of these regulations.
- ◆ To assure that all stormwater control facilities will be properly designed, constructed, and maintained.
- ◆ To provide for enforcement of this ordinance and penalties for violations.

Bay do indicate an overall improvement in water quality in the last few years. In addition, there have been fewer complaints of flooding since the passage of the ordinance. While these events cannot be directly linked to the ordinance alone, it is presumed that the ordinance, as part of the county's overall stormwater management program, played an important role in bringing about these positive developments within the Bay watershed.

Over 600 permits per year have been issued since the passage of the ordinance, at least 1,063 in 1999 alone. The number of permits is an indication of the increased growth in the county. The objective of the ordinance however, was not to restrict devel-

opment and economic growth within Grand Traverse County but to ensure that all new development consist of minimal impervious cover and proper BMPs to control runoff. Therefore, all developers seeking permits are required to minimize land disturbances in environmentally sensitive areas, preserve wetlands, adhere to additional requirements for development on sites with clay type soils, and practice other conservation site design techniques where practical. Without the ordinance requirement for onsite detention and stormwater runoff controls, the county believes there would have been many additional problems related to flooding and nonpoint source pollution loadings to local water bodies.

## County Organization

The Grand Traverse County Soil Erosion and Stormwater Runoff Control Ordinance is truly a community ordinance, conceived and written by local people. It was developed locally by a Stormwater Management Advisory Committee whose participants included:

- The County Drain Commissioner
- Township Officials
- Michigan Department of Natural Resources Staff
- U.S. Department of Agriculture Staff
- Engineers
- Architects
- Builders
- Concerned Citizens

As stated before, the ordinance is implemented through the Grand Traverse County Drain Commissioner. The Grand Traverse County Drain Commissioner, in cooperation with local, county, and state officials, addresses both stormwater management and soil erosion controls through enforcement of the 1992 ordinance. Both the county and townships are involved in assuring that the requirements of ordinance are adhered to in each development proposal. Though the county issues stormwater permits directly, if a development proposal is submitted to the township planning commission without required stormwater permits, the planning commission will reject the proposal until proper permits are obtained.

## Funding and Costs

The Grand Traverse County Board hired a consultant to incor-



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porate the guidelines developed by the Stormwater Management Advisory Committee and develop the ordinance document. The cost for this effort was \$10,000. At this point, it is difficult to assess the cost of enforcing the ordinance. General oversight of the soil erosion and stormwater runoff control permit applications and plans are administered in the county drain commissioner’s office as normal day to day operations of the office. The ordinance has led to a reduction in flood mitigation costs incurred by the county.

## Accomplishments and Lessons Learned

It is well documented that stakeholder input in any environmental or watershed-wide resource management project is a key element for its success. Community leaders should be educated on programs and techniques that protect local environmental resources and be involved in the early stages of a project that intends to protect those resources.

The ordinance was conceived and written by local government officials and community represen-

tatives. The involvement of township officials was important because they would play a major role in the eventual enforcement of the ordinance.

## Advice for Other County Officials

Michigan is the only state in the nation in which each county has an elected drain commissioner to regulate stormwater runoff. Whether or not a county has such a position, it is important for government officials and community leaders to view stormwater management as a priority. A county government should designate a person or office to directly address stormwater management and erosion/sediment control issues. In addition, local government officials and community leaders need to understand the relationship between land use and water quality. By involving community representatives early in the process and informing them of the causes and costs of water resource depletion, a county can increase the acceptance for the use of regulatory tools to address stormwater runoff.

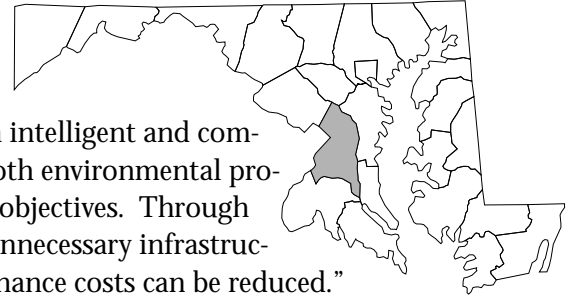
## Notes

<sup>1</sup>National Geographic “Our Polluted Runoff,” John G. Mitchell, February 96.

<sup>2</sup>For more information on Grand Traverse County Watershed Management Program, please see the profile of Grand Traverse County’s Stormwater Management Program in NACo document Leadership in Watershed Management—The County Role, prepared by Jim Kundell, June 1999.

