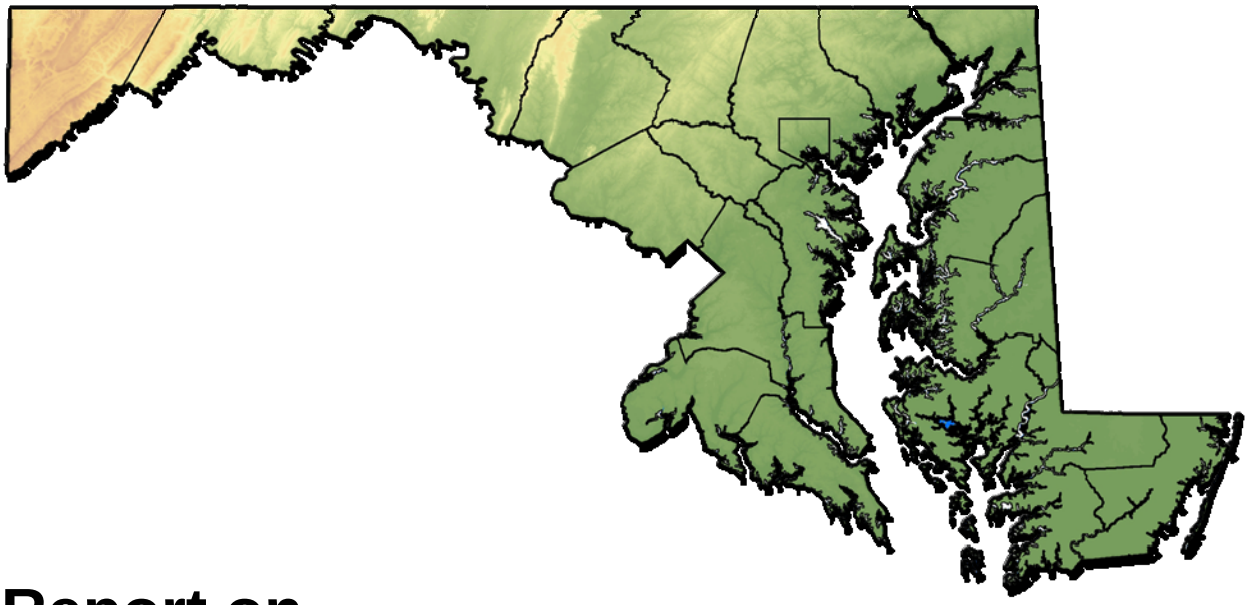

Report on
Stormwater Management Act of 2007

Environmental Matters Committee
Education, Health, and Environmental Affairs Committee

May 2008

MARYLAND
Department of the Environment

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Table of Contents

I. Executive Summary…… 1

II. Introduction…….. 4

III. Background…….. 4

IV. TMDLs and NPDES…… 7

V. State Funding…… 8

VI. Stormwater Utilities……... 10

VII. Summary…….. 13

VIII. References…….. 15

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Report on Fee Systems for Stormwater Management

Executive Summary

On April 24, 2007, Governor Martin O'Malley signed the "Stormwater Management Act of 2007" (Act), which became effective on October 1, 2007. The Act requires that Environmental Site Design (ESD), through the use of nonstructural best management practices and other better site design techniques, be implemented to the maximum extent practicable. Charged with implementing the Act, the Maryland Department of the Environment (MDE) will be developing guidance including changes to regulation and the current model stormwater management ordinance. MDE is also required to evaluate options and a schedule for a stormwater management fee system necessary to improve the enforcement of the provisions of Title 4, Subtitle 2 of the Environment Article, specified as follows:

> **SECTION 2. AND BE IT FURTHER ENACTED, That:**
> **(a) The Department of the Environment shall evaluate options for a stormwater management fee system and an appropriate schedule of fees necessary to improve the enforcement of the provisions of Title 4, Subtitle 2 of the Environment Article.**
>
> **(b) On or before December 1, 2007, the Department shall report its findings to the House Environmental Matters Committee and the Senate Education, Health, and Environmental Affairs Committee, in accordance with § 2–1246 of the State Government Article.**

Stormwater management historically has been financed with general revenues from property taxes. Reliance on property taxes, however, is often inadequate. Since 1973, jurisdictions across the Country have begun implementing stormwater utilities as an alternative source of revenue. Today over 500 stormwater management utilities are in operation nationwide.

Municipal stormwater management for local governments has evolved over time from an urban flood control function, to a water and resource management function, to an environmental protection and regulatory function. This evolution has forced changes in how stormwater systems are planned, designed, constructed, operated, and financed. More specifically, the stormwater function has evolved from a basic capital construction and maintenance program supported primarily by local taxes, to a program of integrated water resource management, environmental enhancement, and

recreational services requiring a multi-faceted benefit base finance system ("Guidance for Municipal Stormwater Funding," January 2006).

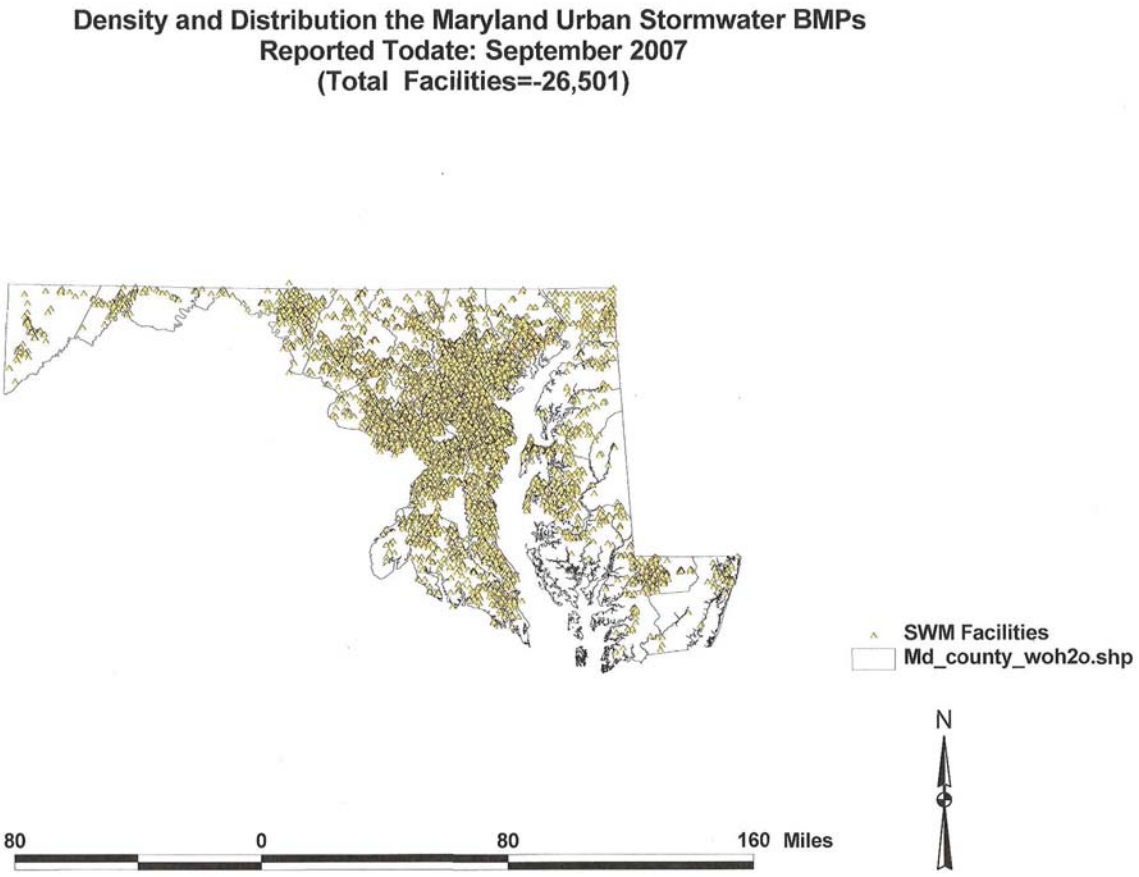
The primary objective of this report is to evaluate current options for stormwater management fee systems available in Maryland. The State has recognized the need to establish dedicated fund sources since the early 1990's. In 1992, the General Assembly enacted enabling legislation that allows localities to developed a "system of charges" to finance stormwater programs. To date three local jurisdictions have develop a stormwater user charge. The City of Tacoma Park implemented a Stormwater Utility, Montgomery County recently developed a "Water Quality Protection Charge" that appears on individual property tax bills and pays for the structural maintenance of stormwater facilities, and most recently the City of Rockville passed legislation to implement a stormwater utility fee. Also, Prince George's County uses an Ad-Valorum Tax that provides funding for many of the County's environmental programs and capital improvements.

MDE continues to support the development of a "system of charges" by local governments to provide the funding needed to meet local obligations under State and federal law. MDE offers financial assistance through low interest loans involving the State Revolving Loan Fund with a delayed payment plan contingent upon starting a "system of charges." Technical assistance is also provided through informational papers such as "Financing Stormwater Management: The Utility Approach", "Potential Revenues from Stormwater Utilities", "Model Ordinances for Stormwater Utility", to assist in the development of a regional or watershed Stormwater Utility. The main concern with developing a "system of charges" is that the public views it as a tax. Therefore, implementing any dedicated funding option is extremely difficult. However, if overall efforts toward restoring and protecting surface waters, the Coastal Bays, and Chesapeake Bay are to be successful, State and local stormwater management programs must be properly funded to meet the requirements of National Pollutant Discharge Elimination System municipal permit, and Total Maximum Daily Load (TMDL) programs.

To meet the State's obligations under the law, MDE relies on approximately $280,000 in general funds to administer the State's stormwater management program. These monies support oversight of locally implemented programs, and State and federal construction project approval. This equates to approximately 4 full time equivalent (FTE) employees that are involved with these aspects of the program.

To properly administer the State's stormwater management program and meet the intent of the new "Stormwater Management Act of 2007" MDE would need 8 additional FTE's (e.g., 5 - Water Resource Engineers and 3 - Natural Resource Planners) at an approximate cost of $610,000. These additional resources would provide technical oversight of affected localities, conduct plan approvals, continue research and ensure innovation of ESD, conduct training sessions, and evaluate local implementation.

At the present time, MDE does not have the authority under State law to implement a State system of charges to support these additional activities and must rely upon existing general funds allocated by the Governor and approved by the legislature.



Introduction

Untreated stormwater runoff from urban development is a major source of pollution to local streams, rivers, and the Chesapeake and Coastal Bays. To achieve targeted reductions in nutrient and sediment loads to receiving waters and protect stream channel stability, stormwater management is required of new and redevelopment projects. The law mandating stormwater management requires local implementation. Also, other regulatory programs like the National Pollutant Discharge Elimination (NPDES) stormwater permitting process and Total Maximum Daily Load (TMDL) implementation have placed additional financial burdens on both local government and the State of Maryland. These programs have historically been financed with general revenues from property taxes and developer fees. An alternative to property taxes is the creation of stormwater utility charges, which are "user" fees paid by owners of properties in proportion to the amount of runoff generated from their properties.

Background

The State of Maryland has recognized the need to establish dedicated funding (e.g. Stormwater Utilities or Fee Systems) since the early 1990's. In 1992, MDE helped enact enabling legislation that allows localities to develop a "system of charges" to finance stormwater programs. MDE also provides financial assistance through the Stormwater Pollution Control and the Small Creeks and Estuary Cost-share Programs (e.g., demonstration projects, retrofit existing developments with BMP's, and restore degraded stream segments). To date, three local jurisdictions have developed a stormwater user charge. The City of Tacoma Park implemented a "System of Charges," Montgomery County recently developed a "Water Quality Protection Charge" that appears on individual property tax bills and pays for the structural maintenance of stormwater facilities, and most recently the City of Rockville passed legislation to implement a stormwater utility fee. Also, Prince George's County uses an Ad-Valorum Tax that provides funding for many of its environmental programs and capital improvements.

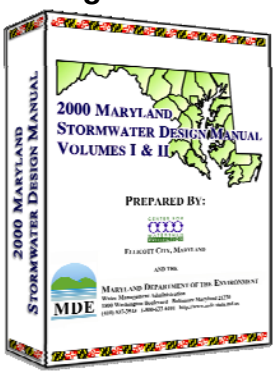
Several local governments have been interested in developing a "Stormwater Utility." Anne Arundel County, Baltimore Metropolitan Council (BMC), Baltimore City, Carroll, and Howard Counties have all entertained stormwater user fees some going as far as holding public hearings. MDE strongly supports the development of dedicated funding sources to implement stormwater programs and has offered the use of low interest loans through the State Revolving Loan Fund (SRF) with delayed payment plan contingent upon starting a "system of charges".

Urbanization changes the hydrologic equilibrium of the land surface and the receiving estuarine environments. These changes include: increases in peak flow and total volume of stormwater runoff; accelerated stream channel erosion; decreases in receiving stream baseflow; and decreases in water quality and the stream environment. Efforts to control these conditions in Maryland have resulted in statewide programs for erosion and sediment control, stormwater management, and floodplain management.

The original Stormwater Management Act was passed by the Maryland General Assembly in 1982. The primary goal of the State and local programs established by this law is to "maintain after development, as nearly as possible, the predevelopment runoff characteristics." Regulations promulgated by the State in 1983 define this to mean, for quantity, on-site control of the 2 and 10 year storm events. In addition, a list of preferred management practices was established for water quality control. Pursuant to the list, local officials responsible for plan review were required to investigate the feasibility of infiltration of the first half inch of runoff – the so-called first flush. Infiltration was preferred because it offered the highest potential to reduce pollutants such as sediment and phosphorus, address groundwater recharge, maintain baseflow, and mitigate thermal impacts. When infiltration proved infeasible, other practices such as shallow depressions, retention, and detention ponds could be used. All counties and incorporated municipalities in Maryland were required to adopt ordinances by 1984 that established programs to implement these controls on every development that disturbed more than 5,000 square feet of land.

State obligations under the initial stormwater management regulations included providing technical guidance, reviewing and approving stormwater plans for State and federal construction projects, and evaluating the competency of local governments' runoff control programs. After more that a decade of oversight, MDE discovered several technical weaknesses and programmatic shortcomings that needed to be addressed. From a technical perspective problems that surfaced included the inability to implement and sometimes the failure of infiltration throughout portions of the State, poor water quality management, and continued stream channel instability below new development controlled by stormwater BMPs. Programmatically, inconsistent and liberal waiver policies, poor construction inspections, disparate as-built plan processes, and limited long-term BMP maintenance all contributed to a need for stormwater program improvements.

The process of improving Maryland's stormwater management program began in 1993 when MDE distributed for comment draft modifications to the existing Code of Maryland Regulations (COMAR). Over the next seven years, a complete overhaul of the State program took place, culminating in the adoption of the "2000 Maryland Stormwater Design Manual, Volume I and II" (Design Manual). Accompanying COMAR revisions changed the direction of runoff control in Maryland by eliminating the preferred practices list in favor of a better, more balanced BMP approach; instituting a redevelopment policy that eliminated water quality waivers for projects in existing developed areas previously waived under old policies; and placed additional responsibilities on local stormwater management programs for plan reviewers, construction inspection, and maintenance enforcement.



As for the nationally recognized Design Manual, not only were many of the previously realized technical problems addressed, but numerous other states used it as a model to develop or improve their own stormwater management programs. The Design Manual changed the structural design policy from a peak discharge methodology (e.g. 2 year, 10 year storms) to a volume-based approach to address a range of storm events (e.g. recharge, water quality, channel protection, and flooding). Additionally, the mandatory preferred practice list topped by the infiltration requirement was replaced with a performance-based suite of structural BMPs more efficient to control new development runoff. Arguably one of the most significant changes made to Maryland's stormwater management program by the Design Manual however, was the introduction of nonstructural technique incentives that can be used to reduce the generation of runoff, thereby reducing the size of structural practices like ponds and constructed wetlands. Until recently, these incentives or ESD techniques have been an option developers and stormwater designers could use to more closely maintain pre-development runoff characteristics and rely less on conventional BMPs.

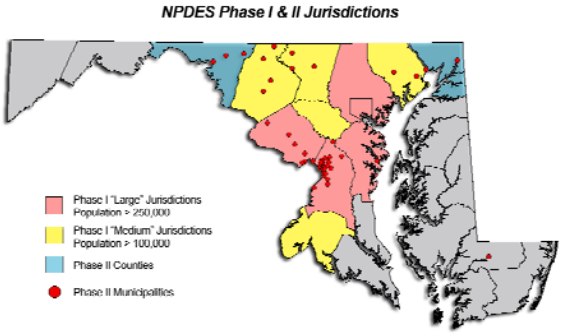
Residential "Raingarden"

With the passage of the "Stormwater Management Act of 2007" (Act) came the latest change to the State program. Simply stated, the Act requires the implementation of ESD, also known as low impact development (LID), to the maximum extent practicable. Therefore, those techniques first contemplated in the Design Manual as design options are now required to be investigated for all new development in the future. Aside from this fee report specified by the Act, MDE is developing presently Design Manual guidance and accompanying COMAR changes to implement ESD. For additional information on how MDE is addressing the Act please see the following web link:
http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/swm2007.asp

TMDLs and NPDES

Aside from stormwater responsibilities found in Maryland laws, federal mandates under the Clean Water Act (CWA) have imposed additional requirements on State and local governments as well. States are required to establish water quality standards for all waters of the State and for waters that do not meet standards, determine the total maximum daily load (TMDL), which is the assimilative capacity of a water body to absorb a particular pollutant and maintain its water quality standard. Should a TMDL be exceeded, various remedies for meeting water quality standards become necessary. These remedies usually fall to State and local governments to implement and range from mandated limits on wastewater discharges and cover crops for fallow agricultural lands to wastewater treatment plant modifications to implement biological and enhanced nutrient removal capabilities. Additional requirements have also been focused on storm drain system pollutant discharge control under NPDES as yet another approach to meet TMDLs.

Stormwater permitting regulations under NPDES were adopted by the U.S. Environmental Protection Agency (EPA) in 1990. These regulations required that stormwater discharge permits be issued to industrial activities and the most densely populated (>100,000) local jurisdictions in Maryland. The latter of these, municipal separate storm sewer system permits, encompassed not only long-standing State water quality programs like sediment control and the stormwater management program described above, but more comprehensive water pollution control mandates specified in the CWA. These mandates include storm drain system outfall mapping and screening, identifying pollutant sources, eliminating illegal storm drain system connections, monitoring rain events, and implementing management programs to address pollution discharged from municipally owned infrastructure. The average cost nationally to apply for an NPDES municipal stormwater permit was $1.0 million in 1993. Since then, the Maryland NPDES stormwater program has, over the course of three 5-year permit terms for eleven entities, evolved into a process where tens of millions of dollars are spent annually by local governments to comply with conditions imposed to improve stormwater discharges. Since the initial regulations were adopted, no federal funding has been provided for direct NPDES stormwater program support forcing both State and local environmental agencies to absorb the cost increases in existing budgets.



State Funding

In 1984, as part of a legislative package known as the Chesapeake Bay Initiatives, the General Assembly authorized two additional programs related to stormwater management. One of these programs was the "Stormwater Grant-in-Aid" Program. This program, which became effective in 1985, allocated approximately $1.5 million annually to local governments to assist them with implementation. Grants-in-Aid were used to fund personnel. To assist local jurisdictions in estimating manpower requirements, MDE provided productivity guidelines. Most funds were used to pay plan review staff and inspectors at the time. The grants program was competitive and yet some local governments chose not to seek support. Funds were eliminated in 1991 as part of a statewide cost containment measure.

The Stormwater Pollution Control Cost-Share Program, which also was authorized in 1984, is a grant program that provides matching funds of up to 75% of the cost of stormwater management retrofits – projects to serve areas developed without stormwater management. The objectives of the Cost-Share Program are to demonstrate BMPs pollutant removal efficiency, cost effectiveness, social acceptability, and maintenance requirements. Grants are awarded competitively; funds for the projects are raised through the sale of State bonds. In total, between 1984 and 2007, the General Assembly has authorized nearly $24 million. Currently, MDE receives $500,000 per year.