<sup>3</sup>Purpose—Grand Traverse County Soil Erosion and Stormwater Runoff Control Ordinance, 1992.

# Low-Impact Development



## Opening Statement

“Low Impact Development is an intelligent and common sense approach to achieving both environmental protection and economic development objectives. Through careful planning and reduction of unnecessary infrastructure, both construction and maintenance costs can be reduced.”

*Wayne K. Curry  
County Executive  
Prince George's County, MD*

"Low Impact Development (LID) demonstrates how Prince George's County is leading the nation in developing new technologies to protect precious ecological resources. LID clearly proves that good environmental design makes good economic sense."

*Samuel E. Wynkoop, Jr.  
Director of the Department of Environmental Resources  
Prince George's County, MD*

## Demographics

### Population:

Prince George's County  
770,633 (July 1, 1997—  
U.S. Bureau of the  
Census)

The county population  
is expected to grow  
23% by year 2020.<sup>1</sup>

### Type:

Suburban/Urban/Rural

### Region:

U.S. Mid-Atlantic

### Key Contact:

Larry Coffman,  
Associate Director,  
Programs and  
Planning Division  
Department of  
Environmental  
Resources

Prince George's County  
Inglewood Center 3,  
9400 Peppercorn Pl.  
Largo, MD 20774

## Background

Prince George's County is located in central Maryland, immediately northeast of Washington DC and is 37 miles south of Baltimore, Maryland. Prince George's County's political boundaries are delineated by the Patuxent River to the east and the Potomac and Anacostia Rivers to the west and the Mataponi to the south. Throughout the County's 350-year history its rivers and water sources have played an important part in its economic development, culture, recreation, quality of life and sense of place. The protection of the county's waterways is vital to the preservation of its water resources heritage and the continued use and enjoyment of this resource.

The county is 487 square miles and consists primarily of suburban and urban development. However, approximately 15 percent of the coun-

ty is zoned for rural uses. These rural areas are located along the eastern and southeastern borders of the county. The county does not provide sewer services in these areas which have been zoned for large lot estates (2 acres or larger) and agricultural use. The county also contains a significant amount of parklands, open spaces, and stream valley parks, encompassing approximately 18,000 acres.

Prince George's County is culturally and ethnically diverse and also includes a broad cross-section of businesses, government centers (Andrews Air Force Base, Goddard Space Center, Beltsville Agricultural Research Center and the Census Bureau), and educational institutions (University of Maryland). Much of the Prince George's County's economic growth can be attributed to its proximity to the nation's capital attracting federal contractors and installations.

## Impetus

In 1988, Prince George's County Department of Environmental Resources (PGDER) began researching alternative best management practices (BMPs) for stormwater management. The county was looking to replace some of the aging structural stormwater BMPs because of the growing costs to maintain them and the fact that many of these facilities were failing to protect the physical and biological integrity of receiving waters within the county. The county intended to implement less costly but more effective solutions to stormwater management.

The county began working with developers to incorporate bioretention (now commonly referred to as "rain gardens") in various commercial developments throughout the county. The objective of bioretention is to utilize existing green space on the site to treat "first flush" runoff from a storm or heavy rain. The success of rain gardens as a stormwater management practice led to the use of this technique to store and treat runoff from residential development sites, as well.

PGDER further discovered through some of its locally developed models that rain gardens significantly reduced stormwater runoff from recently developed sites, much more than originally anticipated. This led PGDER in 1994 to explore changing the form and function of developed sites through intelligent site planning and design of landscape features to control stormwater runoff and mimic runoff levels of a site before

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## Focus

With growing concern about the limitations of conventional technologies and to address the changing objectives of watershed protection, Prince George's County Department of Environmental Resources began exploring alternative stormwater management practices in the late 1980s. They created a technique, Low Impact Development, which incorporated a wide array of micro-scale stormwater management strategies on a developed site. The reasons for producing this new site design technique were:

- To improve state of the art stormwater management and provide superior protection to receiving waters and wetlands
- To reduce infrastructure planning, design, construction, and maintenance burdens for the public, developers, and the county
- To develop new technology to retrofit existing urban development and highways.

In 1997, Prince George's County Department of Environmental Resources released the Low Impact Development Design Manual demonstrating how this new technique uses natural features of a site to both reduce and treat stormwater runoff from that site.

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development. The result was the formulation of the Prince George's County Low Impact Development (LID) approach to Stormwater Management.