Local governments are allowed to collect fees (developer fees) to help support stormwater management program implementation. These fees can cover all aspects of the program (e.g., plan review, inspection, enforcement and maintenance). Counties and municipalities also have the ability to establish a "system of charges" or "stormwater utility." In 1992, MDE helped enact enabling legislation that allows localities to develop a "system of charges" to finance stormwater programs. Changes to the Stormwater Management Act were as follows:

Environment Article§ 4-204

(d) System of charges.-

(1) Each governing body of a county or municipality may adopt a system of charges to fund the implementation of stormwater management programs, including the following:

(i) Reviewing stormwater management plans;

(ii) Inspection and enforcement activities;

(iii) Watershed planning;

(iv) Planning, design, land acquisition, and construction of stormwater management systems and structures;

(v) Retrofitting developed areas for pollution control;

(vi) Water quality monitoring and water quality programs;

(vii) Operation and maintenance of facilities; and

(viii) Program development of these activities.

(2) The charges shall take effect upon enactment by the local governing body.

(3) The charges may be collected in the same manner as county and municipal property taxes, have the same priority, and bear the same interest and penalties.

Recognizing that local governments would need to find alternative funding mechanisms, MDE provided assistance through informational papers such as "Financing Stormwater Management: The Utility Approach", and "Model Ordinances for Stormwater Utility." These were designed to explain the theory of user fees and provide a vehicle for legal support.

MDE also conducted an analysis entitled "Potential Revenues from Stormwater Utilities." The primary objective for this study was to estimate the potential revenue generating capacity of county-level stormwater utilities in the State. The study investigated the sensitivity of the proposed estimates to a variety of simplifying assumptions and several alternative options regarding who would be charged by a utility, that is, which standard land use categories would be included in the rate base. Finally, the distribution of charges among various types of land uses are explored for a representative set of counties.

The general approach to a stormwater utility involves estimating revenues as a function of parcel size and land use. It is assumed that parcels within a land use category, such as industrial land use, share very similar runoff characteristics (in particular a similar proportion of impervious area). This assumption allows all of the parcels of a certain land use category to be grouped and treated using the average parcel size for each category. Next is assigning a stormwater runoff coefficient or rate

factor to each category, which reflects the typical amount of impervious material associated with that type of land use.

Six variations on this general approach were used in MDE analysis to investigate the effects of alternate assumptions. The primary differences included the level of detail information and using different methods to determine what amount to charge single-family residential parcels relative to other land use categories.

Numerous analyses regarding cost distributions are possible when developing a utility. The process involves the consideration of the number or parcels, the parcel sizes, and the relative proportions of these characteristics among the land use categories. It is possible to alter the distribution of the cost among different land use categories to some degree by altering the utility charge structure; however, the results of this study indicated that the development patterns of a county is the primary determinate.

The (1991) estimates of the total annual State revenue for all six approaches ranged from $60 million to $72 million. If agricultural parcels, exempted parcels, and undeveloped parcels are introduced into the rate base for one of the six approaches, the annual revenue estimate increases from approximately $72 to $215 million. For more information please see the appendix, "Potential Revenues from Stormwater Utilities in Maryland," July 1991.

Stormwater Utilities

In June 1996, the City of Tacoma Park became the first State locality to adopt a stormwater management utility ordinance that created a fee system based on the amount of runoff from each property. A separate ordinance was adopted by the City Council in February 1997 establishing a fee structure. The stormwater management fee is billed through a stand-alone system. Please see the referenced report regarding the City of Tacoma Park "Stormwater Management Utility Implementation Report," February 1997.

For a number of years, policy makers statewide have struggled with the daunting task of equitably funding the maintenance and construction needs of the local stormwater management facilities. These facilities provide critical water quality and quantity functions, and are an essential tool in the effort to protect and preserve the environment. However, many are privately maintained and there has not been consistent maintenance and inspection of these facilities. As a result, a large percentage are in a state of disrepair and need various levels of restoration and/or maintenance.

The User Fee concept, which is widely employed by other states' local jurisdictions, assigns costs to landowners based on each property's contribution to

the amount of impervious surface area for the property type. Revenue generated by the fee is used to clean and repair public and private stormwater conveyance and storage facilities. This ensures that all pay a fair and reasonable rate, reduces reliance on general fund tax monies, and, by providing credits, encourages reductions in stormwater quantity and improves water quality. Please see the referenced information on "Guidance for Municipal Stormwater Funding" by National Association of Flood and Stormwater Management Agencies, January 2006; "Stormwater Utility Fees" by the New England Environmental Finance Center, May 2005; "Five Phases in Developing and Implementing a Stormwater Utility;" and "Financing Retrofit Projects: The Role of Stormwater Utilities."

Montgomery County implemented a "system of charges" for specifically dealing with maintenance of BMPs. In 2002, Montgomery County established the Water Quality Protection Charge (WQPC) with a proposed rate of $12.75 per Equivalent Residential Unit (ERUs). The WQPC appears as a line item on property tax bills and pays for the structural maintenance of stormwater facilities. The WQPC is the result of years of study, recommendations and hard work by citizens serving on work groups and task forces, County Council Staff and the Department of Environmental Protection. The WQPC rate is determined by the costs of structural maintenance for residential and associated nonresidential stormwater facility divided by the number of ERUs. Originally, the estimated yearly collection of charges netted approximately $4.0 million for Montgomery County, but the fee has been raised over the years to $25.23 per ERU and is schedule to be increased again this month to $35.50 per ECU to provide $7.01 million for stormwater facility inspection and maintenance, streetsweeping, LID retrofits, and monitoring. For additional information on Montgomery County Water Quality Protection Charge, please see the following web links:

http://www.montgomerycountymd.gov/content/dep/SFMP/pdf/faq.pdf

http://www.montgomerycountymd.gov/deptmpl.asp?url=/content/dep/stormwater/funding.asp

In November 2006, the Mayor and Council of the City of Rockville voted to develop a funding plan on a new annual fee to support stormwater management programs through a stormwater utility. Fee enabling legislation was introduced in December 2007, followed by a public hearing in February 2008, and formal legislation adoption occurred in April 2008. The Stormwater Management Utility for a single family resident annual fee is estimated for FY2009 at $55.80, and for a multi-story commercial building of approximately 53,000 sg. ft. of impervious surfaces the fee is estimated at $1,283.00 or 23 ERUs.

For more information on the City of Rockville's stormwater utility see the following link: http://www.rockvillemd.gov/residents/swm/

Another approach to establishing a dedicated fund is Prince George's County's utilizing an Ad-Valorum Tax. Through the County's "Stormwater Management Enterprise Fund" an Ad-Valorum Tax is levied on assessable property within two Prince George's County Stormwater Management Districts at a rate of 5.4 and 1.2 cents for every $100 of assessed value, respectively. The Fund generates approximately $26 million per year and supports the County's environmental programs and capital improvement projects.

Stormwater management has evolved from flood control programs into sophisticated local efforts to protect water and stream quality. State and federal pollutant discharge laws are more aggressively enforced, yet State and federal resources for implementing federal stormwater and MS4 permit requirements are dwindling. Local governments are required to implement expensive best management practices with limited fiscal resources, resulting in very costly unfunded local mandates.

In response to such requirements, the Environmental Finance Center launched the Stormwater Financing Initiative. This initiative provides communities with tools and resources to effectively finance and implement wet weather management programs.

The final component of the initiative is to provide on this website a "Toolbox" of funding resources. For more information see the following link:

http://www.efc.umd.edu/swlidfinancing.html

For other case studies concerning stormwater utilities across the County, please refer to the latest stormwater funding report:

Guidance for Municipal Stormwater Funding January 2006, prepared by the National Association of Flood and Stormwater Management Agencies, Under Grant Provided by the United States Environmental Protection Agency (USEPA).

The City of Bellevue is one of these case studies that established its stormwater management program in 1974. Bellevue's Storm and Surface Water Utility provides a full range of capital infrastructure and operational services. Funding is mainly derived from a user fee that is based on gross property area and a factor reflecting the intensity of development of each property. Residential fees range from $3 to over $20 per month with an average of about $10/month. The annual operating budget is approximately $6 million. The population of Bellevue was about 117,000 in 2005.

Another case study involves Mecklenburg County, North Carolina with a population of about three quarter million as of 2005. The County Utility was instituted in 1994 with the total stormwater budget for all entities being over $85 million with at large part allocated to capital betterments. The fee for a single-family house is $1.06/month throughout the County. Local stormwater programs of the County, cities and towns are funded by a separate additional rate component which ranges from $0.30 to $6.72/month in Charlotte (which has a population of about 650,000).

The evolution in stormwater program expectations that is motivating the movement to utility based funding requires more than just the revenue mechanism being evaluated. A stormwater utility is seen as an umbrella under which individual communities address their own local problems, priorities and practices. A stormwater utility provides an opportunity for consolidating responsibilities previously dispersed among several departments; generating funding that is adequate, stable, equitable and dedicated solely to the stormwater function; and developing programs that are comprehensive, cohesive and consistent year-to-year.

Summary

Maryland's stormwater management program is implemented locally with little support from the State regarding current funding. Initially, the State provided financial assistance through the "Stormwater Grant-in-Aid program (e.g., $1. 5 million per year) that partially funded plan review and inspection activities as part of a Chesapeake Bay Initiative in 1984. Unfortunately through cost containment measures in 1991 the "Stormwater Grant-in-Aid" program was eliminated. By 1992, the Sediment and Stormwater Administration was also dismantled, and the State's stormwater management program activities were distributed to other Administrations (e.g., Water Management Administration and Chesapeake Bay Watershed Management Administration). This left local programs the following options for funding their stormwater management programs:

Property Taxes: Historically, most local governments have paid for stormwater with general revenues from property taxes. With increasing demands on general revenues, officials are seeking alternative sources of funds.
Developer Fees: Many local governments charge developer fees for plan review and inspection services.
Stormwater User: Across the Country, communities are turning to stormwater user fees to finance programs. In this alternative, all property owners pay fees based on the area of their property that is covered by impervious surfaces (e.g., roof and driveways).

Very few localities have elected to develop a "stormwater utility" or 'system of charges" in Maryland due to the political challenge of them being perceived as an additional tax. The exceptions are City of Tacoma Park, Montgomery County, and most recently the City of Rockville. However, there is renewed interest in financial support of local stormwater management programs as was demonstrated through the passage of the Chesapeake Bay Trust Fund of 2010 in the 2007 Special Session of the General Assembly, and the $25 million fund established through the 2008 Session.

MDE continues to support the development of a "system of charges" by local governments, and offers both financial and technical assistance. However, if overall efforts toward restoring and protecting surface waters, the Coastal Bays, and Chesapeake Bay are to be successful, difficult decisions that impose taxes or fees will need to be made to fully fund local new development stormwater management, National Pollutant Discharge Elimination System municipal permit, and Total Maximum Daily Load (TMDL) programs.

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TABLE OF CONTENTS

	Page
Acknowledgements	i
Executive Summary	ES-1
Sources of Funding	ES-1
Legal Considerations	ES-2
Implementing User-Fee Based Funding	ES-4
Case Studies	ES-5
Chapter 1, Background and Introduction	1-1
What Is Municipal Stormwater	1-1
Historical Development of Stormwater Systems	1-2
New Paradigm	1-2
Legislative Perspective	1-5
Stormwater As A Service	1-6
Issues and Challenges for Local Governments	1-7
Chapter 2, Sources of Funding	2-1
Funding Strategies	2-1
Money, Revenue, and Resources	2-1
Expensed Versus Debt Funding	2-2
Characteristics of Successful Funding Strategies	2-2
A Business Plan Approach Is Based on Strategic Objectives	2-3
Effective Stormwater Business Plans Identify Linkages And Dependencies	2-3
Community Expectations Are Represented in the Business Plan	2-4
Effective Programs Respond to Change	2-4
Service Fee Rates Are Cost-Based	2-4
Resources Are Dedicated and Stable	2-4
Trends in Funding Practices	2-5
Increasing Complexity	2-5
Blended Funding	2-6
Multi-jurisdictional Funding	2-6
Cost-sharing With Other Public Programs	2-7
Broader Private Sector Participation	2-8
Increasing Influence of Technology and Data	2-8
Funding Methods and Mechanisms	2-9
Local Governments' Funding Authority	2-9
Funding Methods and Mechanisms	2-10
General Revenue Appropriations	2-10
Stormwater User (Service) Fees	2-12

Plan Review, Development Inspection and Other Special Fees 2-14
Special Assessments 2-14
Bonding for Capital Improvements 2-15
In-lieu of Construction Fees 2-16
Capitalization Recovery Fees 2-18
Impact Fees 2-19
Developer Extension/Latecomer Fees 2-21
Federal and State Funding 2-22
Service Fee and Assessment Design Considerations 2-22
Legality 2-22
Equity 2-23
Technical Foundations 2-24
Origin of Costs 2-25
Revenue Sufficiency 2-27
Flexibility 2-27
Balance of Rates with Level of Service 2-27
Data Requirements 2-28
Compatibility with Data Processing Systems 2-29
Consistency with Other Local Funding and Rate Policies 2-30
Revenue Stability and Sensitivity 2-30
Service Fee Rate and Assessment Methodologies 2-31
Rate Design 2-31
Service Fees 2-31
Assessments 2-32
Uniform and Tiered Charges 2-32
Service and Equivalency Units 2-33
Classification and Grouping of Like Customers 2-34
Service Fee Credits 2-34
Example Stormwater Rate Methodologies 2-36
Impervious Area 2-36
Impervious Area and Gross Area 2-38
Impervious Area and Percentage of Impervious Coverage 2-41
Gross Area and Intensity of Development 2-45

Chapter 3, Legal Considerations 3-1
Overview 3-1
Common Themes 3-4
Tax vs. Fee 3-4
Found Not to Be a Tax 3-5
Found to Be a Tax 3-7
Voluntary Service and “Opt-Out” Provisions 3-8
Fee vs. Special Assessment 3-10
Related to Cost of Services 3-11
Properties Benefited 3-12

Summary and Conclusion 3-17
Cases Cited 3-18

Chapter 4, Implementing User-Fee Based Funding 4-1
Overview 4-1
Forces Driving Action 4-2
The Stormwater Utility, Program Concept and Due Diligence 4-3
Utility Program Concept 4-3
Due Diligence 4-4
Creating Momentum and a Process for Program Action 4-5
Understanding Problems 4-5
Vision for the Future 4-6
Bringing About Action 4-7
Process Framework 4-7
Process Framework, Quick Concept Study 4-8
Process Framework, Feasibility Study 4-9
Process Framework, Utility Implementation 4-11
The Public Track 4-11
The Program Track 4-13
The Finance Track 4-14
The Database Track 4-15
Policy Issues 4-17
Schedule 4-19

Appendix, Example Stormwater Utility Programs A-1
City of Bellevue, Washington A-1
Keynotes A-1
Community Profile A-2
Formation Process A-3
Service Area A-3
Role and Program A-3
Governance Structure A-5
Organization and Staffing A-5
Funding A-5
Inter-governmental Cooperation A-6
Public Participation A-6
City of Charlotte/Mecklenburg County, North Carolina A-7
Keynotes A-7
Community Profile A-9
Formation Process A-10
Service Area A-11
Role and Program A-12
Governance Structure A-13
Organization and Staffing A-14
Funding A-14
Inter-governmental Cooperation A-15
Public Participation A-16
City of Tulsa, Oklahoma A-18

Inter-governmental Cooperation A-15
Public Participation A-16
City of Tulsa, Oklahoma A-18
Keynotes A-18
Community Profile A-19
Formation Process A-22
Service Area A-22
Role and Program A-23
Organization and Staffing A-24
Funding A-24
Inter-governmental Cooperation A-25
Public Participation A-25
Louisville/Jefferson County Metropolitan Service District (MSD), Kentucky A-25
Keynotes A-25
Community Profile A-26
Formation Process A-27
Service Area A-27
Role and Program A-28
Governance Structure A-28
Organization and Staffing A-28
Funding A-28
Inter-governmental Cooperation A-29
Public Participation A-29
Sarasota County Stormwater Environmental Utility, Florida A-29
Keynotes A-29
Community Profile A-31
Formation Process A-31
Service Area A-31
Role and Program A-32
Governance Structure A-32
Organization and Staffing A-32
Funding A-32
Inter-governmental Cooperation A-33
Public Participation A-34

Summary of Tables:

Table 1-1: Major Stormwater Management Functional Centers 1-4
Table 2-1: Example Schedule of Rates 2-43
Table 4-1: Building Blocks for a Compelling Case 4-6

Summary of Figures:

Figure 4-1: Overall Process Framework 4-8
Figure 4-2: Feasibility Study Roadmap 4-9
Figure 4-3: Utility Implementation Approach 4-12
Figure 4-4: Utility Implementation Schedule 4-20

EXECUTIVE SUMMARY

Municipal stormwater management for local governments has evolved over time from an urban flood control function, to a water and resource management function, to an environmental protection and regulatory function. All three functions now co-exist as responsibilities of local government. This evolution has forced changes in how stormwater systems are planned, designed, constructed, operated, and financed. More specifically, the stormwater function has evolved from a basic capital construction and maintenance program supported primarily by local taxes, to a program of integrated water resource management, environmental enhancement, and recreational services requiring a multi-faceted benefit based finance system.

The focus of this guidance is to provide a resource to local governments as they address contemporary stormwater program financing challenges. The guidance includes procedural, legal, and financial considerations in developing viable funding approaches. The guidance examines a range of possible approaches to paying for stormwater management, but the focus is on guidelines for developing service/user/utility fees to support these programs. The terms service fee, user fee, and utility fee may be used interchangeably in this guidance. Chapter 2 addresses various sources of funding. Chapter 3 covers legal considerations, and implementation of stormwater funding programs is discussed in Chapter 4.

SOURCES OF FUNDING

“Needs” are the key driver of stormwater programs and funding development. Without a well defined stormwater service need, there will not be basic support and success will be less likely. When considering how to develop and finance a stormwater program it is important to prepare a business plan that identifies strategic decisions and guides the program evolution and funding decisions. Emerging trends in funding practices include increasing complexity, blended funding, multi-jurisdictional funding, cost-sharing with other public programs, broader private sector participation, and increasing influence of technology and data.

Stormwater management has historically been supported by a range of funding methods and mechanisms that reflect a mix of federal, state and local programs. While the focus of this guidance is on service fees, other stormwater program funding mechanisms include general revenue appropriations; plan review, development inspection, and special user fees; special assessments; bonding for capital improvements; in-lieu of construction fees; capitalization recovery fees; impact fees; developer extension/latecomer fees; and federal and state funding opportunities such as grants, loans and cooperative programs.

There are several criteria that are commonly used to evaluate and select methods for design of service fee rate structures. They include legality, equity, revenue sufficiency, flexibility, balance of rates with level of service, data requirements, compatibility with data processing systems, consistency with other local funding and rate policies, and revenue stability and sensitivity. The fundamental objective of a service fee/utility is attainment of equity. Service fee rate methodologies are designed to attain a fair and reasonable apportionment of cost of providing services and facilities.

Design of stormwater service fees must meet general and technical standards. A rate structure analysis is performed to determine how costs might be apportioned among those who are served in various ways by expenditures for maintenance and operations, capital improvements, and support activities. Impervious area, gross area, percentage imperviousness, and land use are the parameters most frequently used to determine rate structures. Services fees are generally cost-based and are designed to reflect the impacts that each property has on stormwater service demands. Such costs are primarily a function of the peak stormwater runoff rate, the total volume of discharge, and pollutant contributions.

There are four rate structure concepts or methodologies used as examples in this guidance that are typical of those adopted in the more than five hundred communities that have established stormwater utilities. These examples base their fees on impervious area, a combination of impervious area and gross area, impervious area and the percentage of imperviousness, and gross property area and the intensity of development.

LEGAL CONSIDERATIONS

The type of funding mechanism selected for a stormwater utility or stormwater management program has a variety of legal consequences. Taxes, service fees, special assessments, impact fees and other revenue sources can be used, but each approach will have different implications in terms of who will pay, what procedures must be followed to implement and collect the charge, and how the money can be used. If the funding approach is deemed to be a tax, then tax-exempt entities such as churches, schools, state agencies and federal government facilities will contest their obligation to pay. If a service fee approach

is used, the reasonableness of the rate structure and its relationship to the service being provided may be challenged. In many states special taxpayer approval must be sought.

The distinctions between the various funding approaches are often blurred. In general, a tax is an enforced burden imposed by sovereign right for the support of the government, the administration of law, and the exercise of various functions the sovereign is called upon to perform. Many states have constitutional or statutory restrictions on the ability of local governments to levy taxes, which do not apply to fees or charges.

User/service fees are charges based upon the proprietary right of the governing body permitting the use of the instrumentality involved. Fees have traits that distinguish them from taxes. First, they are charged in exchange for a particular governmental service which benefits the party paying the fee. Second, they are voluntary, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge. Third, the amount of the fee is designed to recover the actual cost of the service being provided. In some cases there may be little practical difference between a tax and a fee, but the legal distinctions between the two are important.

Stormwater service fees have been the subject of litigation resulting in reported opinions from at least 17 states, including many cases involving final decisions by the state's highest court. In addition, there have been unreported decisions from lower courts in states that have involved similar challenges to local stormwater fees. Based on these cases, certain common themes have emerged.

The question of whether a service charge is actually a "tax" has been the issue most frequently litigated. Other reoccurring issues involve whether or not the charge is voluntary, is it a fee or special assessment, is the fee "reasonable" and directly related to the cost of providing the service, are the properties charged fees receiving proportionate benefit from the services provided, and must fees be confined to cost of providing stormwater services alone or may any surplus be applied to capital improvements.

Determining the legality of a specific financing mechanism chosen will depend upon a close analysis of state law. Nevertheless, certain general principals emerge from the cases examined. First, for a stormwater service charge to be regarded as a fee, rather than a tax, the overall cost of the program must be reasonably related to the service being provided, and the funds raised must be segregated for use by the stormwater program. Second, the fee should be proportional to the property's contribution to stormwater runoff. Third, participation in the program should be characterized as "voluntary". And forth, in states with constitutional provisions governing the imposition of any new tax, it may be necessary to seek voter approval for a fee even if it is designed to be service-based.

The imposition of stormwater service fees on federal facilities involves a special consideration of the tax vs. fee issue. In principal, states cannot tax the United States (Chief Justice Marshall's opinion in *McCulloch v. Maryland*, 1819). On the other hand, it is well-established law that the United States must pay reasonable user fees. Furthermore, the Clean Water Act contains an express waiver of sovereign immunity for certain pollution control related fees. Importantly, this waiver applies only to fees or service charges, and not to taxes.

The United States Supreme Court has established a three-pronged test for determining whether fees imposed on federal facilities are "reasonable service charges" or taxes. First, is the fee or service charge non-discriminatory? Second, is it a fair approximation of the cost of the benefits received? And third, is it structured to produce revenues that will not exceed the regulator's total cost of providing the benefits?

IMPLEMENTING USER-FEE BASED FUNDING

The evolution in stormwater program expectations, which is motivating the movement to utility based funding, requires that more than just the revenue mechanism be evaluated. The function, service and performance of the stormwater program itself become a focal point in the effort to develop a stormwater funding mechanism.

A stormwater utility should be seen as an umbrella under which individual communities address their own local problems, priorities and practices. A stormwater utility provides a vehicle for:

- consolidating or coordinating responsibilities previously dispersed among several departments;
- generating funding that is adequate, stable, equitable and dedicated solely to the stormwater function; and
- developing programs that are comprehensive, cohesive and consistent year-to-year.

Implementing user fee based funding involves a related set of actions and activities occurring within a flexible process framework. That framework promotes "due diligence" in five key areas of focus; political, financial, legal, informational, and technical. Bringing about change in the current stormwater program and implementing user based funding requires an understanding of current needs and problems, a vision for the future and a process framework. The use of a citizens/stakeholder participation group and a business plan approach can help build a compelling case for action.

The process framework should include a “quick concept study” which assesses the advisability of proceeding; a “feasibility study” which conducts the detailed assessment of the stormwater program and funding and develops recommendations; and, the “utility implementation process”.

The utility implementation process directs the planning and implementation effort along four tracks of activity. The “Public Track” insures stakeholder involvement and education. The “Program Track” matches program structure to stakeholder expectations. The “Finance Track” insures the legality, equity and adequacy of the funding mechanism; and, the “Database Track” determines the means to compute, deliver, collect and record the charge to be imposed on each property.

The analysis of stormwater utility funding has many policy implications. Policy making usually involves the mayor and council. Day-to-day policy decisions are often made at several levels under guidance set by the mayor and council. A recommended hierarchy for review of important issues is: key staff and consultants, other involved staff, advisory committee, manager’s office, and mayor and council.

CASE STUDIES

Five case studies are examined for City of Bellevue, Washington; City of Charlotte/Mecklenburg County, North Carolina; City of Tulsa, Oklahoma; Louisville/Jefferson County Metropolitan Service District, Kentucky; and Sarasota County Stormwater Environmental Utility, Florida. For each example the following is generally provided: keynotes, community profile, formation process, service area, role and program, local government structure, organization and staffing, funding, inter-governmental cooperation, and public participation.

The City of Bellevue stormwater management program was established in 1974 and was one of the first to give equal consideration to water quantity and quality. Bellevue’s Storm and Surface Water Utility provides a full range of capital infrastructure and operational services, primarily through in-house staff. Funding is primarily derived from a user fee that is based on gross property area and a factor reflecting the intensity of development of each property. Residential fees range from $3/month to over $20 per month with an average of about $10/month. The annual operating budget is approximately $6 million. The population of Bellevue was about 117,000 in 2005.

The Charlotte/Mecklenburg County approach relies on centralized funding and regional programs for major systems combined with local management of minor stormwater systems. The County, City of Charlotte, and towns have a high degree of self-determination in deciding service levels to be provided by local systems, programs and funding. Funding of the program is primarily supported by a composite stormwater service fee that includes both regional and local

components with the County controlling the regional component and local governance controlling the local component. The City of Charlotte and small towns typically employ a blend of funding from several sources while the County relies almost entirely on the service fee.

In 2005 the population of Mecklenburg County was about three quarter million and the population of Charlotte was about 650,000. The County utility was instituted in 1994. The total stormwater budget for all entities in 2005 was over $85 million with a large part allocated to capital betterments. The fee for a single-family house is $1.06/month throughout the County. Local stormwater programs of the County, cities and towns are funded by a separate additional rate component which ranges from $0.30/month to $6.72/month in Charlotte.

The Tulsa Stormwater Management Utility was founded in response to a devastating flood that killed 14 people and caused nearly $220 million in property damage in 1984. A Department of Stormwater Management was established in 1985 centralizing responsibility for all City stormwater activities, and a stormwater utility fee was established by ordinance in 1986 to fund the program. The stormwater program budget has recently ranged from $12 million to $14 million per year. All residential properties are charged a single rate of $3.49/month, and fees for other properties are based on the amount of imperviousness on each property. The population of Tulsa was about 400,000 in 2005. The program includes comprehensive watershed management, dedicated funds for maintenance and operation, and a $200 million capital improvements program.

The Louisville approach involves a consolidation of flood control and stormwater management with a regional wastewater collection and treatment program provided by the Metropolitan Sewer District (MSD). Most of the smaller cities and towns in Jefferson County do not perform stormwater management functions. Funding of MSD is primarily from wastewater and stormwater service fees, which are independently structured and billed. The accounting is kept separately for each function.

The methodology of determining the stormwater fees in Louisville/Jefferson County is based on impervious area. There is flat rate for single-family residential properties, and differential rates for other properties based on a impervious area equivalency unit. The single-family residential stormwater service fee in was $4.41/month. Stormwater service fee revenues in fiscal year 2005 were expected to be nearly $24 million. There are more than 90 cities and towns in Jefferson County. Most, but not all, cities are included in the stormwater program. Louisville had a population of about 700,000 in 2005.

Sarasota County, Florida established a Stormwater Environmental Utility in 1989. Primary objectives of the Utility are to reduce flooding, improve surface water quality, and attain responsible development practices. A Florida Supreme Court decision in 1996 determined that the Sarasota County charge is a special

assessment rather than a service fee. As such, it is subject to the standards applicable to assessments, which emphasize apportionment of special benefit, rather than reflecting the cost of service burden imposed on properties. The benefit assessments have three components that are consistent across the service area, and one component, system capitalization, that is variable by watershed.

The Utility budget in 2005 was approximately $23 million with about $10 million for capital projects. The benefit assessment takes both pervious and impervious areas on each property into account. On average, a medium size single-family residence is assessed $6.70/month. Sarasota County had a resident population of about 340,000 in 2005. There are four cities in the County. The city of Sarasota through an inter-governmental agreement relies on the County to improve its drainage system and perform most stormwater operations. The other three cities retain responsibility for local stormwater systems.

CHAPTER 1

BACKGROUND AND INTRODUCTION

Municipal stormwater management for local governments has evolved over time from an urban flood control function, to a water and resource management function, to an environmental protection and regulatory function. All three functions now co-exist as responsibilities of local government. This evolution has forced changes in how stormwater systems are planned, designed, constructed, operated, and financed. More specifically, the stormwater function has evolved from a basic capital construction and maintenance program supported primarily by local taxes, to a program of integrated water resource management, environmental enhancement, and recreational services requiring a multi-faceted benefit based finance system.

The focus of this guidance is to provide a resource to local governments as they address contemporary stormwater program financing challenges. The guidance includes procedural, legal, and financial considerations in developing viable funding approaches. The guidance will examine a range of possible approaches to paying for stormwater management, but the focus will be on guidelines for developing service/utility/user fees to support these programs. Chapter 2 will address various sources of funding. Chapter 3 will cover legal considerations, and implementation of stormwater funding programs is discussed in Chapter 4.

WHAT IS MUNICIPAL STORMWATER

Municipal stormwater is surface water runoff from public and private lands in urban areas. Typically municipal stormwater is collected in municipal separate storm sewer systems consisting of drains, pipes, and ditches, and conveyed to nearby streams, rivers, lakes, estuaries, basins, wetlands, and oceans carrying with it a variety of urban pollutants.

The United States Environmental Protection Administration (EPA) in their Phase I Municipal Stormwater regulations defined stormwater to mean "…storm water

runoff, snow melt runoff, and surface runoff and drainage." In their Phase II stormwater regulations EPA defined a "municipal separate storm sewer" to mean in part, a conveyance or system of conveyances, including roads with drainage systems and municipal streets, that is owned or operated by a State, city, town, borough, county, parish, district, association, or other public body designed or used for collecting of conveying storm water which is not a combined sewer and which is not part of a Publicly Owned Treatment Works.

The nature of stormwater runoff from a given rainfall or snow event changes as an area urbanizes and more impervious surfaces are created and the landscape and drainage patterns are modified. The volume of runoff, rate of flow, and quality of runoff all change as a result of this urbanization.

HISTORICAL DEVELOPMENT OF STORMWATER SYSTEMS

In the late 1800's and early 1900's combined sewers were built to convey and dispose of both sanitary sewage and stormwater. Eventually, local governments began to separate storm flows from wastewater flows and separate sanitary sewer and storm sewer systems replaced combined sewer systems in many areas. Early municipal storm sewer systems were designed to discharge stormwater rapidly, and included such physical elements as curbs, gutters, inlets, storm sewers, roadside ditches, and concrete and grassed lined open channels.

Thinking began to change in the 1960's and 1970's with the recognition that efficient stormwater systems also transferred problems downstream. With a need to reduce the rate and volume of these stormwater discharges, many local governments started requiring new developments to construct stormwater detention facilities.

In the 1980's and 1990's stormwater quality became a focus of federal regulatory requirements and local governments have had to develop stormwater quality programs in response. Under an evolving regulatory mandate a few local governments are beginning to recombine dry weather flows in storm sewers with sanitary sewage and directing both to treatment plants.

NEW PARADIGM

The character of the stormwater management function has, and continues to change significantly. Originally stormwater systems were built just for conveyance, but stormwater is now a component of a comprehensive integrated urban water resource, environmental enhancement, and recreational services system. Contemporary stormwater management is a multi-dimensional function which includes quantity and quality considerations, multiple-use facilities, riparian

corridors, recreation, wetland preservation and creation, and groundwater recharge.

Stormwater has become a part of the “total” water resources picture and is the third leg of the local government water service stool consisting of water development, treatment, and distribution; sewage collection, treatment, and disposal; and stormwater quantity and quality management. Other more specific changes include recognition of stormwater as a resource; restoration of streams and rivers; preservation of riparian areas and corridors; use of detention areas as parks, playfields, and wetlands; creation and/or restoration of wetlands to provide water quantity, quality, and environmental benefits; capturing stormwater to meet water supply needs; recognition that homes near greenbelts sell for a premium; and evaluation of stormwater from a comprehensive watershed perspective.

Most of these changes recognize stormwater as a resource, but liabilities have also evolved. For example, the disposal of “polluted” stormwater and of sediments accumulated in detention/retention facilities is now a performance issue for local governments. As a result of the evolving regulatory framework stormwater quality issues are now a required part of the urban water resources service sector. The reality is that stormwater quality and quantity are joined at the hip in today’s stormwater management programs.

The new paradigm has introduced a whole new array of issues that has resulted in basic changes in stormwater planning, design, operation and maintenance, construction, and financing. These changes have also resulted in greater public expectations. In addition to the effective control of drainage and flooding, the public also expects riparian corridors, wetlands, recreation amenities, trails, visually pleasing facilities, and a continued maintenance effort. Stormwater managers now must find the resources to effectively satisfy these expectations as well as the regulatory requirements.

To meet the challenges of the new paradigm some urban stormwater programs are evolving into multi-functional operations. Table 1-1 provides a listing of major stormwater management components for a utility/service fee type program. Not all programs will be this comprehensive, but many local governments in order to meet public expectations will likely move in this direction over a period of time.

Table 1-1: Major Stormwater Management Functional Centers[1]

Administration

General Administration
Prog Planning and Development
Interagency Coordination

Public Involvement & Education

Public Awareness & Education
Public Involvement
Standing Citizen's Group

Billing and Finance

Billing Operations
Database Management
Customer Service
Financial Management
Capital Outlay
Overhead Costs
Cost Control
Support Services

Stormwater Quality Mgmt

Quality Master Planning
Retrofitting Program
Monitoring Program
Struc and Non-Struc BMP Progs
Pest, Herb and Fertilizer
Used Oil & Toxic Materials
Street Maint Prog
Spill Response and Clean Up
Prog for Pub Ed and Reporting
Leakage and Cross Connections
Industrial Program
Gen Com and Residential Program
Illicit Con and Illegal Dumping
Landfills and Other Waste Facilities
Combined Sewer Overflow Program
Groundwater & Wellhead Protection
Drinking Water Protection
Watershed Assessment & TMDL
Septic and I&I Program

Engineering & Planning

Des Criteria, Stds and Guidance
Field Data Collection
Master Planning
Design, Field and Ops Engineering
Hazard Mitigation
Zoning support
Multi-objective Planning Support
GIS and Database Management
Mapping
Land Use Planning & Controls

Operations

General Maintenance Management
General Routine Maintenance
General Remedial Maintenance
Emergency Response Maintenance
Infrastructure Management
Public Assistance

Regulation and Enforcement

Code Dev and Enforcement
General Permit Administration
Drainage Sys Insp & Reg
Zoning and Land Use Reg
Special Inspection Programs
Flood Insurance Program
Multi-Obj Floodplain Management
Erosion Control Program

Capital Improvements

Major Capital Improvements
Minor Capital Improvements
Land, Easement, and Right-of-Way

[1] Table 1-1 provided by Hector Cyre, Water Resource Associates, Inc., Friday Harbor, Washington, 2005

LEGISLATIVE PERSPECTIVE

Legislative action has dramatically changed the face of contemporary stormwater management. This includes passage of laws, adoption of regulations, and interpretation of laws and enforcement of regulations by the courts at local, state and federal levels. These legislative activities impact all aspects of stormwater management by local governments, as well as the private sector, such as developers who provide basic infrastructure as a part of their developments, industrial facilities that discharge stormwater from their properties, and those conducting ground disturbing construction activities.

Initially stormwater was considered a common enemy and was solely a local issue. Local governments constructed stormwater systems to address local drainage service needs and flooding problems. Property owners had the right to protect their property from stormwater as long as unreasonable harm was not inflicted on other properties. Today as a result of the Clean Water Act (CWA), stormwater is also a state and federal issue, and landowners are required to detain stormwater on their property and provide a level of treatment.

Passage of the 1972 CWA signaled the beginning of a serious national effort to improve the quality of the nation's streams, rivers, lakes, wetlands, estuaries, bays, and oceans. The CWA required dischargers of "point sources" of pollution such as sewage treatment plants to obtain National Pollutant Discharge Elimination System (NPDES) permits in order to discharge pollutants into the nation's waters. Initially municipal stormwater was considered a non-point source of pollution and NPDES permits were not required of municipal stormwater dischargers.

However, stormwater was defined as a point source of pollution in the early 1980's pursuant to a federal court decision brought by the Natural Resources Defense Council against the EPA. This marked the beginning of the municipal stormwater quality mandate through the NPDES permit program. In addition to NPDES permit requirements, municipal stormwater systems are also now subject to Total Maximum Daily Load (TMDL) requirements of the CWA.

NPDES permits typically require pollutant dischargers to meet numerical effluent limits at the end of the discharge pipe. Because it is difficult to apply this standard to stormwater systems, the CWA was amended in 1987. Section 402(p) was added to the CWA defining basic permit compliance requirements for municipal stormwater runoff that are different than those for typical point source discharges such as from sewage treatment plants. Section 402(p) required municipal storm sewer systems to reduce pollutants discharged from municipal stormwater systems to the maximum extent practicable (MEP). MEP is thus the standard of treatment for municipal stormwater and its definition is very important.

The following, from the Federal Register, December 8, 1999, p. 68754 publishing NPDES Phase II stormwater regulations, is EPA's interpretation of the meaning and intent of the MEP standard.

> "Maximum extent practicable (MEP) is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The CWA requires that NPDES permits for discharges from MS4s 'shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods.' CWA Section 402(p)(3)(B)(iii). This section also calls for 'such other provisions as the (EPA) Administrator or the State determines appropriate for the control of such pollutants.' EPA interprets this standard to apply to all MS4s, including both existing regulated (large and medium) MS4s, as well as the small MS4s regulated under today's rule.
>
> For regulated small MS4s under today's rule, authorization to discharge may be under either a general permit or individual permit, but EPA anticipates and expects that general permits will be the most common permit mechanism. The general permit will explain the steps necessary to obtain permit authorization. Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard.
>
> Implementation of the MEP standard under today's rule will typically require the permittee to develop and implement appropriate BMPs to satisfy each of the required six minimum control measures."

The federal/state/local relationship regarding stormwater management was fundamentally changed by the 1987 CWA amendments and subsequent regulations. There is now a federal mandate that local governments address stormwater quality through the NPDES permit mechanism, and there is federal and state oversight on how, and how well it is done. Drainage and flood control is still a discretionary activity, but stormwater quality management is now required of most all local governments

STORMWATER AS A SERVICE

Uncontrolled stormwater flows can be a danger to both the constructed and natural environments, and the control of stormwater and the pollutants it carries is a difficult and expensive task. Implementation of stormwater management programs and measures by local government, therefore, creates a service benefit for the lands and improvements so served.

Public and private properties are benefited in several ways through the new stormwater management paradigm. Benefits include recreation opportunities, community aesthetics, environmental enhancement, flood damage reduction, protection of transportation systems, development of urban trail corridors, handling of excess drainage from public and private properties, maintaining property access, protecting and providing water supply, providing regulatory compliance, protecting property values, and providing long term system maintenance. Also, where there is a community stormwater program with oversight and management, the service benefit can include system planning and engineering, development of design criteria, flood warning systems, NPDES compliance plans and BMP's; and publication of resource information.

It is important to realize that a long-term obligation is created when stormwater infrastructure is added and stormwater programs are developed. For example, all the stormwater facilities that have been constructed, and will be constructed as a result of new development or redevelopment, must be maintained in perpetuity. NPDES regulations require municipal permit holders to assure the maintenance and continuation of these new facilities and programs. Further, implementation of NPDES permit requirements will most likely intensify in the future.

The significant and continuing capital construction, operation and maintenance requirements for storm sewer systems, stormwater quality facilities, pollutant source control programs, flood control facilities, vector control, drainage corridors, detention facilities, wetlands, etc., is beyond the capacity of individual property owners, and are services provided by the local government stormwater service program.

ISSUES AND CHALLENGES FOR LOCAL GOVERNMENTS

The new stormwater paradigm presents many issues and challenges. What is to be the design and content of the stormwater program, what will it cost, who pays, who decides, and how will it be funded? Among these, cost and how to fund it is of significant importance to local government.

Local governments are expected by their citizens to provide and fund basic services such as police and fire protection, local transportation systems, sewage treatment, water supply, libraries, social services, and recreation. Stormwater quantity and quality must now be added to that list. The new paradigm requires the development of institutional and funding frameworks to support this long-term responsibility.