## Description

In Prince George's County, LID did not represent a new mandate or regulation. County officials believed that LID would benefit the public, local governments, developers, and the environment through reduced costs resulting from less site grading, minimal infrastructure construction and stormwater facility maintenance, and reduced need for environmental mitigation.

Traditional stormwater management technologies attempt to reduce the impact of runoff to downstream water bodies by using large structural facilities and end of pipe treatment practices such as

stormwater ponds. The problem with these facilities is that the natural hydrology of a site is significantly altered. LID minimizes site alteration as much as possible by incorporating natural landscape design techniques to control runoff both during and after development. The natural landscape is used not only to reduce runoff from a site, but also to treat and filter the runoff that is discharged from the site. LID practices are small-scale and uniformly distributed throughout the developed site to more closely mimic its natural hydrology. LID management practices can be organized into four major categories:

- **Runoff Prevention**—Measures designed to minimize alterations to the site that would increase the amount of runoff during a rainstorm such as strategic clearing and grading practices, saving

groundwater recharge areas and highly pervious soils, using vegetated buffers, engineered landscaping, and eliminating curbs.

- **Small Scale Retention**—Facilities that store runoff, typically for drainage areas up to 2 acres, and have no positive outlet or release. These include bioretention, dry wells, cisterns, and rain barrels.
- **Small Scale Detention**—Facilities that temporarily store a portion of the increased runoff volume and release it through a measured outlet such as filter strips, grassed swales, and level spreaders.
- **Pollution Prevention Planning**—Pollution prevention through public education, implementation of site maintenance and management plans, and industrial process changes, is an integral part of low-impact site develop-

ment. Pollution prevention programs complement any existing large or small-scale structural control and will help promote citizen stewardship and local participation in environmental restoration and enhancement efforts.

In order for this approach to be successful, the developer must educate the property owners on maintaining these BMPs. This includes educating the property owner on how to prevent the entrance of pollutants into stormwater runoff. Prince George's County has established a six-step process to assist developers in relaying this information to the property owner. The county will continuously provide various services to the developer including technical assistance, annual training, free design manuals and technical updates on research.

## Results

The first prototype development "Somerset" is about 50 percent complete. At this point, homes are selling well and there have been few drainage problems. The LID techniques resulted in a \$4,500 per unit savings due to the reduction in required structural and drainage facilities. There are also two more developments in the design stage. Due to the apparent financial advantages of LID technique, some developers have requested the county eliminate LID restrictions and further expand the use of LID techniques. Currently LID can be used only in larger lot residential and commercial/industrial developments.

One of the more interesting results of LID technology is that its micro-management principles and strategies can easily be applied to urban stormwater management retrofit and redevelopment. Through county, state, and regional awareness and education efforts, Prince George's County has provided LID technology information to business associations, federal agencies, property owners, state agencies, community groups, and environmental associations. What has happened is that armed with LID tools each of these institutions and organizations has integrated LID practices into the long-term retrofit and restoration programs.

As an example, the Maryland State Highway Administration has undertaken a program to use bioretention treatment technology as part of their neighborhood revitalization program. Through a joint effort with the University of



Maryland and the Low Impact Development Center, the highway administration will transform urban streetscape features (tree boxes, medians and sidewalks) in multifunctional urban runoff treatment devices.

EPA is also recommending LID as a stormwater management technique to meet the National Pollutant Discharge Elimination System (NPDES) phase II requirements and has sponsored the development of a national LID manual. EPA region III is studying the use of LID to retrofit highly urbanized areas to control combined sewer overflows. Some communities around the nation are researching the use of LID techniques and bioretention for stormwater management. For additional information, please see web sites listed in the resource section of the document.

## County Organization

PGDER/Programs and Planning Division (which runs the county stormwater management program) organized a multi-agency task force (comprised of all county officials involved in land use planning, zoning, transportation, and building codes) to develop the basic principles and practices for the use of LID. Including all the agencies in this process helped gain their support for the new technology.