There are legal and equity issues imbedded in the funding considerations. Funding of stormwater systems must be relevant and proportional to services or

benefits provided, or in other words, it must be fair and legal. It will be critical for funding options, particularly those that include utility/user fees, to be based on sound legal principals to avoid challenges.

Local governments will likely be facing changing rules. Municipal stormwater management systems will need to have flexibility to adjust to changes in regulations, regulators, legislation, public demands, and court decisions. For example TMDLs are developing as a new performance issue for local governments. If stormwater discharges contain pollutants contributing to the impairment of a water of the nation, additional control requirements may be imposed and additional costs incurred.

Cost and effectiveness are major considerations for local government when developing stormwater management programs. MEP is the current CWA regulatory standard to which stormwater programs are held. Cost and effectiveness should be factors (others include regulatory compliance, public acceptance, and technical feasibility) in the selection of BMPs and in the approval by regulators of stormwater management programs.

Partnership opportunities are available to local government in implementing stormwater quality programs. Local governments can develop individual stormwater programs to meet regulatory requirements; or they can join together in partnership with other local governments, including cities, counties, and special districts in the conduct and financing of the stormwater program. There is good potential for cost savings when local governments work with others in implementing control measures required in their permit.

There are governance decisions to be made. Local governments can implement a stormwater program through an existing organization, they can set up a new department or organization, or they can develop some combination of the two. The decision could influence the funding structure that is used.

Ultimately, all issues and challenges focus attention on cost and how it is funded. The focus of this document is on service/user/utility fees which addresses an important element of the funding challenge.

CHAPTER 2

SOURCES OF FUNDING

FUNDING STRATEGIES

Money, Revenue, and Resources

In formulating a funding strategy for any local government program it is often helpful to think of a framework of money, revenue, and resources that can be selectively applied to specific needs. Cumulatively they provide the financial support required for the mix of capital, operating, and non-operating expenditures. It is important to recognize the distinctions that influence their capability and suitability for various tasks, and how they can best be orchestrated.

"Money" encompasses a range of sources and types of funds that can be tapped to support stormwater services and facilities. Appropriations of general revenues, proceeds of bond sales and special-purpose sales taxes, and transfers from other accounts represent "money" that have all been used to support stormwater programs, either on a one-time basis, temporarily, or as a part of a long-term funding strategy.

"Revenue" is a term usually used in specific reference to the cash flow generated by user fees of various sorts and other relatively consistent income streams such as charges, assessments, rentals, fines, etc. Most stormwater utilities have a periodic charge generally applied to all customers. They may also have other revenues generated through special fees applied to individual customers or classes of customers (e.g., plan review and inspection fees), special assessments, and capital recovery fees of various sorts. In some cases, revenue supports other funding mechanisms, as in the allocation of user fee revenue to service bond debt.

"Resources" that support stormwater programs take many forms, ranging from developer-contributed capital facilities, to federal and state grants and loans, to

maintenance of public drainage systems performed by homeowners' associations and private property managers, to land and easement dedications and other exactions. They also include a variety of funding mechanisms that are commonly used to structure how money and resources are applied to specific objectives, for example bond issues that are used to fund capital infrastructure and inter-fund loans to meet temporary cash flow needs.

Expensed Versus Debt Funding

Two principal categories of funding employed by stormwater management programs are expensed funding and debt funding. Most stormwater programs employ a mix of these.

Expensed funding is typified by "pay-as-you-go" strategies, in which expenditures are supported by a more or less concurrent revenue stream. For example, a city's stormwater utility may have a user fee that generates $5 million in annual revenues, an appropriation in its road budget for maintenance of roadway drainage systems of $1 million, and a total annual stormwater management budget of $6 million that essentially matches the combined income. Costs are "expensed" as they are incurred.

Debt funding is typified by bond sales, which are most commonly used to fund major capital expenditures, but debt funding may also include intergovernmental loans, warrants, and other mechanisms. Debt is sometimes also used to fund utility start-up costs, undertake system-wide remediation, or to make funds available to cooperating entities in the form of grants or loans. In all these examples, borrowing is utilized to enable a stormwater program to expedite improvements or activities so as to accomplish its goals more quickly, thereby reducing the time of exposure to certain risks. For example, bonding to build extensive flood protection works in two years rather than twenty years may be a prudent action if valuable property is protected more quickly.

CHARACTERISTICS OF SUCCESSFUL FUNDING STRATEGIES

A Business Plan Approach Is Based on Strategic Objectives

Some common characteristics are evident among successful stormwater utility programs. The most successful programs have relied heavily on a business plan model which guides both the program evolution and funding decisions. The strategy for accomplishing the program is defined, the type and magnitude of costs are projected, resource requirements are determined, and timing issues are resolved before the analysis of specific funding mechanisms takes place.

"Needs" are the key driver of program and funding strategies. Authority, capability, and a clear vision of the mission are essential, but in the absence of

compelling needs local government leaders apply their attention and resources elsewhere.

The demands of the diverse stormwater management activities identified in Table 1.1 challenge local governments' funding capabilities, and encourage them to use a variety of funding sources. State constitutions and legislation, governance structures and service responsibilities, drainage problems, needs and priorities, local politics and economics, and simply the different ways that communities conduct their business all differ and influence their decisions on stormwater program and funding strategies. These influences should cause local agencies to carefully examine their needs, and the most successful have crafted a detailed business plan as a guiding document.

Effective Stormwater Business Plans Identify Linkages and Dependencies

Stormwater business plans or program strategies contain many linkages and dependencies among program components and processes. Addressing some needs may require several years as preparatory steps are accomplished. For example, even if infrastructure improvements are the highest priority, they may have to be preceded by master planning studies, prioritization processes, engineering of specific projects, land acquisition, and contracting before a system improvement is actually realized. Formal approvals by elected officials may be needed at various points in this process, potentially creating additional delays.

Such linkages and dependencies make timing very influential in structuring the business plan. An extended schedule for addressing one program priority may present an opportunity to expedite others that do not require so much preparatory work or approvals. Routine maintenance is a function most easily expedited and can have the most immediate benefit in terms of service assurance. Regulatory measures that can be adopted at the discretion of managers and that do not require extensive analyses can also be easily activated. Other regulatory activities can involve several years, as in the case of developing and gaining adoption of design manuals. Education, public participation, and other efforts to improve water quality likewise can be initiated relatively quickly, but it may take years to demonstrate results. Some remedial repairs to deteriorated infrastructure can be accomplished quickly, although the process of identifying specific projects, prioritizing them, assembling necessary resources, acquiring land or easements, and contracting with vendors can delay others.

The negative experiences of communities that didn't recognize the relationship between program and funding strategies suggest that adopting funding strategies or mechanisms, without the benefit of a clear vision of the program strategy, creates a high potential for problems. This has proven especially true in the case of instituting stormwater utility user fees. One need only review the case law decisions in Chapter 3 of this guidance manual to find strong support for the

proposition that a clear program strategy buttresses funding decisions by local elected officials.

Community Expectations Are Represented in Business Plans

The most effective stormwater business plans recognize community expectations. In some cases, expectations must be elevated by convincing demonstrations that stormwater problems exist and can be solved. Stormwater management rarely captures public support unless problems impact the daily lives of citizens. Many drainage systems are underground and essentially invisible to the public. If they are designed, constructed, and maintained properly, most people are unaware of them. More visible problems such as potholes in roadways consistently rate higher than drainage problems. The most effective programs identify and publicize the problems they must address, seek public participation and support, and orchestrate the use of various tools and resources over time.

Effective Programs Respond to Change

Flexibility is an important attribute of utility user fee funding and the ability to change as circumstances dictate should be always be a consideration in formulating a business plan. User fees provide a stable revenue source, and offer equity advantages over traditional tax funding, but perhaps their most valuable attribute is their flexibility for funding a variety of operational and capital investment needs. A long-range program can be defined with a realistic expectation that funding will be available when needed and also suitable for changing priorities. However, as a primary funding source, a user fee may lend itself to a focus on short-term, rather than a long-term program strategy, which can be counterproductive.

Service Fee Rates Are Cost-Based

The funding philosophy represented by utility service fees of all types is that customers should pay in relation to the demands they impose on the services and facilities – characterized as a “user-pays” approach. This is a primary consideration in selecting parameters from which service fees will be calculated, and formulating a rate methodology that results in an apportionment of those cost deemed fair and reasonable by the responsible local officials. The most successful stormwater utilities are those that have clearly established and documented the rationale for linking their service fees to the cost of providing services and facilities.

Resources Are Dedicated and Stable

Whether in city, county, or special district entities, most successful stormwater utilities are accounted for as enterprise or special revenue funds that are separate and apart from the funding of general public services. As segregated accounts, enterprise and special revenue funds limit the use of revenues and other resources to a specific purpose, such as stormwater management. Also,

since reserves can be accumulated from one year to the next, there is no pressure to expedite funding at fiscal year-end if that is not prudent. This adds to program stability and efficient management of financial resources.

TRENDS IN FUNDING PRACTICES

Increasing Complexity

The emerging trends in the 21st Century suggest that funding issues will encourage tailoring of funding to specific program objectives, and funding practices will branch out in several directions. As stormwater programs become more sophisticated, unique local concerns and priorities gain greater visibility and support. Also, as more linkages are established with other governmental and even private-sector programs, the general trend in funding is toward greater complexity, and "standard practice" is increasingly likely to be supplanted by local innovations.

Stormwater utilities established in the 1970's and 1980's tended to be funded almost entirely from their service fees. Service fee rate methodologies were relatively consistent though rarely identical. They were cost-based, and rate structures were linked to peak and/or total volume of runoff by fee calculations employing parameters such as impervious area. Use of other funding methods and mechanisms in coordination with service fees was very limited.

Beginning in the 1990's a refinement trend emerged. The basic structure of funding and service fee rates remained relatively stable, but local entities began to push for more sophisticated and detailed cost, rate, and funding analysis. In part, this was due to the rapidly increasing technical capability offered by computerization and data gathering and processing. It also reflected the fact that more large cities instituted stormwater utilities as Phase I NPDES requirements were imposed. Their expectations were generally geared to more sophisticated cost and rate analyses and they often retained management and rate consultants with experience in other disciplines.

In the first decade of the 21st Century the trends in funding have been primarily in response to Phase II of the NPDES program, which impacts many more cities and towns than Phase I. This has had two somewhat conflicting effects. The introduction of a water quality objective caused many local governments to view stormwater management more broadly. However, as an increasing number of smaller cities and towns explored stormwater fee options to meet NPDES permit obligations, they tended to demand simpler and less expensive approaches than those preferred by large communities. These factors have been further compounded by federal and state initiatives to manage watersheds holistically, which is filtering down through regulatory programs and grant and loan opportunities. As a result, the key stormwater funding trends for the next decade include the following.

Blended Funding

Blending several sources of funding to support stormwater management program strategies has been a slowly emerging trend. The most successful stormwater programs are supported by several sources of funding, enabling them to spend more money to elevate the visibility of the program and improve cost accountability of specific functions or improvements.

Other sources of funding used in combination with service fees include general budget appropriations, dedicated special taxes (property, income, sales), special assessments, fees charged in lieu of requiring compliance with standards or requirements such as on-site detention, system capitalization or development impact fees to recover past expenditures or better allocate the cost of infrastructure over a period of time, and matching funds such as federal and state grants and loans. There are few constraints on local governments' authority to combine and selectively target several types and/or sources of funds to accomplish various purposes, see Appendix for examples.

Multi-jurisdictional Funding

Cooperative funding with other entities is a hallmark of many successful stormwater programs. Several factors have induced stormwater managers to participate in multi-jurisdictional funding, especially in recent years as water quality considerations became more prominent.

Stormwater runoff doesn't conform to jurisdictional boundaries. Drainage waters flow from jurisdiction to jurisdiction based on topography. Solving an upstream community's problem may become the source of a problem in another jurisdiction located downstream. Thus, the most efficient infrastructure solution for a given drainage problem may lie outside the jurisdiction where the impacts are manifested. For example, to relieve flooding a regional detention facility built in an upstream portion of a watershed in a rural unincorporated area may be less expensive and provide better protection than extensive flood protection works installed downstream within a major urban area. This may encourage several cities and towns in the downstream portion of a watershed to fund a common solution higher in the upstream reaches rather than attempt to install independent drainage improvements in each of their communities.

The availability of federal and state grants and loans and cooperative programs has also encouraged local governments to join in conducting activities associated with stormwater management. This has been a significant inducement to local governments to establish stormwater service fee funding. For example, the City of Griffin, Georgia was able to obtain more grant, loan, and shared funding from federal, state, and county sources during the first two years of its stormwater utility operation than was generated in service fees. A key factor in gaining other agencies' financial support was the City's ability to match their grants and loans with reliable local funding.

The presence of stormwater quality program mandates of state and federal agencies has also encouraged local governments to participate in cooperative programs. The emerging emphasis on stormwater quality has created both opportunities and incentives for cities, counties, and special-purpose districts to participate in cooperative efforts. Examples include public education, water quality monitoring and sample analysis, the development of drainage, erosion control, and other technical manuals, and even consolidated development plan review.

Cost-sharing With Other Public Programs

Successful stormwater utility programs have financial strength that has enabled them to venture into cost-sharing programs with entities that have different responsibilities but shared interests. Greater funding has broadened the scope of stormwater management to include related issues such as land use and development regulation, environmental protection, and habitat preservation. This in turn has revealed more opportunities for linkages with other programs, and sharing of resources to address mutual interests and needs is increasingly common.

Wastewater treatment, especially, lends itself to cooperative funding with stormwater management, due in large part to the extensive historic use of combined sanitary/stormwater sewerage systems in many areas of the country. Stormwater separation and inflow/infiltration corrections were often funded as wastewater treatment expenses in the past. Now some communities have recognized that the expense of separating stormwater and wastewater or eliminating stormwater inflows into wastewater sewer systems may be assigned to a stormwater cost center rather than wastewater. When a stormwater utility is present, the costs shift to properties that generate substantial runoff versus those that generate substantial amounts of sewage.

Watershed management practices and water quality protection also introduce opportunities to share costs with other programs. The City of Bellevue, Washington Storm and Surface Water Utility has a primary objective of preserving small streams. Protection of wetlands and construction of regional detention ponds were key elements of the City's stream preservation strategy. The Utility purchased extensive areas of wetlands and other areas along streams, and worked closely with the City's Park Department to manage them as passive-use parks and open space. Other properties used for detention and groundwater recharge have been developed into active recreation facilities such as neighborhood playgrounds, soccer pitches, and even tennis courts.

Countless other communities have built parks, greenways, and trails along streams, including examples such as the Mingo Creek linear park in Tulsa, Oklahoma and along Cherry Creek, South Platte River, and many other drainageways in the Denver, Colorado metro area. Salt Lake City, Utah modified

and improved a high school baseball field to serve as a major detention facility during severe storms and major snowmelt events.

Some communities have also used their stormwater utility funding resources to support program enhancements such as geographical information systems (GIS), upgrades to financial management and utility billing/collection systems, and transportation improvements such as construction of roadside curbs and gutters to replace open ditches. The linkage of stormwater management to other programs has justified funding in whole or in part activities such as leaf collection to reduce local flooding due to plugged inlets (e.g., Greensboro, North Carolina) and street sanding and snow removal/dumping to reduce stormwater quality pollution.

Broader Private Sector Participation

The importance of contributed capital infrastructure built by developers should not be underestimated. Though often unplanned and uncoordinated, many early components of local drainage systems that emerged in the 19th Century were built by the private sector coincidental to commercial, industrial, and residential projects. The economic boom of the 1920's spawned a major surge in private investment in public facilities, including stormwater drainage systems. In most suburban communities developed since World War II, a majority of the stormwater infrastructure has been built by developers and turned over to a public entity for long-term operation and maintenance.

More recently this approach has expanded to include cooperative efforts involving public entities and the private sector, with stormwater management requirements being integrated with other objectives. For example, a stormwater detention facility built by a developer might now be integrated with recreational facilities such as greenway corridors, golf courses, baseball fields, or soccer pitches. The financial participation in such improvements may be broadened to include several public agencies having primary responsibility for the long-term operation and maintenance of the facilities.

This trend has several important implications for stormwater managers. They will need to reach out to private-sector entities and programs to identify opportunities that serve their mutual benefit. They will need to broaden their community's vision of what stormwater management entails to ensure support for cooperative programs with private interests. Because many more developments are being built by larger, more competent and better financed development companies, local stormwater management programs will need to increase their skills and sophistication to keep pace and ensure that participation is optimized.

Increasing Influence of Technology and Data

Perhaps the most pervasive factor guiding changes in stormwater management in the past thirty years is rapid acceleration of new technology. This directly influences trends in stormwater funding practices as well as engineering and

other technical endeavors involving the availability and management of data. For example, the cost of creating or gathering data required to prepare a master account file for stormwater service fee billings has plummeted in the past decade, from as much as $6/account to less than $0.25/account depending on the parameters and rate structure involved. Satellite imagery of extensive land areas now renders digital information that is at least as precise as visual interpretation of aerial photography, with far greater consistency and reliability at much less cost.

Such increased efficiency encourages local governments to seek more sophisticated stormwater service fee rate methodologies, and to combine several funding mechanisms in much more complex approaches. However, is it practical and beneficial to refine a community's stormwater service fee rate structure when other parameters are not yet as precisely quantifiable? The trend is clearly toward more sophisticated rates, but optimizing the value of the rapidly increasing technological capability has not yet been adequately addressed.

FUNDING METHODS AND MECHANISMS

Local Governments' Funding Authority

Stormwater management has historically been supported by a range of funding methods and mechanisms that reflect the mix of federal, state, and local programs. Since this guidance is directed toward the funding of local stormwater management programs, especially stormwater utilities, we focus on the approaches used primarily by cities, counties, and special-purpose districts.

Cities and counties in most states are generally authorized by state legislation to conduct stormwater management. This general authority is supplemented in some states by home rule provisions. Cities and counties adopting such powers may gain greater latitude to undertake stormwater management functions, regardless of whether specific statutory authorization is available, subject to certain limitations and ballot approval requirements.

The changing nature of stormwater management is also providing greater flexibility in stormwater funding. Undeniably, stormwater management has now become fundamentally regulatory. Federal and state laws confer a water quality regulatory role upon local governments through the NPDES permit program. Similarly, adoption of local system design criteria and on-site control requirements for runoff quantity is rooted in a regulatory purpose of preventing problems. This regulatory foundation may expand and strengthen the local authority, especially as it relates to funding decisions. Generally speaking, locally-elected officials have greater latitude in adopting fees that are associated with regulatory purposes than for other objectives.

Funding Methods and Mechanisms

Funding methods and mechanisms commonly used for stormwater programs include:

- General revenue appropriations
- Stormwater user (service) fees
- Plan review, development inspection, and special user fees
- Special assessments
- Bonding for capital improvements
- In-lieu of construction fees
- Capitalization recovery fees
- Impact fees
- Developer extension/latecomer fees
- Federal and state funding opportunities such as grants, loans, and cooperative programs

General Revenue Appropriations

Despite the proliferation of stormwater utilities, general tax revenues remain the most common source of stormwater management funding. Substantial technical analysis is normally not needed to fund stormwater management from general revenues, which local governments may use for any legal purpose. The majority of most cities' and counties' general revenues are from taxes (e.g., property, sales, and income), exactions (e.g., franchise fees on utilities), and federal/state revenue sharing, and are simply appropriated for specific purposes, including stormwater management, through the normal budget process. Because they have limited purposes and, in most states, often do not have broad general taxing powers comparable to cities and counties, special-purpose districts are more likely to be funded through limited property taxes, special assessments and service fees.

The practice of funding stormwater management from general revenues has contributed to a dispersal of stormwater management responsibilities. Stormwater management is not typically an independent municipal function, either operationally or financially. Many city and county functions are peripherally involved in or impacted by stormwater runoff. Components of what might be collectively considered a consolidated stormwater program are often embedded in operational units such as public works, engineering, transportation, street maintenance, wastewater treatment, and even recreation. The funding of stormwater management in such cases is also typically embedded in whatever resources are assigned to the primary function. They may budget for costs that are essentially stormwater management, but not readily identifiable as such in their budgets. Such dispersion of functions and costs may obscure any discernible relationship between demands for stormwater services and facilities and how the cost burden is apportioned.

General revenues have several attractive attributes for stormwater management. Most cities' and counties' general revenues are, in the absence of other demands, sufficient to support effective stormwater management. The sources of general revenues are usually well-established, fully understood, and well-accepted by citizens and business interests. They are relatively stable from year to year, though economic downturns tend to excessively impact jurisdictions whose general revenues are highly reliant on sales and other business taxes rather than property value, which is more stable.

However, general revenues also have significant disadvantages as a source of stormwater management funding. Many worthy public purposes, including public safety and social services, are commonly funded from general revenues. Stormwater management has historically struggled to compete effectively against other needs, and major long-term reallocations of general revenues simply to enhance stormwater management capabilities are rare. In the absence of a major budget reallocation, increasing general revenues to support stormwater management implies approval of a tax increase of some sort. Neither option is politically attractive for most local officials.

Because they are not earmarked or dedicated to any specific purpose, annual appropriations of general revenues shift with elected officials' and administrators' perceived priorities. Stormwater management needs are more likely to receive better treatment in a year following severe storms and drainage problems than in a year following a drought. A lack of stable funding makes it difficult to plan and carry out a consistent, long-term program.

The sources of general revenues have little if any inherent association with the origin of stormwater management demands and costs. For example, property taxes are a major source of general revenues for many cities and counties. Such taxes are usually calculated based on the economic value of land and improvements, which have little direct relationship with stormwater runoff quantity or quality. Sales taxes are typically based on retail sales, which likewise have no identifiable link to stormwater management costs. Franchise fees are normally a percentage of the gross income of the activity utilizing the franchise rights.

Because general revenues are derived primarily from taxes and exactions imposed upon businesses and individuals, other parties that impose significant demands on stormwater systems and programs may be excluded from participating financially in solutions. For example, in cities which have state-owned properties, public universities or federal military installations, a substantial demand for stormwater services may be traced to such tax-exempt properties.

The disparity between the need for stormwater services and facilities and the source of general revenues does not end with tax-exempt properties. Some private properties, for example discount retail stores, parking lots and warehouses that have large expanses of relatively low value impervious

coverage, do not pay taxes commensurate with the demands they impose on the stormwater systems. Conversely, more valuable properties such as high-rise office and residential condominium towers that may have less impact on stormwater runoff pay substantial property taxes.

Stormwater User (Service) Fees

Stormwater utilities funded primarily through service fees are the focus of this guidance. Service fees are discussed only briefly in this section, but are covered in greater detail in other sections of this chapter. Specifically the sections on "Service Fee and Assessment Design Considerations" and "Service Fee Rate and Assessment Methodologies" further address this area.

Although user fee funding of stormwater programs is generally associated with the stormwater utility concept inaugurated in the 1970's, Billings, Montana adopted a "storm water charge" in June, 1964. Relying in part on that revenue stream, the voters of Billings also approved the issuance and sale of negotiable revenue bonds for the purpose of reconstructing and extending the City's stormwater and sanitary sewer systems. This action was challenged in court and was eventually upheld by the Montana Supreme Court in 1966[2]**.** Billings has since funded a majority of its stormwater management programs through the charge.

Billings' "storm water charge" represented a major departure from conventional stormwater funding but did not elicit widespread imitation. The transition to user fee funding did not become widespread until the early 1990's, although several cities and counties in Washington, Oregon, and Colorado established utilities during the 1970's and 1980's. The utility user fee concept has now been adopted by over five hundred cities and/or counties. It is generally referred to as the "stormwater utility" approach because it not only provides user fee funding but also incorporates accounting and management practices similar to those of other municipal utilities like water supply, wastewater treatment, and solid waste management. Similar approaches have been used in Canada and Germany.

Substantial latitude is available to local elected officials in structuring rates and fees, especially if they are associated with regulatory functions. Specific methods of calculating stormwater user fees are not mandated by law in most states, though some limitations do exist. For example, in Texas the state legislature has exempted public universities from local stormwater user fees. Most stormwater user fee rates account for conditions on properties that affect the peak rate of runoff, total volume discharged, and pollutant loadings on receiving waters. A majority are based on the amount of impervious area (roofs, paved areas, etc.),[3] which determines both the proportion of rainfall that runs off and the peak rate of discharge during and following storms.

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[2] City of Billings v. Ralph Nore, 148 Mont. 96; 417 P.2d 458 (1966)

[3] Stormwater Utility Survey 2004 – 2005, Black & Veach, Kansas City, MO, 2005

Stormwater rates have also been based on the gross area of properties and numerical factors that reflect the intensity of development. A few cities and counties have incorporated both gross area and impervious area or the percentage of imperviousness into their rate calculation. Other stormwater service fee rate parameters include land use classes, zoning classes, and water meter size, though these are generally not considered to offer comparable equity of cost allocation relative to impervious and gross area methodologies.

A stormwater user fee is highly flexible and can easily be tailored to individual situations and coordinated with other funding methods. Revenue from user fees and other funding sources can be blended together or a fee might be applied only in a limited service area rather than the entire jurisdiction, excluding other areas which do not require service or are impractical to serve. No fixed practice prevails; though most cities apply their user fees city-wide and many counties define more limited service areas where urban/suburban conditions exist.

User fees are also authorized for some types of special-purpose districts, which may apply them district-wide or designate them only for specific service zones. Such approaches can be combined, as in the case of a stormwater utility that has both a general service fee and also administers special-purpose improvement districts to fund localized improvements or services.

The stability of a dedicated user fee revenue stream ensures that long-range scheduling of capital improvements and operations can be done with reasonable assurance. User fees may also free up general revenues and other resources allocated to stormwater management for other purposes.

The greatest potential disadvantages of stormwater user fees are high visibility of the charge and the cost of its development and implementation. Regardless of technical distinctions between "taxes", "exactions", "assessments", and "service charges", any form of government funding may be viewed by some citizens as a "tax" and thus be unpopular. However, the high visibility of a defined stormwater user fee might also be beneficial if it convinces a community that long-standing flooding or pollution problems will be addressed.

The cost of developing and implementing utilities reflects the size of a community or the complexity of processes employed. Some of the formative costs such as program and cost analyses are essentially common to all situations. Others are “unit” costs. For example, data must be assembled to populate a master account file for billing. The cost of implementing a utility user fee is a function of the number of accounts, and the total cost typically amounts to eight to twelve weeks of the revenue stream that is created. This includes all costs associated with the necessary program and financial analyses, data assembly, modification of billing and other information systems (or activation of a new system), and public education and involvement.

Plan Review, Development Inspection, and Other Special Fees

A variety of special user fees could reasonably be included under the scope of a stormwater utility or adopted separately to support regulatory measures. Most often they are related to special services provided to a limited group, as opposed to user fees that are generally applicable to utility customers. Such fees apportion the costs only among those who require the service or cause the need for the regulatory measure.

Fees for the performance of regulatory activities are usually associated with protecting the public health, safety, and welfare in some manner. Some regulatory activities may be mandated by federal and/or state requirements or as conditions of NPDES or other permits. Regardless, to the extent special fees are associated with a regulatory function (e.g., development regulation); authority to institute them is typically a product of the police powers of the governance entity.

Special fees may also have other applications, such as a cost recovery mechanism that assigns certain expenses to a specific group. For example, experience has demonstrated that maintenance of on-site detention systems is frequently ignored or deferred by property owners, or alterations may be intentionally or unintentionally made to such facilities. Inspections may be necessary to ensure that on-site systems are properly maintained and not altered from their approved design. Placing the cost of such inspections on the specific property owners through special fees relieves the general taxpayers or utility ratepayers of the expense.

Special fees typically provide only a small additional amount of revenue for a stormwater utility, but enhance the equity of cost apportionment. Adoption of such fees may require that other fees associated with regulatory reviews, inspections, or special services be evaluated to ensure that individuals are not being charged twice for the same service.

Special Assessments

Special assessments have been used to fund capital improvement and operation of stormwater systems since colonial times. The assessment concept is predicated on apportioning costs in proportion to the direct and special benefits individually derived by specific properties. It has been applied to funding of various public facilities, ranging from sidewalks and roads to flood control channels and dikes. In application to stormwater management, the special assessment mechanism has evolved as the management paradigm changed.

The chief drawback of the traditional special assessment methodology is that the distribution of costs must be proportionate with the direct and special benefit accruing to each property being assessed. Although standards differ from state to state, generally the benefits must be definable, measurable in some economic manner, and available to the property being assessed within a practical timeframe. In most cases, general benefits accruing to all properties as a

consequence of a stormwater improvement or activity cannot be used to justify a special assessment.

The courts have established substantially different standards for special assessments versus service fees. Broader latitude is given to local elected officials in setting service fee rates, and especially those associated with regulatory purposes. Special assessments must conform to more restrictive technical standards based on apportioning costs to reflect the value of benefits accruing to individual properties. Fully complying with the standards the courts have set for special assessments may therefore require more precise and costly data than is needed to support a service fee, which must simply be fair and reasonable.

Special assessments for drainage are most workable in relatively localized or specific applications. For example, improving a ditch or channel that directly serves a few properties or a relatively small service area is an appropriate project for special assessment funding. A special assessment is less suitable for capital projects that serve a wide area, and may be wholly unsuited to facilities providing a general benefit to the community at large.

Much of what must be done to effectively manage stormwater quality may not be directly and specially beneficial to individual properties. Thus, special assessments are not widely used as a primary funding mechanism for that purpose, though in recent years several benefit assessment areas have been instituted in Southern California to support local water quality programs, and Florida counties fund stormwater management through assessments (as so defined in a Florida Supreme Court decision) that are similar to many stormwater service fees.

Bonding for Capital Improvements

The expense of major capital infrastructure, land, and equipment has posed a significant challenge for stormwater programs whose annual revenues and resources are limited. As a result, local governments have used bonding to fund major capital improvements for many years.

Bonds are sometimes used to fund operations as well as capital improvements, though that practice is not generally viewed as prudent and some states prohibit or limit such uses of bonding. However, some stormwater management costs can be viewed either as a capital or operating expense. For example, remedial repairs to aging infrastructure might legitimately be viewed as either a capital expenditure or an operating expense.

Bonds are not a revenue source, but rather a method of borrowing money to fund expenditures. Debt service of bonds is commonly derived from general revenues, service fees, or special assessments. In some cases, specific funding mechanisms or sources are identified in bond covenants. For example, a bond

might be issued with debt service to be paid from a special local option sales tax or a special assessment upon properties served by the improvement.

The chief advantage of bonding is that it allows expenditures that far exceed current revenues and resources. Construction of major improvements can be expedited in advance of what could be funded from annual budget appropriations by spreading the costs over time, much like a home mortgage or automobile loan enables a buyer to acquire assets they could not afford to buy for cash.

In the case of stormwater management, expediting a capital project by several years through bonding may result in significant public and private savings if flooding, other damaging impacts, and inflation of land acquisition and construction costs are avoided. The major disadvantage of bonding is that it is essentially a loan that incurs an interest expense, increasing the total cost of capital projects.

Two types of bonding are available, revenue bonding and general obligation bonding. General obligation bonding incurs a debt that has first standing with regard to public assets and is backed by the "full faith and credit" of the issuing agency. All revenues and resources of the entity, including various taxes, may be used to service a general obligation debt. Revenue bonding is supported and ensured only by specified revenues, such as service fees or assessments. As a result, the bond market sometimes imposes higher interest rates on revenue bonds and/or dictates that excess revenue be generated (termed coverage) to reduce the risk of non-payment. Recent experience suggests that the bond market has recognized the stability typical of stormwater utility service fee income, and has priced stormwater revenue bonds favorably.

Cities and counties in some states are also authorized to issue bond debt that is backed by the full faith and credit of the issuer but has debt service funded from a designated revenue source. This is commonly referred to as “double-barreling” of bonds. The full faith and credit provision is simply a fall-back if the revenue stream should fall short. Such bond issues typically attain the bond rating and interest rate of the issuing agency’s general obligation debt, but the entity’s general tax revenues and statutory debt limits are not burdened.

In-lieu of Construction Fees

In-lieu of construction fees are not specifically authorized under most state laws, but might be adopted in some circumstances as one element of a comprehensive stormwater utility user fee rate methodology or as a regulatory fee. Such fees have been charged in lieu of requiring construction of on-site stormwater systems for many years.[4]

[4] For example, Tulsa, Oklahoma instituted fees in lieu of requiring on-site stormwater detention improvements on each and every development project in more than a dozen watersheds during the 1970’s, and used the revenue to defray a portion of the expense of regional detention facilities in those areas.

In-lieu of construction fees are sometimes confused with impact fees. However, an in-lieu of construction fee is usually a substitute for requiring on-site solutions such as detention storage. They may be used even in instances when an on-site system would work but an offsite regional facility is preferable.

In contrast, impact fees are generally used to pay for off-site measures to compensate for the service-demand effects of development that are not solvable on-site. For example, the impact of a shopping center on stormwater runoff might be resolved either by requiring an on-site detention system or by building a regional facility off-sight that is paid for (in part) through the in-lieu of construction fee. Shopping center traffic that clogs nearby roads cannot be solved on-site, but an impact fee might be used to pay for additional traffic lanes and/or signalization to mitigate the impact.

The need for in-lieu of construction fees associated with stormwater management stems from problems that have emerged with on-site measures to mitigate development impacts. Experience has shown that requiring developers to install individual on-site detention and water quality facilities can lead to a regulatory and/or maintenance problem for a local government. Alternative regional solutions may be more efficient and reliable in controlling runoff volumes and pollutant discharges into public stormwater systems and streams. However, on-site systems are typically funded by the developers whereas the general public usually pays for regional systems. An issue of equity arises if general taxpayers or ratepayers have to fund regional solutions to mitigate the impacts of private development projects rather than requiring on-site control.

The flexibility to address issues either by on-site mitigation or by alternative actions elsewhere is advantageous if the financial conundrum can be resolved. An in-lieu of construction fee offers a practical option that may be preferable to both developers and local governments. Developers simply pay a fee in-lieu of designing and building an on-site system or facility, and the local government obtains financial support for more efficient and reliable regional systems.

The most significant disadvantage of in-lieu of construction fees is that they rarely generate sufficient revenue to fund construction of regional detention facilities, enlarge conveyance systems, or install water quality facilities in a timely manner. Also, they do not fund maintenance. This dictates that other revenues must be available to initially build and maintain regional facilities, and taxpayers or ratepayers are the parties burdened with those costs. However, over time, in-lieu of construction fees can contribute a meaningful component of the total long-term funding of regional facilities and equitably compensate those who have initially borne the costs.

In-lieu of construction fees are not necessarily easy to implement. They demand well-refined capital improvement plans and analyses of on-site versus regional alternatives, from which the alternative cost of the regional options can be

reliably determined as the basis for setting the fees. This may necessitate detailed and costly analysis of potential regional facilities when a simple regulatory approach would suffice. At least a portion of the cost of preparing suitable analyses and documentation should be incorporated into the structure of in-lieu fees.

Capitalization Recovery Fees

Capitalization recovery fees are also known as system development charges, capital facilities fees, utility expansion charges, and by other titles. They are not specifically provided for by authorizing legislation in most states, but have been incorporated into various utility user fee rate structures for many years.

Capitalization recovery fees are sometimes confused with impact fees and even with in-lieu of construction fees. Capitalization recovery fees are most often intended to recover a fair share of the prior public investment in infrastructure capacity installed to accommodate future development. The fees are applied to developers who make use of that provisional capacity when they develop projects. In some instances, capitalization fees may also be used to attain suitable apportionment of future capital costs. This is particularly applicable in cases where funds have been accumulated in preparation for major capital projects.

There are several ways of structuring and calculating capitalization charges, including the growth-related cost allocation method, the system buy-in approach, the marginal incremental cost approach, and the value of service methodology. They differ from in-lieu of construction fees and impact fees primarily in terms of: 1) the fundamental purpose of the charges; 2) the timing of improvements versus when the charges are collected; and 3) their relationship to the specific facilities that are funded through user fees. In most cases, capitalization recovery fees are related solely to capital costs, though some justification may exist in certain circumstances for incorporating long-term operating expenses.

Capitalization charges provide a mechanism whereby developers participate in paying for capacity that was previously built into public systems in anticipation of their needs or which is planned for the future and for which funding is being accumulated in anticipation of building the improvements. In effect, they allow a deferral of participation in the capital cost of facilities until a property is developed and either makes use of the provisional capacity already in place or buys into the previously accumulated fund reserves intended to build future improvements. The use of such fees for stormwater management capital costs is clearly appropriate since most drainage systems are consciously designed to provide capacity to accommodate future development in an economical manner.

Whether a stormwater capitalization charge is appropriate in specific cases may be related to the user fee rate methodology that is employed. For example, many stormwater user fees are based solely on impervious area where only

developed properties are charged. Undeveloped properties do not have impervious area and therefore are not charged. However, the capital facilities being funded by the fee are normally designed with future conditions in mind. This initially results in excess capacity being built into the system, which is paid for solely by currently developed properties. A capitalization charge may therefore be an appropriate recapture mechanism to ensure a fair and reasonable allocation of the capital costs among all properties using the facilities over time.

If the rate methodology allows user fees to be charged to undeveloped properties, a recovery mechanism may not be needed at the time properties are developed. The rate structure might have a system capitalization component that assigns an appropriate proportion of the capital costs to undeveloped properties based on expectations of the future developments and their stormwater system demands.

Impact Fees

Impact fees have been adopted by local government entities for a variety of public infrastructure components. They are based on the cost of mitigating development impacts of individual developments by building public off-site improvements where impacts can't be solved on-site. For example, traffic impact fees support the cost of additional lanes and/or signalization to accommodate the added traffic generated by projects such as shopping malls and high-rise condominiums. Such impacts cannot be effectively addressed by on-site facilities. Impact fees have also been employed to meet communities' park and recreation standards and other objectives.

Standards and requirements have evolved for adopting and applying such fees and have been institutionalized in legislation in several states. Some of these statutes impose so many administrative burdens and limitations on use of the impact fee revenues that they are essentially impractical. At least one state, Georgia, has adopted legislation that specifies limited uses of developer impact fees that do not include stormwater management. Specific applications of impact fees have also been the subject of a great deal of litigation nationally. An unusual aspect of impact fees is that state courts around the country have been notably inconsistent. Recent cases that have reached the United States Supreme Court have added some clarity. The following is a summary of pertinent cases provided by David Burchmore, author of Legal Considerations, Chapter 3.

> City of College Station v. Turtle Rock Corporation, 680 S.W.2d 802 (Texas 1982)
> College Station adopted an ordinance requiring developers to dedicate land or pay an in-lieu fee for new parks. Turtle Rock paid the fee and sued. The Texas Supreme Court ruled that the ordinance was

"reasonable" and "accomplished a legitimate goal substantially related to public health, safety, welfare."

Nollan v. California Coastal Commission, 483 U.S. 825 (1987)
Nollan wanted to replace his beachfront bungalow with a larger house. The Coastal Commission required public access across his property to the beach and an adjacent park. Nollan sued. The US Supreme Court supported Nollan, stating there was no "essential nexus" between imposed conditions and impact of use.

Northern Illinois Builders Association v. County of Du Page, 165 Ill. 2d 25 (Ill. 1995)
NIBA challenged the legality of two State enabling acts and three County ordinances imposing road impact fees. The court declared the first act and the first ordinance unconstitutional, and the second act and second ordinance constitutional. Monies collected under the first ordinance were ordered returned.

In Hillis Homes v. Snohomish County, 97 Wash. 2d 804 (Wash. 1982), the state Supreme Court invalidated an impact fee imposed on residential development to help pay for schools on the ground that the exaction was in effect a tax intended to raise revenue, rather than a fee intended to regulate land use, and that only the state legislature could levy such a tax.

Florence Dolan v. City of Tigard, 512 U.S. 374 (1994)
Ms. Dolan wanted to expand her hardware store and pave her parking lot. Tigard requested dedication of an adjacent floodplain and bikeway. Dolan refused and sued. The US Supreme Court ruled there was no "essential nexus" and that the City failed to demonstrate that the benefits justified the requirements.

Erlich v. City of Culver City, 114 S. Ct. 2731 (1994)
The Supreme Court extended the Dolan analysis from property dedications to development fee exactions. Erlich was the owner of a defunct private health and tennis club, and sought a building permit to construct condominium townhouses on the project site. The city approved the permit but conditioned it on payment of numerous fees, including $280,000 to enable the city to build tennis courts that would replace the facilities lost with the demolition of the tennis club. Erlich refused, and sued claiming that the fee exactions bore no relationship to the impact caused by the project. The Supreme Court granted certiorari, vacated the judgment of the lower court dismissing the case for failing to state a takings claim under the Fifth Amendment, and remanded the case "for further consideration in light of Dolan."