County elected officials, the county executive and county council, endorsed LID through approval of the capital budget which contained funding for LID research. PGDER staff briefed both political bodies on the technology of LID in the early stages

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## Resources

- [http://www.dakotaswcd.org/lid\\_fs.htm](http://www.dakotaswcd.org/lid_fs.htm)
  - <http://www.co.ba.md.us/bacoweb/news/home/news/html/lid.htm>
  - [http://www.dof.state.va.us/rain\\_gardens.htm](http://www.dof.state.va.us/rain_gardens.htm)
  - <http://www.porttowns.com/special/rain.html>
  - <http://www.dakotaswcd.org/newsnotes/1999fal/nnf9904a.htm>
  - <http://www.pacd.org/bmphandbook/practices/bioretention.html>
  - <http://www.lowimpactdevelopment.org>
  - <http://www.epa.gov/owow/nps/lidnatl.pdf>
  - <http://www.epa.gov/owow/nps/lidlit.html>
  - <http://www.canr.uconn.edu/ces/nemo/jordancove.html>
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to obtain funding for preliminary research. The Maryland National Park and Planning Commission (Prince George's planning board) had to endorse LID in order to incorporate LID techniques in the site planning process.

The county review process for developments with LID practices is essentially the same as developments with conventional stormwater BMPs. One significant difference is that numerous small-scale BMPs are distributed throughout the site unlike conventional systems that require one or two big facilities. In Prince George's County, close coordination with the county Transportation and Public Works Department is required because of the downsized roadways and the potential for some of the BMP functions to be located in the right of way. The county can effectively promote LID because PGDER oversees the stormwater management program for the entire county, including all municipalities except for the city

of Bowie that manages its own program. The Prince George's County LID manual outlines the 9 steps in the development review process including agency coordination, plan requirements, and potential requirements for waivers and variances. The process is detailed on page 12.

## Funding

Funding of the computer modeling work and other research was provided through a separate county stormwater tax, EPA grants, state of Maryland grants, developer contributions, University of Maryland in-kind services, and technical assistance from a variety of federal and state agencies. The subsequent promotion of LID and the education program is funded through the same mechanisms. PGDER officials are also periodically asked to conduct training seminars around the nation and in the Chesapeake Bay region. No additional staff was needed to implement LID, howev-

er, extensive training for developers, contractors, inspectors, review staff, and consulting engineers was required. Maintenance of LID facilities is relatively simple and does not require any specialized training or equipment. Routine landscape care is usually all that is required.

## Accomplishments and Lessons Learned

Though PGDER and other county officials were pleased with the early successes of using LID for reducing and treating stormwater runoff, a number of roadblocks had to be overcome. Regulating agencies, the development community and the public all had numerous concerns about the use of this new technology. The LID design manual represented the culmination of four years of work to address these concerns. Important in the promotion of LID, was having a key proponent who had the authority and ability to champion this new technique.

Continued education and training of elected officials, developers, consultants, and the regulatory community is essential in assuring overall acceptance of LID. This means demonstrating the marketability of green development, the effectiveness of LID, and the cost benefits of the LID approach. In addition, the county must have a public education process that informs property owners how to prevent pollution and maintain on-lot BMPs. Generally, both developers and environmentalists have supported LID.

## Advice for Other County Officials

Using LID approaches instead of conventional, large-scale systems requires changing conventional thinking and existing codes

that recommend use of structural BMPs. Jurisdictions with stormwater programs must re-educate regulatory staff, engineers, developers, elected officials and other appropriate stakeholders. Managers of established stormwater programs

## *Development Review Process*

**Step 1**—LID planning and site analysis. Site feasibility study and initial contact with review agencies such as PGDER and the county's Department of Public Works and Transportation (PGDPWT), Department of Health (PGDOH) as well the Maryland-National Capital Park and Planning Commission (M-NCPPC, the local planning and zoning agency) and Prince George's County Soil Conservation District (PGSCD).

**Step 2**— Pre-preliminary planning phase. Optional preliminary review phase to identify opportunities and potential problems with review agencies such as PGDER, PGDPW&T, and M-NCPPC.

**Step 3**— Stormwater management concept phase. Review and approval of preliminary hydrologic analysis and BMP selection. PGDER

**Step 4**—Preliminary plan/subdivision review and approval. Detailed site plan/specific design plan review and approval if required by zoning ordinances. Site design issues for residential development. M-NCPPC.

**Step 5**—Technical review phase. Technical review of calculation and structural details. PGDER.

**Step 6**—Fees and bonds. Determination of final construction and bonding fees. PGDER and M-NCPPC

**Step 7**—Construction/inspection phase. Determination of proper construction and stabilization of BMPs. PGDER.

**Step 8**—Public outreach and education. Maintenance materials and education for property owners and property managers. PGDER.