Impact fees are typically limited to situations in which the impact of new development on existing infrastructure systems is: 1) measurable and certain; 2) of definable geographic or systemic extent; and 3) quantifiable in terms of the incremental capital investment that will be required to maintain (not attain) an adequate service level in the face of the added growth attributable to the subject development. The final point is critically important in terms of stormwater management systems. Impact fees cannot be used to bring inadequate existing systems up to an adequate service level. Nor can they be used to address the impacts of other past, present, or future developments. Thus, they are not useful in correcting many deficiencies that already exist in stormwater systems. Impact fee revenues must also be earmarked for specific projects or uses, must be expended relatively quickly, and, if not, must be returned to the developer, often with interest.

Developer Extension/Latecomer Fees

Developer extension/latecomer fees are a good example of resources available to stormwater management entities that do not directly generate income but support attainment of important objectives. They are not a revenue mechanism, but rather a means of apportioning capital costs among several properties as they are developed. The most common use of this type of fee around the country is for water and sanitary sewer system extensions.

Extensions to utility systems and other infrastructure improvements are often built by developers. Under the developer extension/latecomer fee concept, the initial developer is later compensated for providing the facilities by fees applied to subsequent developers that tap onto or otherwise make use of the improvements. Although such fees are not specifically authorized in legislation in most states, they can be adopted as part of a comprehensive stormwater user fee rate structure or negotiated on a case by case basis.

A developer extension/latecomer fee works in the following way. Developer "A" proposes a project that requires a stormwater (or water, or sewer) system with "x" capacity for its own purposes. However, practical design considerations indicate that a larger system should be installed to properly serve other nearby properties that are currently undeveloped. Developer "A" therefore is required to build a larger system than necessary simply to serve his or her own property, and incurs an additional cost. Property owners subsequently tapping into the improved system when their development occurs are charged a one-time fee, and the fee is then transferred to Developer "A". This type of fee is structured so that Developer "A" and all other users of the facilities ultimately bear a fair proportion of the capital cost. The management entity typically receives no revenue from the fee, although some charge administrative expenses on top of the capital cost.

Federal and State Funding

Federal and state funding for local stormwater management takes many forms, including technical support, facility construction, cooperative programs, and grants and loans for various purposes. Local governments are generally authorized to make use of federal and state government funding, such as the State Revolving Fund Loans financed by EPA to achieve CWA objectives, for various purposes including stormwater management, flood control, and water quality protection.

SERVICE FEE AND ASSESSMENT DESIGN CONSIDERATIONS

The remainder of this chapter will focus on service fees and to a lesser extent assessments.

There are many reasons for local governments to adopt service fees to fund their stormwater programs. These include: 1) generation of sufficient revenue to meet capitalization and operational expenses; 2) customizing the apportionment of costs among various segments of the community; 3) support a growth management strategy, facilitate life-cycle asset management, or help segregate costs related to unfunded federal and/or state mandates; and 4) diminish a general revenue budget problem by moving stormwater off that source of funding and substituting service fees. Regardless of the specific motivation, the process of designing a stormwater utility funding strategy introduces the need for a higher level of analysis than that required for general fund revenue allocations.

Design of both service fees and assessments must meet general and technical standards. Standards differ between fees and assessments, and vary from state to state as a result of constitutional, legislative, and case law differences as addressed in Chapter 3. Selection of a preferred approach is not a purely technical issue. It is not required that the very best technical approach be selected. A user fee rate structure that fits local practices and meets basic industry standards may serve a community better than a highly detailed, very expensive approach that is confusing to the public. In many cases, decisions are influenced by practical considerations like public perceptions of equity, implementation and upkeep costs, timing, and ease of understanding. The following considerations are among those commonly used to evaluate and select preferred methods for design of user fee rate structures.

Legality

Nearly thirty (30) percent of the respondents to a recent national survey of stormwater utilities indicated that their stormwater utility funding decisions had

been subjected to a legal challenge of some sort.[5] That such a high percentage would be contested on legal grounds is probably not surprising given that the funding decisions and user fee rate structures involve money. The legal issues are addressed more thoroughly in Chapter 3, Legal Considerations, however the following is provided to help provide context for service fee and assessment design considerations.

Stormwater management is clearly a function that falls within the general authority of cities and counties in most states. Managing and funding that function as a utility is now an accepted practice, and both cities and counties have the latitude to adopt stormwater user fees in many states. The courts in several states have determined that there are certain characteristics that determine whether a charge is a tax, service fee, special assessment, or exaction. Although the detailed findings in the various states differ, they are influenced by both intent of the legislative body and the structure and application of the funding methods and charging mechanisms. Procedural issues that may have an impact on the legality of service fees and assessments include the following:

- What was the intent of the jurisdiction in establishing the charge, and how are funds being used?
- Was the service fee adopted simply to counter a budget deficit, or was it predicated on meeting stormwater program costs?
- Does the rate structure satisfy general standards of how service fees should be applied to individual properties?
- Are similar fees charged to similarly-situated properties or customers?
- Are charges to disparate properties or parties consistent and balanced?
- Did the local board or council act with adequate knowledge and consideration of the issues?
- Were all procedural steps scrupulously followed?
- Was adequate publication of notice of intent given for all of formal actions taken by elected officials?

Equity

Attainment of equity is a fundamental objective in the design of both fees and assessments, and one of the primary justifications commonly cited for establishing a utility. Equity has both technical and perceptual aspects. Service

[5] Survey of Stormwater Phase II Communities, National Association of Flood and Stormwater Management Agencies, Washington, DC, July 1999

fee rate methodologies are designed to attain “equity” as a fair and reasonable apportionment of cost of providing the needed services and facilities. Fees are expected to have a substantial relationship to the cost of providing the services and facilities to each customer. In contrast, assessments seek to equitably apportion benefits derived from facilities or services as the means of applying the cost of them. Exactions, such as stormwater impact fees, are not necessarily required to meet standards applicable to fees or assessments, but must exhibit a rational nexus or linkage between the exaction and the purpose of the fee. Taxes generally have to meet only the standards contained in authorizing legislation.

Equity must be weighed against simplicity and clarity. The best utility rate structures generate charges that clearly and simply relate to the services and facilities being provided. A utility service fee rate structure might be highly equitable in terms of assigning costs according to service demands, yet still be deficient politically if it is too complex for the public to grasp the linkage between service, costs, and charges. In the case of stormwater management, most people can understand that replacing natural earth with impervious pavement or structures will diminish infiltration of water and increase runoff. Thus, rate structures based in some manner on impervious area and gross area are common. A realistic objective is to be consistent within generally accepted technical standards that most people will view as fair.

Courts in most states have usually deferred to the judgment of local elected officials in determining what constitutes equity in local applications and have demonstrated a reluctance to intervene in the details of rate or assessment design. Applications accepted by various courts suggest that the relationship must only be sufficient to satisfy reasonable common sense. This leaves the structure and level of service fees, assessments, and some exactions largely at the discretion of locally elected officials. As a result, details of service fee rate methodologies, assessment formulae, and some exaction charges can vary significantly. However, a governance body may not act arbitrarily and capriciously in setting rates and the resulting service fees may be illegally discriminatory or confiscatory.

Technical Foundations

Stormwater service fee rate design practices are derived from an understanding of hydrology and stormwater runoff from individual properties. A rate structure analysis is performed to determine how costs might be apportioned among those who are served in various ways by expenditures for operations, capital improvements, and support activities. Since stormwater facilities and services cannot be metered or directly measured, they must be represented by one or more parameters believed to reflect the service demands and therefore the costs.

Timing is a consideration in formulating rate methodologies and setting the amount of fees. The structure of a rate methodology is intended to recover pertinent costs over a given period of time, most commonly a budget period or, in the case of bonded capital projects, a debt service period. For example, infrastructure is provided to collect, convey, and discharge stormwater runoff in a manner consistent with prudent design and applicable water quality standards. The resulting system capitalization is generally applicable to all properties served by the improvements, ranging from those at the top of the hill to those at the bottom of the hill who are protected from upland drainage. By using different rate parameters and finance mechanisms, a rate designer can alter the apportionment of costs among such customers over time.

Expensing capitalization costs through annual budgets focuses the financial impact on rates that customers pay during the budget period in which projects are constructed. Bonding to finance projects spreads capitalization cost over the debt service period. Accepted rate design standards do not dictate that costs be allocated on an annual, debt-service period, or service life basis. That is left to the discretion of locally elected officials. What is expected is that apportionment of costs is generally consistent with the service demands of the properties served by the facilities.

Life-cycle costing of stormwater infrastructure is an emerging issue. Because a large proportion of the cost of stormwater capital infrastructure is initially borne by private developers, their costs have not been allocated directly to stormwater ratepayers in most cost and rate analyses. However, much of the stormwater infrastructure built by developers is transferred to public stormwater service providers, and the long-term expense of recapitalizing the improvements as they wear out becomes a public cost. Cost of sustaining such infrastructure has not, however, been incorporated into financial planning and analyses of most local governments or stormwater utilities.

With the advent of the stormwater utility concept, the perspective on long-term life cycle accounting of stormwater infrastructure has begun to change. Most water, wastewater, electrical and other utilities have incorporated the life-cycle cost of capital assets in their rate projections and financial reporting for many years. In 1999 the Governmental Accounting Standards Board (GASB) introduced Statement 34 on infrastructure reporting which introduces comparable accounting for capital assets into general governmental practice. This reinforces the standard of full accounting for life-cycle costs of stormwater systems and facilities, and mandates incorporating them into cost and rate analyses.

Origin of Costs

Conditions on individual properties, which collectively dictate what types of systems, programs, and activities must be provided, are primary factors influencing stormwater costs. The objective of service fee rate design is to craft a schedule of fees for various users that reflect the cost of efficiently meeting

their cumulative service demands. Modern stormwater assessment design objectives are more often reflective of the cost of providing benefits to the subject properties rather than value of the benefit, which was the traditional approach employed when assessment were based on property value.

“Service” can be defined in much broader terms than just operational activities and physical facilities directly attributable to a given property’s stormwater runoff. For example, it is clearly a service to upland properties that their stormwater runoff is collected and safely conveyed to a discharge point. Such service relieves them of the responsibility of disposing of their runoff, and reduces their potential liability for downstream impacts. At the same time, a service is also clearly being provided to downhill properties in the form of protection from the upstream runoff. Flood protection and regulatory programs that protect floodprone areas reduce public emergency and recovery costs. Drainage of roads and sidewalks facilitates mobility essential for public safety services, commerce, education, and other aspects of modern life. Stormwater quality management protects and enhances environmental health.

Precision is not a defined standard in formulation of costs or service fee rates. Cost analyses produce estimates, some of which can be more exact than others. The cost of operating a particular piece of equipment can be rather accurately projected, but watershed capital infrastructure plans may provide only an engineer’s estimate of the future cost of acquiring land and constructing a stormwater facility. An estimate may be a valid reference point for incorporating projected capital costs into rate structure and fee analyses, but the actual costs may vary from the estimate. And the rate structure and/or fees may have to be adjusted from time to time.

A variety of approaches are used in assigning costs among customers. Some communities have opted to localize capital costs by watershed to attain a high degree of association of their infrastructure costs with the property owners served. Localizing capital costs by watershed is also common practice when stormwater utilities employ special assessments. Most, however, have determined that their system capitalization costs are relatively consistent, that the service provided by such improvements is not limited to individual properties in specific areas, and allocation of the costs can reasonably be applied to the entire jurisdiction or utility service area. They reason, for example, that adequate drainage system capitalization along roadways is a service to the entire community.

A community’s historic approach to capitalizing stormwater infrastructure may influence rate design. Many communities have historically funded stormwater system capitalization from general revenues, spreading the cost throughout the community, though facilities may not have been equally capitalized throughout the jurisdiction. After spreading the cost community-wide for years but not attaining uniform service capability, it would be inappropriate to localize future

capital costs by watershed even if that approach more closely reflects the origin of cost for specific facilities to be built by the stormwater utility.

Revenue Sufficiency

If a service charge is adopted, it is essential that the enhanced stormwater program provide visible results. A new fee that doesn't achieve a higher level of service is more likely to face opposition than one that provides demonstrable improvements. In order to ensure that is attained, a service fee, along with any other funding sources, must generate sufficient revenue.

Flexibility

A service fee offers extraordinary flexibility compared to other funding methods. Within reason, a rate structure can be designed to apportion costs as a board, council, or commission wishes. There is no absolute prescription that must be followed. For example, some communities charge properties located in floodplain areas less than upland areas, but the City of Boulder, Colorado imposes a surcharge for floodplain properties. Some communities only charge developed properties, while others also charge service fees to undeveloped lands.

The latitude given to local elected officials to make various decisions regarding the design of a rate structure is a distinct contrast to taxation concepts based on property value and assessments based on benefit. Taxation methods generally allow little flexibility, and cannot be selectively applied or tailored to specific needs. Although assessment methodologies are generally more flexible than taxes, they must reflect direct and special benefit.

A service fee rate structure can also be augmented by secondary funding mechanisms and altered by modifications to tailor the cost allocation to the local situation. For example, many stormwater utilities use credits to recognize on-site control systems or activities that reduce the public expense of stormwater management. Such credits can be creative. The City of Griffin, Georgia negotiated a service fee credit with the local school district. The district agreed to teach an environmental education program that satisfied most of the City's NPDES permit public education mandate. Mecklenburg County (Charlotte), North Carolina offers a partial service fee credit to industrial properties that have their own NPDES permits.

Balance of Rates with Level of Service

A general legal standard for a utility service fee rate structure is that it must be fair and reasonable. The resultant charges must bear a significant relationship to the cost of providing services and facilities. The balance between rates and service levels does not have to be precise or perfectly consistent. If significant differences in service levels prevail over time, however, a rate structure should reflect the variance to a reasonable degree. This can be accomplished in several ways. The rate structure itself might be altered in some way. The rate charged

per equivalent unit of the service might be reduced or increased. A modifying factor or surcharge might be applied to the basic rate to reflect a lower or higher service level provided to a specific geographical area or customer group.

Data Requirements

The data requirements of various rate structures differ, sometimes significantly. Two general rules usually prevail: 1) new data costs more than existing data; and 2) each additional increment of precision costs more than the previous one. As a result, many communities prefer to use existing data and apply a rate structure that is relative simple and gross. The number of parameters necessary to calculate a service fee for each customer is an important cost consideration, but it is not necessarily less costly to use a single parameter rather than two or more. If complete and accurate data is readily available from an existing source, it does not necessarily cost more to assemble a master account file based on a more precise parameter or several parameters, though that is usually the case.

Industry standards for stormwater service fee rate structures have coalesced around a few data parameters that have a demonstrated relationship to the cost of stormwater services and facilities. Impervious area is a common parameter, not only because it is closely related to runoff rates and pollutant loadings but also because many communities already have that data in the form of planimetric polygons defining building footprints, paving, etc contained in their geographical information systems. If, however, the data is available only as line definitions and not in closed polygons, the polygons have to be created to measure the area. This may involve interpreting satellite imagery, aerial photographs and property line maps, and may make impervious area a more expensive parameter to implement. In some cases, an algorithm can be applied to the line segment data to join segments into polygons that can be measured, but that approach requires a significant amount of quality assurance review.

The data requirements associated with implementing and maintaining a stormwater service fee depend more on the subtleties of the rate methodology and the use of modifying factors than on the basic parameters selected. If an impervious area method were to be applied to all properties individually, impervious area information would have to be generated for residential as well as non-residential parcels. However, if a simplified residential service fee is utilized, data requirements and costs might be reduced by as much as 70 percent regardless of the type of rate methodology employed.

Implementation costs of a tiered residential rate structure are usually higher than for a single flat-rate residential service fee. A two-tier or three-tier simplified rate structure for residences requires some additional analysis of the residential housing stock subject to the charge. If information available from other databases could be used to determine the proper assignment of residential properties to different tiers, the impervious area of individual properties would not have to be carefully measured. However, experience has shown that grouping

residential properties is only slightly less demanding than precisely measuring the impervious area on each property.

The cost of implementing an impervious area rate structure is a function of the number of properties that must be measured, the accuracy standards adopted for data, and the measurement technique employed. Techniques available for determining the impervious area and gross area of individual properties range from very time-consuming and expensive on-site measurements to photo-interpretive methods using scaled aerial photographs or satellite imagery. Cost of developing impervious area data has ranged from less than $1 to over $6 per unit, depending primarily on whether or not a simplified residential rate is used.

Accuracy standards also influence the cost of both initial implementation and subsequent data maintenance. Use of an equivalency unit for grouping properties into ranges subject to a rate schedule allows less exacting data standards to be used without diminishing the percentage of properties that are correctly charged according to the rate schedule. Automating the maintenance of the data file can significantly reduce the on-going administrative expense. If building permit applicants are required to provide impervious area coverage figures, the information can be transferred directly to a service fee master account file.

Some counties and cities use both gross and impervious area or gross area and a second data parameter reflecting the intensity of development (percentage of imperviousness) instead of the actual impervious area. These approaches involve two parameters, but do not necessarily increase the cost of implementation and upkeep if the required data is readily available from existing sources. Intensity of development can be interpreted relatively quickly and cheaply for each property, and properties can be assigned to general categories instead of assigning unique development intensities to each one.

A mistake sometimes made by cities and counties when they first adopt a rate structure is to use a parameter simply because they have an existing database, not because it correlates with the cost of stormwater services and facilities. For example, at least a few cities and towns have used water meter size or even water use as a stormwater service fee parameter, simply because the data was readily available. This can lead to serious problems if the stormwater rate structure is challenged in court because there is little if any correlation between such factors and the cost of providing stormwater management.

Compatibility with Data Processing Systems

The cost of implementing and applying a stormwater utility service fee includes the work required to assemble a master account file comprised of customer names and the data required to calculate a billing. A master account file must also be linked to or integrated in some manner with a billing system that enables

the service fee to be delivered to the proper party, payments received and processed, and proper accounting to be performed. All of these typically involve extensive use of a computer data processing system and one or more databases.

Degree of compatibility of a preferred service fee rate methodology with existing databases and data processing systems directly influences the cost of long-term maintenance and operation of utility funding. Service fee billing, collection, and accounting costs are often less if a stormwater charge can be added to an existing system rather than creating a new means of delivering the billing and processing payments.

A majority of city stormwater utilities bill their service charges on water, wastewater, solid waste, electric, gas, and other municipal utility service bills. Many counties are primarily rural service governments that do not operate such utilities, so another approach is needed. Most counties have local property tax assessment, billing, and collection responsibilities. Therefore, county stormwater utility service fees in some states are added to their property tax billings. Some counties have opted to prepare separate service fee billing systems so as to avoid any confusion between property taxes and stormwater service fees. Special service districts either integrate the master account file and billing with existing water, wastewater, or other billing systems or, in some states, they are able to attach stormwater billing to a county or city property tax billing.

Consistency with Other Local Funding and Rate Policies

Most urban communities have a variety of funding mechanisms in place and adopted policies that portray local practices. If, for example, a community has water and sewer service fee rate structures that use residential flat rates, a simple residential stormwater fee would probably be very acceptable. If, however, local water and sewer rates are very complex, the general public's expectations are likely to be geared to that level of refinement. A flat-rate stormwater service fee for all residential properties might not be perceived as sufficiently accurate.

Revenue Stability and Sensitivity

Fortunately, stormwater service fee rate structures are not prone to some of the revenue stability and sensitivity problems of water and wastewater (sewer) methodologies. Stormwater costs and rates are generally associated with providing and maintaining a provisional system capacity that is fully utilized only infrequently, rather than with delivering a certain amount of water or collecting and treating a relatively consistent quantity of wastewater each day. As a result, the revenue stream of a stormwater service fee is not susceptible to conservation measures like water and wastewater utilities. Stormwater utilities do not have to increase rates as a result of customers reducing their consumption of a commodity like potable water.

SERVICE FEE RATE AND ASSESSMENT METHODOLOGIES

Rate Design

Conventions are emerging as stormwater utility service fees and assessments become increasingly common. Impervious area, gross area, percentage imperviousness, and land use are the most frequently used parameters.

Service Fees

In most instances, service fees are cost-based, i.e., they are designed to reflect the impacts that each property has on stormwater service demands and thus the cost of providing facilities and operational and support activities. Such costs are primarily a function of peak stormwater runoff rate, total volume of discharge, and pollutant contributions, but design practices for stormwater service fees and assessments have yet to settle upon a single common standard or even a generally-accepted best model for calculating charges.

Empirical studies have demonstrated that impervious surface area on a property is the single most significant factor influencing all of these impacts. Impervious area is also relatively easy to identify and quantify numerically and is the most common parameter used in stormwater service fee calculations. However, the impact of a given area of impervious surface may also be influenced by its shape, slope, surface condition, vegetation, and nature of its discharge to a conveyance conduit or channel.

Location of impervious and pervious areas on a given site is also important in determining the degree of runoff mitigation that results due to the presence of pervious areas. Runoff from an impervious parking area draining across a broad grass slope of permeable soil to a roadside ditch may be significantly less compared to that of a similar impervious area collected and drained by storm sewers. This has led some to focus on “directly-connected impervious area” in their stormwater rate structures.

Percentage of imperviousness is also significant because pervious surfaces may mitigate runoff impacts from a given property. Relatively few stormwater service fee methodologies employ impervious percentage directly in the calculation of service fees, but it is indirectly accounted for in methodologies that use a combination of gross area and impervious area or gross area and intensity of development.

Permeability of soil and vegetative conditions may also influence the mitigation effects attained from pervious areas. However, soil and vegetative conditions are rarely considered because they can vary dramatically, even across a single site. There are very few reliable and accurate soil inventories, soil conditions may be altered in the course of development, and vegetative effects vary significantly from season to season.

Assessments

Modern urban stormwater benefit assessment parameters are different than those employed in earlier times. Stormwater assessments were historically derived from ditch law practices applied to drainage and protection of agricultural areas. Since agricultural income was closely tied to the area protected or improved by the drainage practices, property area was the most common parameter for apportioning the benefit and impervious area was not a common consideration. Because the systems subject to drainage and ditch law assessments were geographically and functionally limited, built to protect acres owned by relatively few farmers, assessments would typically be based on acreage each owned. In later periods, property value was often used as the parameter for assessment calculations.

In contrast, the service area of modern urban stormwater districts or utilities is typically much larger with thousands of properties and owners. In addition, urban stormwater management may not always have a distinct benefit that is direct and special to individual properties. Therefore, use of the special assessment process for urban drainage projects must carefully evaluate area to be served, benefit to be provided, and relationship of benefit to individual parcels which might be assessed. Present-day assessment calculations are frequently based on parameters similar to those employed for stormwater service fees, i.e., impervious area, gross area, and development intensity. Additional discussion of this topic is included in the section covering Special Assessments in this chapter.

Uniform and Tiered Charges

A majority of rate structures currently in force employ uniform (flat-rate) or tiered fees for some or all customers rather than a calculated charge based on conditions on each property. The most common form is a flat-rate for detached single-family residential properties, coupled with discrete rates applied to non-residential properties. Two or three tiers of residential rates are common in communities that have a diverse housing stock. Some rate methodologies also apply uniform or tiered rates of various sorts to other classes of customers. For example, individual mobile home parks, condominiums and townhouses are sometimes billed flat rates per unit.

Rate structures that classify and group properties by development intensity or land use and apply a fixed rate to the classes are a form of tiering. For example, gross area/intensity of development rate structures commonly group properties into five to ten descriptive classes ranging from undeveloped or very lightly developed to very heavily developed. Such rate methodologies also typically group customers into gross area increments, so dual tiers of area and development intensity are used in the fee calculation formulae. A few communities have adopted very simple rate structures that charge residential properties one flat rate and all other properties another. Given the diversity of non-residential development conditions, this approach does not attain a high degree of equity in apportionment of costs of service.

Service and Equivalency Units

Many communities have opted to use various service units or equivalent unit values in their utility rate methodologies. For example, water rates are often based on metered use of gallons or cubic feet of water, which are units of service. Solid waste charges are frequently based on service units such as the size and number of bins or the tonnage of waste dumped at a transfer station. Stormwater service units or equivalency unit values are usually based on impervious area or gross area, and are most commonly derived from the typical or average condition on a single-family residential property. Terms like "equivalent residential unit" or "equivalent service unit" are commonly used to describe these values.

Service units or equivalency units are typically applied as "block charges", where customers are billed for increments of use. Water customers may be billed in increments of 1000 gallons or 100 cubic feet, rather than for a precise number. Such practices have been adapted to stormwater service fees. For example, Columbia County, Georgia uses an impervious area stormwater rate structure and charges each customer a fixed rate for each 100 square feet of impervious coverage.

Some communities have opted to use a combination of flat rates for single-family residential customers with an equivalency unit applied to other types of properties. For example, an average residential property in a given community might be determined to have 3,000 square feet of impervious area (including roofs, drives, walks, patios, etc), and this value might be used as a service or equivalency unit for other customers. All single-family residential properties might be charged for one equivalent unit, or two or more tiers of that increment might be applied to residential properties. The impervious area on other types of properties would be measured and that figure divided by 3,000 to determine the number of equivalent units that each should be charged. It is common practice to bill for each equivalent unit or fraction thereof, effectively rounding up to the next full unit.

Water and sewage rate structures often include increasing or declining fee schedules to encourage or discourage consumption, in which incremental "blocks" are defined. For example, in water and sewer rates the first 10,000 gallons used or discharged in a month would be charged at one rate, the next 10,000 gallons at another, and so on. This practice is not common in stormwater rates, though a few jurisdictions that bill undeveloped as well as developed properties employ declining rates to moderate the charges on large undeveloped tracts of land.

One of the benefits of a service or equivalency unit value is that it allows easy comparisons of charges among dissimilar customers. For example, under the assumptions used in describing an impervious area rate methodology previously, a commercial or other non-residential property with ten times as much

impervious area as a typical residence (assumed to be 3,000 square feet) would be charged for ten units of use. A “big-box” retail store (or small shopping center or industrial site) with 600,000 square feet of impervious coverage (about fourteen acres) would be billed for 200 units.

Classification and Grouping of Like Customers

Classification and grouping of like customers having similar characteristics and/or service demands is a common practice in utility service fee rates. For example, wastewater treatment demands and costs are related not only to the volume of the waste to be treated, but also to the type of constituents found in the wastewater and their strength or concentration. Some users discharge wastes to public sewers that are radically different than a typical residence. Therefore, wastewater rates for some commercial and industrial customers may include both a volume component and a strength component.

This particular wastewater rate practice has not been directly adapted to stormwater rates, but a comparable classification or grouping of like customers based on their impacts on stormwater services and facilities has been incorporated into some rate structures. For example, all single-family detached residential properties are often grouped in a single user class or into tiers and each class is then billed a common rate. In a gross area/intensity of development rate methodology, properties having like land use may be grouped in a single intensity of development classification, e.g., all commercial office properties might be deemed heavily developed for rate calculation purposes. Industrial properties or those undergoing land disturbance activities might be grouped for NPDES impacts and erosion/sediment control service demands.

Service Fee Credits

Many communities have modified basic stormwater rate design practices to accommodate local circumstances. Perhaps the most widely-used modification to basic rate structures is application of a credit adjustment to service fees. Credits are typically conditional, i.e., they are premised on continuing specified performance by the customer. If the specified performance is not maintained, credits may be rescinded. The concept is similar to industrial pre-treatment credits commonly provided wastewater customers to reduce strength of sewage discharged into public systems.

Stormwater service fee credits are most commonly provided for properties that have on-site detention or retention facilities. In most cases detention or retention systems are designed to approximate pre-development conditions or to meet capacity limitations of downstream facilities. Such controls reduce capacity requirements (and cost) of downstream systems and may, if properly designed and maintained, enhance water quality. Credits have also been given for facilities or activities that assist in provision of services or reduce the public cost of providing services.

Credits have also been adopted in some jurisdictions for properties subject to and in compliance with National Pollutant Discharge Elimination System (NPDES) permits and for public and private schools providing approved water quality education programs. The rationale for the latter credit is that education is a minimum control measure in NPDES Phase 2 stormwater discharge permits. If not provided by local schools educational programs the service would have to be performed by the stormwater management entity at additional cost to the ratepayers.

Various means are employed to provide service fee credits to properties having on-site detention. For example:

- Boulder, Colorado, for properties providing on-site detention, has administratively adopted the practice of reducing the normal service fee twenty (20) percent for an on-site detention system that meets standards for a 5-year storm. Systems that meet 100-year storm requirements are eligible for an eighty (80) percent reduction.

- Bellevue, Washington changes the intensity of development classification of properties with detention systems to that of very lightly developed land, resulting in a variety of percentage reductions, depending on the intensity of development classification that would normally be applied to the subject property.

- Charlotte, North Carolina allows up to fifty (50) percent credit for peak runoff attenuation and up to twenty-five (25) percent credit for flow volume reductions.

Practices elsewhere reduce service fees between thirty-three (33) percent and seventy-five (75) percent in recognition of on-site control that reduces runoff rates. In most situations the long-term impact on revenue resulting from this type of adjustment is minor, typically no more than one or two percent. Ratepayers who do not have on-site systems have to pay slightly more to cover the minor deficit resulting from the credits.

The primary intent of credits is to recognize reductions in the cost of public stormwater services and facilities that can be attributed to private systems or activities. Credits only partially compensate developers who install and properly maintain facilities. Rarely do they offset loss of space such facilities occupy or the degree to which on-site systems disrupt the layout of commercial properties and subdivisions. Nor do most credits consider water quality impacts of on-site systems, or their influence on the cost of stormwater quality management. However, they do marginally improve equity of service fee cost allocations.

The balance of fees with level of service required and provided is, at least in theory, improved by use of credits. On-site control of peak flow of stormwater

runoff means that a property requires less service from the public stormwater system. Downstream reductions in peak runoff allow a higher level of service from a given size of facility or enable a community to build smaller systems in the future. A reduction in pollutant discharges into the public system could translate into lower NPDES permit compliance costs.

Developers' engineers can provide the information required to incorporate a credit for on-site measures. An allowable runoff release rate based on pre-development conditions and required on-site storage capacity can be used to determine the effectiveness of each on-site facility for crediting purposes.

Example Stormwater Rate Methodologies

The rate structure concepts used as examples in this guidance are typical of those adopted in the more than five hundred communities that have established stormwater utilities or special districts. Direct comparison with rate methodologies used in specific communities is not productive, however, since the general approaches examined in this guidance should be viewed in the specific context of the local needs, priorities, and circumstances of each community.

Generally speaking, any rate methodology that incorporates gross area tends to reduce the proportion of the service costs allocated to commercial and other intensely developed properties and increase the proportion of costs assigned to residential and less intensively developed properties.

Example stormwater rate methodologies examined in this guidance base stormwater fees on:

- impervious area;
- a combination of impervious area and gross area;
- impervious area and the percentage of imperviousness; and
- gross property area and the intensity of development.

Impervious Area

Stormwater rate structures based solely on impervious area have been widely used. They are simple, the concept is easily understood by the general public, and is generally perceived as equitable. Impervious area rate methodology reflects a philosophy of allocating costs based on each property's contribution of runoff to the system. Large expanses of roofs and paving in shopping centers and other commercial and industrial business areas are highly visible to the general public, and most people understand the hydrologic impact of covering natural ground with paving and rooftops. The approach is generally consistent with local service fee rate practices for wastewater services, wherein fees are

based on the amount of water used and strength of effluent discharged to the public treatment works.

Numerous technical studies, references, and citations in engineering literature technically validate the equity of an impervious area rate methodology. The coefficient of runoff value in hydrologic engineering tables closely approximates the percentage of impervious coverage. Empirical evidence gathered in the field by monitoring changes in runoff before and after development verifies that impervious coverage is the key factor influencing peak stormwater runoff. Data gathered during the National Urban Runoff Program (NURP) in the 1970's and 1980's and subsequent research showed that impervious area is the most dominant factor in pollutant loadings conveyed by stormwater runoff.

The impervious area approach may introduce a "timing" problem in the acquisition of capital assets. Impervious area service fees typically are applicable only to developed properties, but stormwater capital improvements are designed to accommodate future growth. Present ratepayers may be paying for capacity provisions far beyond their own use, and undeveloped properties (not subject to an impervious area fee) would not be charged for their future needs. Other funding mechanisms, such as development impact fees or system development charges, can be used in concert with an impervious area rate methodology to ensure that undeveloped properties ultimately participate in the cost of capital improvements designed with capacity to serve them.

An impervious area rate methodology is highly stable and insensitive to property alterations by ratepayers. The rate of revenue growth using an impervious area methodology would more or less correspond to the pace of development. Economic downturns would tend to diminish the addition of new impervious area and the stormwater revenue growth, while rapid growth would add to it. Reductions in impervious coverage on individual properties are rarely justified merely to reduce stormwater fees. Alterations that would reduce stormwater fees are essentially infeasible under all the rate structure scenarios examined in this guidance.

Most impervious area rate structures include simplified single-family residential service fees, often applied as flat-rate charges. Charges to non-residential properties may be structured in a variety of ways under an impervious area methodology. In some cases the single-family residential property, "equivalent unit" value, or ranges of impervious area (100, 500, or 1,000 square feet) are used as a billing unit.

Impervious area service fees are usually calculated by dividing the amount of impervious area on each parcel by an equivalent unit or a range value to determine the number of billing units and multiplying a charge per unit. Very few use the exact amount of impervious area on each property because the accuracy

of the impervious area data typically available does not support such a precise calculation.

The following example illustrates how service fees based on impervious area might be calculated. Assume that a typical single-family residential property is determined to have 3,000 square feet of impervious area including driveway and patio area as well as roof coverage. An annual rate of $.02 per square foot of impervious coverage would result in a typical residence being charged $60.00 per year, or $5 per month.

If a flat-rate fee were applied to all single-family residences, an equivalency value equal to the impervious area of the typical single-family residence might be used to determine charges to other properties, including multi-family apartments. The 3,000 square foot increment might also be used as a range value in the rate structure, with all non single-family residential properties grouped into impervious area ranges of 3,000 square feet which serve as a billing unit.

All properties in a given range are typically charged the same fee even though they might have slightly different impervious area. For example, using an equivalency unit of 3,000 square feet of impervious coverage, two commercial properties with 21,000 square feet of impervious area would be charged for seven equivalent units (7 X $60 = $420/year) even if their gross property areas differed. A large shopping center or discount store with 600,000 square feet of impervious coverage would be charged $12,000.

An impervious area rate methodology is not highly flexible or subject to judgment in its application to specific properties. It is based on a single parameter that can be accurately measured, although modifying factors might be applied to the basic rate calculation. Approaches based on parameters like intensity of development allow substantially more judgment to be applied, both in the design of the rate methodology and in its application to specific properties.

Other funding mechanisms can be blended with an impervious area service fee. For example, a system development charge could be adopted to recapture a system capitalization component from properties as they are developed. Other revenue sources can be used to supplement service fees, such as general revenue support for an NPDES stormwater quality program.

Impervious Area and Gross Area

Both total property area (gross area) and impervious coverage of properties influence amount, peak rate, and make up of stormwater discharged to public drainage systems. A combined impervious area and gross area rate methodology can account for both factors. Most stormwater rate methodologies utilize one or the other parameter in calculation of fees. A few (including Denver, Colorado) use both parameters to derive percentages or ratios used in rate calculations.

The concept underlying an impervious/gross area rate methodology is relatively easy to explain and grasp. It is consistent with the public's general understanding of hydrology and the impact that both gross area and impervious coverage have on stormwater runoff. This type of rate methodology tends to allocate more of the cost burden to lightly developed and undeveloped properties than methodologies that are based strictly on impervious area. Depending on the weighting factors and/or cost allocations, however, smaller properties that are almost entirely covered with impervious surfaces could conceivably be charged more than larger properties that are undeveloped or very lightly developed with little impervious coverage.

An impervious/gross area rate methodology requires that the mix of impervious and gross area in the service fee calculation be “tuned” to properly reflect the significance accorded to each parameter. This can be achieved in at least two ways: 1) by applying weighting factors to gross and impervious area; or, 2) by allocating certain costs of service to each parameter. Weighting assigned to gross and impervious area should be consistent with the local hydrologic conditions, patterns of development, program requirements (e.g., operating versus capital needs), balance of stormwater quantity and quality program costs, and the community's perceptions.

Rates could be structured in a variety of ways under this approach to reflect the importance assigned to each parameter. Units of gross area might be charged a basic rate, with a surcharge applied to units of impervious coverage. Alternatively, cost of service might be apportioned between impervious area and gross area instead of assigning specific costs to each parameter. For example, eighty (80) percent of total stormwater cost of service might be allocated to impervious area and twenty (20) percent to gross area.

Coefficients of runoff used in hydrologic engineering suggest that gross area to impervious area ratios in a service fee calculation might be as low as 1:4 or as high as 1:40. If costs are allocated to the two parameters, the significant influence of impervious coverage on peak runoff and pollutant loading suggests that seventy-five (75) percent or more of the costs should be assigned to the impervious area component of the rate.

Solely for the purpose of illustrating how fees might be calculated using an impervious/gross area methodology, assume that each 100 square feet of gross area might be charged $.10 (ten cents) per year. A surcharge of $1.60 per year might be applied to each 100 square feet that is covered by impervious area. This would yield an effective ratio of 1:17 between areas that are pervious and those that are impervious (i.e., areas covered by impervious surfaces would be charged seventeen times as much as areas that are not). That ratio is generally consistent with the difference in peak runoff between undeveloped and developed properties.

Applying the example values cited above to a twelve thousand (12,000) square foot residential property with 3,000 square feet of impervious coverage would result in a total service fee of $60 per year or $5 per month. The charge for the gross area of the property (12,000/100 @ $.10 = $12/year) would be added to the charge for the impervious coverage (3,000/100 @ $1.60 = $48/year). An undeveloped 12,000 square foot property would be charged $12/year in this scenario.

Applying the same values to a small commercial property of 30,000 square feet having 21,000 square feet impervious (70 %), the annual service fee would be $366 per year (30,000 sq ft / 100 x $0.10 = $30/year for the gross area and 21,000 sq ft / 100 x $1.60 = $336/year for the impervious coverage). Thus, the stormwater service fee would be more than six times as much as that for the example 12,000 square foot residential property even though the example commercial property is only two and one-half times larger in gross area. The proportionately greater increase reflects more intense development of the larger parcel in this example (70 % impervious coverage versus 25 % for the residential example).

Using the same formula, if it is assumed that a 600,000 square foot shopping center is completely covered with impervious rooftops and paving, the annual service fee would be $10,200 (600,000 sq ft / 100 x $0.10 = $600 for the gross area plus 600,000 sq ft / 100 x $1.60 = $9,600 for the impervious coverage). In both commercial examples cited, the gross area/impervious area rate methodology results in slightly lower fees for the non-residential properties than does the impervious area methodology examined previously, but that is purely a function of assigned values and is subject to modification.

A gross area/impervious area rate methodology facilitates charging undeveloped properties a service fee. Charging undeveloped properties would broaden the rate base, especially if extensive rural areas were included in the utility service area. It would also enable some operating and capital expenses to be distributed among all properties, although system development charges or other funding methods to recapture financial participation in infrastructure capitalization may still be needed. Using the above example values, an undeveloped 12,000 square foot property might be charged $ 12 per year (12,000 sq ft / 100 x $0.10), an undeveloped 30,000 square foot property would be charged $ 30 per year (30,000 sq ft / 100 x $0.10), and an undeveloped 600,000 square foot would be charged $600 per year (600,000 sq ft / 100 x $0.10). Because charges to very large undeveloped acreages quickly escalate, such rate methodologies might need to have a schedule of incrementally declining charges as the size of properties increases.

A residential flat-rate charge could also be used with this methodology, using a sample of residences to determine how much gross and impervious area is

typical in a given community. The residential rate could constitute equivalent unit values for both parameters. Obviously, different rates for gross area and impervious area might be applied in all of the above examples to meet the cost of services and facilities or apportion costs differently.

Both gross area and impervious area data are needed for this methodology, adding to the cost of developing a master account file, although fee calculations could be relatively simple. The gross area on each property might be divided by a billing unit increment (100 square feet in example above) and multiplied times a charge per unit. The same could be done for impervious area, with the two sub-totals added together to generate service fee amounts. Adjustments and credits might be applied to either or both of the parameters.

Cost of implementation and upkeep of this type of rate methodology is influenced by the cost of assembling data for a master account file and the computer programming associated with billing/collection and billing inquiry processes. Using a flat-rate charge for one or more classes of properties would substantially reduce costs. Maintenance of information might also be simplified by requiring data from developers' engineers and/or architects when plans are submitted.