**Step 9**—Maintenance. Ongoing upkeep and improvement of facilities. PGDER

The property owner maintains most of the LID practices. Any public facilities (those that serve more than one property) are maintained by the PGDPW&T.

may resist change, unless they are motivated by economic necessity, citizen demands, or other factors.

The effectiveness of LID design techniques necessitates thorough education of developers and the general public on the proper use of the technology. It may be easier for jurisdictions that do not currently have stormwater programs to implement LID techniques than ones that have already made large financial investments in standard large scale systems.

Through the use of more effective and innovative technologies, it is possible to achieve environmental protection objectives and pro-

mote economic development. Better water resources protection does not have to cost more, but implementing any new innovative technologies can be challenging due to the regulatory, technical and institutional obstacles.

The most challenging roadblocks are changing the attitudes, cultures, policies, philosophies and procedures within our existing institutions. This requires persistence and dedication with someone taking responsibility to ensure that change can and will happen.

The most successful stormwater management programs have had some champion innovation

that became the agent of change. To implement change through successful technology is worth the investment of time and effort because the result will be superior environmental protection at a reduced cost and a higher quality of life for all.

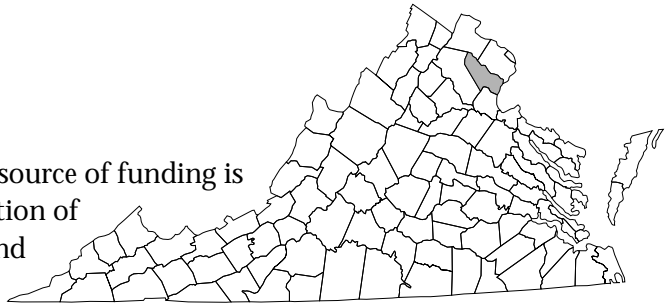
### *Notes*

<sup>1</sup>Source Round 6 cooperative forecasts Maryland National Capital Park and Planning.

# Stormwater Management Fee

## Opening Statement

“Providing a dedicated source of funding is integral to the implementation of stormwater management and water quality programs in Prince William County.”



*Sean Connaughton  
Chairman, Prince William County Board of Supervisors  
Prince William County, VA*

## Demographics

### Population:

Prince William County  
279,845 (1999 estimate)  
Projected to grow to  
over 384,000 persons  
by 2020.

### Type:

Suburban/Urban

### U.S. Region:

Mid-Atlantic

### Key Contact:

Oscar Guzman  
Chief, Watershed  
Management Branch  
Department of Public  
Works  
4379 Ridgewood Center  
Drive  
Prince William, VA  
22192-5308  
703 792-7070  
703 792-7012 (fax)  
oguzman@pwcgov.org

## Background

Prince William County is located in Northern Virginia approximately 35 miles southwest of Washington, DC and sits adjacent to the Potomac River. The combined area of Prince William County and the independent cities, Manassas and Manassas Park, is 360 square miles. Federal land accounts for 18.8 percent of the total area and includes Quantico Marine Corps Base, Manassas National Battlefield Park and Prince William Forest Park.

Approximately 32.6 percent of the workforce in Prince William County are in retail and wholesale trade, with the Potomac Mills Outlet Mall being the biggest mall in the county.

Approximately 22.8 percent of the work force are in government services and 21.7 percent in the service industries. The number of housing units in the County grew over 30 percent since 1990. Of the approximately 97,671 housing units in the county as of December 1999, the housing stock consisted of 55.1% single family detached units, 26.8% townhouses and 18.1% multi-family structures.

## Impetus

In 1992 Virginia Department of Environmental Quality notified the county that federal and state regulations would require the county to implement management programs to control all forms of nonpoint source pollution including stormwater runoff from existing and new development. These regulations included:

- US EPA National Pollutant Discharge Elimination System (NPDES) stormwater program,
- the Virginia Chesapeake Bay Preservation Act,
- the Virginia Erosion and Sediment Control Regulations, and
- the Virginia Stormwater Management Act).

Previously, Prince William County depended on general fund revenues and a capital improvement projects' (CIP) budget to support its stormwater management program. To meet the requirements of the new regulations, public works staff began working with the county's finance, management and budget staff to identify a continuous funding source that would support a

stormwater management program. Staff held several workshops with the county executive and county elected officials to discuss funding options by assessing the benefits of each option and the impediments to implementing each option.

The workshops considered funding options such as taxes, long-term borrowing (general obligation and revenue bonds), developer-related charges, and a stormwater utility (stormwater management fee). An increase in the tax rate was not considered because of potential impacts on economic development and other political considerations. Though long-term borrowing can provide substantial funding in a short time, it was rejected because of its impacts on the county's debt capacity and credit rating, as well as the fact that it typically cannot be used to fund operation, maintenance, or repair activities.

In 1993, the Prince William County Board of County Supervisors authorized the staff to hire a consultant to conduct a feasibility study on a stormwater management fee. In the meantime, county staff made several presentations to various local civic and community organizations to explain the needs and benefits of implementing a fee to support the watershed management program. The board adopted the fee in March of 1994.

## Description

Prince William County's Watershed Management programs are supported in the following ways: stormwater management fee (stormwater utility), development

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## Focus

Prince William County's Stormwater Management Fee provides a dedicated source of funding to support the county's Stormwater Management program. Due to state and federal regulations, Prince William County was required to implement a program to improve stormwater runoff from existing and new development. Prince William County integrated the requirements into its Watershed Management Program but funding levels varied because the program was funded through the county's general fund. The county needed a stable, reliable and equitable source of funding to meet both the stringent regulations and local needs of the county's watershed and stormwater management programs. A breakthrough occurred in the early 1990s when the Virginia General Assembly provided a new funding mechanism for all Virginia localities, the stormwater utility. The new state code allowed local governments to implement service charges to finance stormwater-related activities.

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fee, and grants and cooperative agreements.

• **Stormwater Management Fee (stormwater utility)**—The fee is assessed on all developed properties and charged to the owners of the properties. The rate structure is based on the amount of impervious area on a property. A "Base Unit" represents the impervious area of a typical single family home in the county and was estimated to be 2,059 square feet. For simplicity, the county established a flat rate for residential properties based on the "Base Unit" as follows:

- Single families are charged at \$18 per year.
- Townhouses and condominiums pay \$13.50 per year.
- Apartments are charged at \$13.50 per dwelling unit.

On the other hand, nonresidential properties are charged as single family equivalents but may pay a higher rate if the level of impervious surface is higher than one base unit. For example, if a non-residential property has 10

times the impervious area of a typical single-family home (one base unit), the property owner pays 10 times the single-family fee. Therefore, nonresidential properties are charged at \$18/per year/base unit. Tax Exempt properties are also treated as nonresidential properties.

Undeveloped properties are exempted from the fee. Properties owned by federal, state and local government agencies are also exempt when those agencies own, operate and maintain their own stormwater management facilities.<sup>1</sup>

Revenues from stormwater management fee are dedicated solely to the following:

- satisfy NPDES requirements;
- drainage maintenance
- improve water quality in local streams;
- protect the Chesapeake Bay;
- maintain stormwater management facilities;
- construct watershed improvements;
- stream restoration;

- protect wetlands;
- increase enforcement of erosion & sediment control regulations;
- monitor water quality;
- drainage improvements; and
- partially fund Virginia Cooperative Extension, Prince William Soil & Water Conservation District and the Occoquan Watershed Monitoring

Fee adjustments are available to owners of developed non-residential property when the owner provides stormwater management onsite and has entered a stormwater maintenance agreement with the county. The fee adjustment is based on proportion of the controls on site compared to the level of impervious surface. The non-residential property owners are also eligible for adjustments when they participate in a pollution prevention or stormwater quality protection program. Maximum adjustment is 50 percent of the fee.

A stormwater assessment system calculates stormwater utility revenues and helps users answer customer related questions related to the basis of the fee. The county's used a geographic information system (GIS) program to calculate the impervious area of each developed parcel within the county and to develop the base unit. The real estate assessment system provided information on account numbers, owner names and addresses, property addresses, and land use. The stormwater assessment system ties these systems together and generates a stormwater management fee for each owner.

• **Development fees**—Fees are collected from the developers when a plan is submitted to the county for review. The fee is based on the size of the development and the complexity of the drainage system. These fees are used to fund plan review activities and administrative requirements. Watershed Management Program staff review plans for compliance with the county's environmental ordinances and regulations.

Once a plan is approved the developer pays additional fees to fund inspection of stormwater facilities— drainage systems, and enforcement of erosion and sediment control regulations. The developer pays a prorated share of the cost of a regional stormwater facility serving the site when an on-site stormwater management facility is not feasible or when a developer obtains a stormwater management waiver. The prorated share is based on impervious cover of the site and proposed land use type.<sup>2</sup>

• **Grants and Cooperative Agreements**—Funds collected from the stormwater management fees and development fees are used to fund the operations of the Watershed Management Program and program specific projects. However, grants and cooperative agreements with state, federal and private entities are used to complement these revenues by funding special projects or activities.

## Results

The stormwater management funding mechanisms have provided the county with the necessary resources to implement a compre-

hensive program that meets regulatory requirements and protects the local watersheds. A dedicated funding source has allowed the county to undertake more projects that improve water quality and assist more citizens with drainage problems.

## County Organization

The Public Works Director initiated the process and worked with the county Finance, Management and Budget staff. The County Executive directed the staff to conduct a preliminary feasibility study on various funding mechanisms. County staff periodically briefed the Board of County Supervisors on the funding options at various stages. The board authorized county staff to hire a consultant to conduct a detailed feasibility study in 1993. In the meantime, staff made presentations to citizen groups, homeowners associations, civic associations, the local chamber of commerce, the Northern Virginia Building Industry Association, etc., on the findings in the feasibility study. The public hearing for the adoption of the fee was duly advertised.

Though the local chamber of commerce and building industry did not openly endorse the adoption of the fee during the public hearings, the development community did not actively oppose it either. The staff driven presentations on the findings of the study may have prompted the development community's decision not to oppose it. The Board adopted the fee in March of 1994 after the public hearing.

Prince William County adopted an ordinance to implement the

stormwater management fee in accordance with the enabling legislation of Virginia, Section 15.1-292.4, and it was incorporated into the county code. The Board of County Supervisors was very receptive to implementing a fee to address upcoming stormwater and water quality needs of the county. Unpaid fees accrue interest, and the county may recover the unpaid charges and interest by action of law or by a suit through a lien against the property.

## Funding and Costs

The Department of Public Works designed the program and implemented it with help from the Finance Department. The Watershed Management Branch has 25 staff members.

Expenditures include:

- Stormwater Management Fee - \$2.2 million/year
- Development Review Fee - \$1.2 million/year
- Grants - \$80,000/year

The County did not hire any new staff to administer the fee. The fee is billed annually as a line item on the first half of a property owner's real estate tax bills. The Treasury Management Division of the County collects the bill. The county's existing GIS program was used as a tool to capture the impervious areas, establish a Base Unit and assess the fee.

## Accomplishments and Lessons Learned

The county did not face any turf battles in adopting a fee. It was important that the Public Works staff kept the County Executive up to date on any devel-



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opments and consequently the County Executive kept the Board members constantly informed. In addition, the staff educated the public, business associations and association groups. Open discussion among everyone involved helped in the adoption of the fee, and as a result, the board members were convinced of the need to establish a dedicated revenue source for the stormwater management program.

The county's effort of educating local citizens, businesses, children, and schoolteachers on the stormwater management fee has

made local citizens more aware of the importance for pollution prevention and sustaining local water resources such as lakes, streams, and rivers. The fee has allowed the county to construct several best management practices for stormwater retrofits to improve water quality in older urbanized sections of the county. The fee has also been funding chemical and biological monitoring programs within the county. Though there is currently no quantitative monitoring data to indicate that implementation of the fee has directly improved the water quality, the

county has been able to undertake stormwater management programs that would not have been possible without the fee.

### Advice for Other County Officials

Counties adopting a fee should determine whether the annual increases in revenue (through new accounts) is enough to offset inflationary and other stormwater management program cost increases. The rate structure should be adopted in such a way that the stormwater management

program can function without frequent rate increases.

One critical component, as stated above, is the importance of keeping the public informed during the entire process of establishing a stormwater management fee and obtaining feed back on the different policy issues. Newspaper articles and cable television news releases are some of the most cost-effective ways to keep the public informed and feedback can be obtained through meetings with various interest groups.

### Notes

<sup>1</sup>More information on how the fee is assessed is included in the NACo/ICMA document Protecting Wetlands, Managing Watershed: Local Government Case Studies, "Prince William County Virginia—Watershed Management Program," 1999.

<sup>2</sup>The developer is asked to pay his share of the estimated construction cost of a regional storm water facility (pro-rata share). The pro-rata share is based on the proportion of drainage area from his/her development, compared to the total drainage area, served by the regional facility. However, the pro-rata share contribution cannot exceed the actual construction cost for an on facility serving just his/her development.