Potential revenue capacity of this type of rate structure is somewhat greater than the impervious area approach because it could conceivably charge both undeveloped and developed properties. For the residential component, the revenue stream would probably be equal to or greater than other methods described in this guidance, depending on weighting factors and rates assigned and/or allocation of costs.

This approach is comparable to the other rate structure options in its stability and insensitivity to external influences. Being based on gross area and impervious area, there is little that can be done by a property owner to reduce parameters that drive the amount of the service fee.

Applying weighting factors or allocating costs to gross area and impervious area makes this approach especially flexible. A broad range of weights could be assigned to gross area and impervious area to account for unusual conditions, presence of modifying considerations like on-site detention or water quality impacts, or runoff mitigation normally realized on large undeveloped tracts. System development charges and other secondary funding methods could also be coordinated with parameters used in this type of rate structure.

Impervious Area and Percentage of Impervious Coverage

This type of rate methodology is currently used by the City/County of Denver, Colorado. Under this rate structure amount of impervious area and impervious percentage are both used to calculate service fees, dictating that data on both impervious and gross area be used. Gross area is not relevant to the service fee calculation, except that it is needed to determine the percentage of

imperviousness. Under this approach impervious area of each property is charged at varying rates depending on the percentage of imperviousness of the subject property. Each square foot of impervious area is typically charged more as the percentage of imperviousness increases. Because this rate methodology is based on impervious area, undeveloped lands are often not charged.

Some anomalies may occur in service fees that result from this type of rate methodology. Consider two properties of different sizes with the same amount of impervious coverage. Because its percentage of imperviousness could be a lot higher, the smaller property could be charged more than the larger property.

The key determinant of charges to individual properties (and of overall revenue capacity) under this rate concept is the schedule of charges per unit of impervious coverage. Properties may be divided into several classes based on their percentage of imperviousness (referred to as “ratio groups” or “imperviousness classes”), and a varying rate per impervious area unit might be applied to each class. For example, properties having ten (10) percent imperviousness or less might be charged $.06 per year for each 100 square feet of impervious coverage, while properties with eleven to twenty percent imperviousness might be charged $.15 per year for each 100 square feet. Proportionately higher values are usually applied as the percentage of impervious coverage increases.

Being based on two parameters which are accurately measurable, impervious area and gross area, from which the percentage of imperviousness is calculated, this approach gives an impression of greater accuracy than some other options. Judgment is introduced to the service fee calculation in the form of different charges for various imperviousness classes.

A community’s perception of equity resulting from this rate methodology may be mixed, and may depend on the number of classes or ranges used for percentage imperviousness and schedule of rates assigned to them. To the extent that a shift in the distribution of costs toward heavily developed properties benefits single-family residences, homeowners would likely see a lower bill than under other rate structures. They might view the balance of services and charges favorably. However, charges for intensely developed commercial properties would not be as favorable as they would bear a much higher proportion of cost of service.

Table 2-1, below, presents a schedule that is typical of what might be applied under this approach.

Table 2-1: Example Schedule of Rates

(per 100 square feet of Impervious Coverage)

Impervious Percentage	***Annual Rate/100 Sq. Ft. of Impervious Area***
1 to 10 %	$.50
11 to 20 %	$1.35
21 to 30 %	$2.00
31 to 40 %	$2.70
41 to 50 %	$3.35
51 to 60 %	$4.00
61 to 70 %	$4.70
71 to 80 %	$5.40
81 to 90 %	$6.00
91 to 100 %	$7.70

A typical residential property has between twenty and forty percent impervious coverage. Some houses are much larger but have a much lower percentage of imperviousness because they are on very large lots or acreage. Recent trends toward very large residential subdivisions with smaller lots and larger structures are resulting in much more intense residential development and increased stormwater runoff. This is being mitigated to some extent by the use of green design practices, such as retention of stormwater in rain gardens and detention ponds.

Both the size and density of residential development are common reference points in the design of impervious area/percentage of impervious area stormwater rates. An average residence in an urban community might have a 12,000 square foot lot and 3,000 total square feet of impervious area (25 %) including driveways and patios. When an impervious area/percentage of impervious area methodology is used, an annual service fee for such a residence under the example schedules of charges might be $60/year (3,000 sq ft/100 x $2), or $5.00/month. The previously-cited example of a commercial property of 30,000 square feet with 21,000 square feet of impervious coverage, 70 % imperviousness, would be billed $987/yr under this methodology with the schedule of rates shown in the table (21,000 sq ft/100 x $4.70 = $987). The 600,000 square foot commercial shopping center example property (100 % impervious) would be charged $46,200/yr. (600,000 sq ft / 100 x $7.70 = $46,200).

This example illustrates just one approach to a schedule of rates for different percentages of impervious coverage. With the same residential service fee as in the impervious and gross area/impervious area rate methodology examples

($60/year), the service fee both for the small commercial and the large retail shopping center would be much greater. It is entirely a function of the rate assigned to each range of imperviousness.

Obviously, care must be taken in designing the schedule of rates to ensure that appropriate allocations of cost of service result. It must also be recognized that this methodology can create anomalies relative to service fees as compared to other rate methods. These calculations are a function of specific schedule of rates used in this example and could be changed by adjusting the schedule.

This rate concept would require that both gross area and impervious area data be gathered. Incorporating a simplified charge for single-family residences could significantly reduce the number of properties requiring specific data. Future maintenance of data for developing properties could be accomplished by requiring that gross area and impervious area data is supplied by each developer's engineer or architect as part of project plans.

This approach would require that the file record be larger than for some other options in order to accommodate use of two parameters. A rate methodology could be written to calculate percentage of imperviousness and assign a property to a classification, or ratio group, based on the data. Some specialized programming might be required for this, but programming expenses would not be significantly greater than for other options.

Revenue capacity of this type of rate structure is greater than most of the other options examined in this guidance, especially if a highly progressive schedule is used. In Denver, Colorado this methodology generates perhaps twice as much revenue per square mile as some of the other rate methodologies because the very heavy weighting applied to the percentage of imperviousness results in much higher charges for intensely developed properties.

The stability and sensitivity of this rate methodology is consistent with the other options considered. Even using a highly progressive schedule of rates, the level of service fees would probably not induce property owners to remove impervious area from their properties. It simply is not cost-effective for most property owners to reduce the impervious area just to reduce a stormwater service charge.

Despite being based on two parameters, this rate concept retains a fair degree of flexibility. Flexibility is directly related to how classes of imperviousness are defined and the schedule of rates assigned. By tailoring number and size of the classes and schedule of rates, flexibility comparable to the other rate structures is achievable. Modifying factors and secondary funding methods such as system development charges can also be used.

Gross Area and Intensity of Development

Rate structures based on the gross area of each property and its intensity of development are currently used by the cities of Bellevue and Tacoma, Washington and Cincinnati, Ohio. An intensity of development factor is usually very similar to the coefficient of runoff. The term "intensity of development factors" is commonly used rather than a "coefficient of runoff", because the relationship of intensity of development to stormwater runoff is easily grasped.

If applied to every parcel, this type of rate methodology requires that gross area be determined for all residential as well as non-residential properties and an intensity of development rating be assigned to each. Most communities using this method have opted to apply a simplified service fee or schedule of fees to one or more categories of single-family residential parcels, but there is no uniform practice. Non-residential properties are usually categorized into five to ten descriptive groups ranging from “undeveloped” to “very heavily developed”. If a flat-rate residential charge is not used, all residential properties are typically assigned to one or two of the intensity of development categories.

Local development patterns may influence how residential properties are treated under this rate methodology. Only one residential intensity of development category might be needed in a community that has highly uniform residential development. More categories might be appropriate in another community that has residential lots ranging from 3,000 square feet to several acres.

Typically, the intensity of development values range from a low figure ranging between .02 and .20 for undeveloped or lightly developed properties up to .85 or even .95 for industrial and commercial uses. This approach groups similar properties and applies average values to all assigned to a given classification. For example, all apartments might be classified as multi-family residential with an intensity of development factor equal to .65 instead of assigning individual ratings ranging from .50 to .85 to individual apartment developments. The gross area parameter is the controlling element of rate calculation for all parcels in a given classification. An apartment building on 40,000 square feet of gross lot area would usually be billed one-half the amount charged to an equivalent apartment building on an 80,000 square foot property.

Calculation of service fees can be structured in several ways under a gross area/intensity of development rate structure. When a simplified residential charge is used, the service fee usually compares conditions on non-residential properties to a defined average specified for residential properties. For example, a typical residence is assumed to have a gross lot area of 12,000 square feet and an intensity of development of 0.25, and a commercial property of 30,000 square feet has an intensity of development of 0.70. The commercial property has an area 2.5 (30,000 sq ft/12,000 sq ft) times larger than the residential lot, and has an intensity of development 2.8 (0.70 / 0.25) times greater. The

example commercial property's stormwater charge would, therefore, be seven times that of the charge to a typical single family residence (2.5 x 2.8 = 7.0).

Using the example properties previously cited, the 12,000 square foot residential property assigned an intensity factor of .25 would be charged $5/month or $60/year (12,000 sq ft x 0.25 / 100 x $2.00/sq ft = $60/year). The 30,000 square foot commercial property with 21,000 square feet of impervious coverage assigned an intensity factor of 0.70 would be charged $35/month or $420/year (30,000 sq ft x.70 / 100 x $2.00/sq ft = $420/year). A 600,000 square foot shopping center property fifty times as large as the single-family residential property assigned an intensity of development factor of .90 would be charged $900/month or $10,800/year (600,000 sq ft x .90 / 100 x $2.00/sq ft = $10,800/year).

This approach allows service charges to undeveloped as well developed properties. For example, Bellevue, Washington assigns a very low intensity of development factor to undeveloped lands. It results in service fees that are about one-ninth (11 percent) of charges for comparably sized residential properties and even a lower percentage when compared with more intensely developed commercial or industrial parcels. Even at relatively low rates, this could generate a substantial amount of additional revenue compared to the impervious area rate methodology applicable only to developed properties when used in jurisdictions with extensive undeveloped areas.

The perceived equity of this type of rate structure is normally equal to or greater than that of other approaches, but the methodology requires a careful explanation to the community. Simplifying terminology associated with the rate methodology is desirable. That is why many jurisdictions use a phrase like "intensity of development factor".

Adjustments to individual bills or even entire classes of properties can be achieved by reducing or increasing the intensity of development factor for an individual parcel or for a class or other grouping. It is common for jurisdictions using this approach to assign an "effective" intensity of development to individual properties in response to service fee appeals, leaving the door open for adjustments that achieve a fair and reasonable rate when anomalous conditions exist.

Data requirements associated with this type of rate methodology would be less than for other options. Gross area information can often be extracted from existing databases and/or maps. Assignment of an intensity of development factor would require that judgment be used in reviewing conditions on each parcel, possibly using aerial photographs. Some additional work would be needed in the event that undeveloped properties were to be charged.

This type of rate structure tends to push a greater proportion of the cost of service onto residential and other lightly developed properties than methodologies based on impervious area, although the differential has diminished as average housing size has increased. Overall revenue capacity could be increased by also charging undeveloped properties. Like other stormwater rate structures examined in this guidance, revenue capacity of the gross area/intensity of development approach is relatively stable and insensitive to external influences

Flexibility of an intensity of development rate structure is equal to or somewhat better than other methods because of latitude available in defining categories and assigning intensity of development factors. A great deal of engineering judgment is involved in determining the intensity of development (coefficient of runoff) of a parcel in a given situation, and the engineering literature offers rather broad ranges of development intensity values. For example, values from .25 to .45 are not unusual for single-family residential parcels.

CHAPTER 3

LEGAL CONSIDERATIONS

OVERVIEW

The type of funding mechanism selected for a stormwater utility or stormwater management program has a variety of legal consequences. Taxes, user fees, special assessments, impact fees and other revenue sources can be used, but each approach will have different implications in terms of who will pay, what procedures must be followed to implement and collect the charge, and how the money can be used. If the funding approach is deemed to be a tax, then tax-exempt entities such as churches, schools, state agencies and federal government facilities will contest their obligation to pay. In many states special taxpayer approval must be sought. If a user fee approach is used, the reasonableness of the rate structure and its relationship to the service being provided may be challenged. If impact fees or special assessments are used, there will be limitations on how and where the funds can be applied.

The distinctions between the various funding approaches are often blurred. In general terms, a tax is an enforced burden imposed by sovereign right for the support of the government, the administration of law, and the exercise of various functions the sovereign is called upon to perform. In some cases there may be little practical difference between a tax and a fee, but the legal distinctions between the two are important. Many states have constitutional or statutory restrictions on the ability of local governments to levy taxes, such as requirements for special voter approval or super-majority votes in the state legislature, which do not apply in the case of fees or charges that are levied by the exercise of local regulatory authority.

State-imposed limits on property taxes have been part of the fiscal landscape for decades, but the nature of those limits changed dramatically in 1978, when California voters adopted Proposition 13, which rolled back property taxes to 1 percent of market value and limited annual increases in property values for tax purposes. Arizona, Massachusetts, New Mexico and Washington adopted very

strict limits soon after passage of Prop 13, and Colorado, Missouri, Montana and Oregon followed suit. Many states that do not fall under the strict limitation category require voter approval for local tax increases, and others require super-majority approval for tax hikes in the state legislature.

User fees are charges based upon the proprietary right of the governing body permitting the use of the instrumentality involved. Such fees have certain common traits that distinguish them from taxes. First, they are charged in exchange for a particular governmental service which benefits the party paying the fee in a manner not shared by other members of society. Second, they are voluntary or paid by choice, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge. Third, the amount of the fee is designed to recover the actual cost of the service being provided, rather than to raise general revenues for other government purposes.

The boundary between special assessments and user fees is not always clear. Generally, a fee is exchanged for a service rendered or a benefit conferred, and some reasonable relationship exists between the amount of the fee and the value of the service or benefit, while a special assessment is a specific levy designed to recover the costs of improvements that confer local and peculiar benefits upon property within a defined area.

Impact fees are one-time payments from property developers to municipal, county or school district governments for off-site improvements necessitated by new development. Such fees may be authorized by state enabling statutes or, in some states, may be imposed without legislative approval under the general home rule or regulatory authority granted by state constitutions and statutes. Impact fees differ from user charges in that they typically fund capital expenditures, not current services.

The legality of various funding mechanisms for stormwater management programs is primarily a question of state law. This guidance cannot survey or analyze the legal implications of different approaches in all 50 states, but it can highlight certain common issues that have arisen to date. Careful research will be needed to determine an appropriate fee structure in your jurisdiction, which will depend on the constitutional and statutory provisions governing the authority of local governments and special purpose districts in your state, as well as the case law interpreting those provisions.

For example, *City of Wichita, Kansas v. Kansas Taxpayers Network,* 874 P.2d 667 (Kan. 1994) involved the interpretation of certain substantive and procedural aspects of the city's home rule authority under Kansas law. Similarly, in *Densmore v. Jefferson County,* 813 So. 2d 844 (Ala. 2001), the Plaintiffs challenged a 1995 state statute as a "local" act (under Alabama state law) that had not been properly advertised under the state constitution. The Alabama Supreme Court held that the statute had been properly enacted in accordance

with the applicable state procedures. In *Billings v. Nore,* 148 Mont. 96; 417 P.2d 458 (1966), the Montana Supreme Court was called upon to determine, among other things, whether a stormwater ordinance enacted by the City of Billings was an administrative function or a legislative action that could be subject to repeal by special voter initiative under Montana law.

Stormwater management program fees have been the subject of litigation resulting in reported opinions from at least 17 states, including many cases involving final decisions by the state's highest court:

- Montana – 1966
- Colorado – 1986 and 1993
- Kentucky – 1989 and 1996
- Ohio – 1990
- Oregon – 1992 and 1993
- Kansas – 1994
- Florida – 1995, 1998 and 2003
- Washington – 1997
- Virginia – 1998
- Tennessee – 1998
- Michigan – 1998 and 2001
- North Carolina – 1998 and 1999
- South Carolina – 1999
- Alabama – 2001
- California – 2002
- Georgia – 2004
- Illinois – 2005

In addition, there have been unreported decisions from the lower courts in these and other states that have involved similar challenges to local stormwater fees, for example cases involving the cities of Tacoma and Bellevue, Washington (ca. 1984); and Atlanta, Georgia (1999).

In several instances, the results of such litigation have required a legislative "fix" to provide the proper authorization for the financing mechanism employed by the local stormwater utilities. In the state of Washington, for example, Washington RCW 90.03.525 was enacted to impose a stormwater charge on the Washington Department of Transportation at a level equal to 30% of the rates charged to other landowners. In North Carolina, GS Ch. 153A-277 was enacted in the wake of the 1999 state supreme court decision, in order to authorize the collection of fees for compliance with federal and state environmental regulations as well as for more traditional drainage services. In other cases, the courts have been called upon to determine the applicability or legality of existing statutory provisions authorizing the creation and funding of local stormwater utilities, such as Fla. Stat. § 403.031 and S.C. Code Ann. § 48-14-10.

COMMON THEMES

Based upon these cases, certain common themes or central issues have emerged. The question whether a stormwater service charge is actually a "tax" has been the issue most frequently litigated, along with related inquiries into whether the charge is actually a special assessment that cannot be levied against the parties challenging the fee. Subsidiary issues such as whether the charge is reasonably related to the cost of the services provided, and whether it is fairly imposed on the properties that are benefited by those services, have also been explored.

Tax vs. Fee

The most commonly litigated issue is whether a municipal stormwater service charge is a valid user "fee" or an impermissible "tax." This issue has frequently arisen in cases brought by tax exempt organizations such as churches, schools, and state agencies such as departments of transportation. As discussed in further detail below, it is also the central issue when local stormwater fees are levied against federal government facilities, which are exempt from local taxation but not from the requirement to pay normal utility charges.

The great majority of recent cases favor the position that stormwater service charges are a fee. Such cases continue to be filed because public perception has been shaped by the historical fact that stormwater drainage costs have traditionally been financed through general revenues, and, as noted above in Chapter 2, any new form of government funding is likely to be viewed as a "tax" regardless of technical distinctions in the manner in which it is structured. This phenomenon can be observed in cases such as those from California and Michigan where taxpayer groups are the plaintiffs and stormwater utility fees are derided as a "rain tax." In Oregon, where a state constitutional amendment (section 11b) defined a "tax" as "any charge imposed by a governmental unit upon property or upon a property owner as a direct consequence of ownership of that property except incurred charges and assessments for local improvements," the state tax court characterized a city storm drainage fee as follows:

> Respondent's storm drainage charge is exactly the kind of "johnny-come-lately" charge on property the public anticipated and intended to limit. Storm drainage systems are traditional municipal facilities. Like city streets, parks, street lights and street signs, storm drains are viewed as part of the infrastructure benefiting the public generally. Local governments may not avoid the limits of section 11b simply by calling something a "service" and requiring payment of a "fee." If that were the case, a city could impose a fire or police protection fee on all persons using improved property. These kinds of serpentine maneuvers, if accepted, would eviscerate the constitutional limitation. . . . [S]ection 11b was adopted as an

> initiative measure by angry, frustrated voters. Local governments which use sophistry, rationalization and self-justification in an attempt to evade the impact of [that section] do their citizens a disservice. *Roseburg School District v. City of Roseburg*, 12 OTR 329; 1992 Ore. Tax LEXIS 33 (Ore. Tax. Ct. 1992).

Although this decision was subsequently reversed by the Oregon Supreme Court, as described below, it is illustrative of the sentiment that continues to inspire protracted litigation on this issue in states across the country.

Found Not to Be a Tax

Stormwater funding mechanisms have been upheld as valid user fees in the cases arising in Kentucky (1989), Colorado, Florida, Washington, Tennessee, South Carolina, Georgia and Illinois.

In *Long Run Baptist Ass'n v. Louisville MSD*, 775 S.W.2d 520 (Ky. App. 1989), the Plaintiffs challenged the constitutionality of a stormwater service charge that was based on an "Equivalent Surface Unit" approach (1 ESU for all residential parcels; 1 ESU per 2500 sq. ft. for commercial and industrial parcels). The court of appeals found that the service charge was not a "tax" and was reasonable and uniform in its application.

In *City of Littleton v. State,* 855 P.2d 448 (Colo. 1993), the City sought to collect unpaid stormwater management fees from state-owned school properties. The Colorado Supreme Court found the charge was not a tax or special assessment, but a service fee reasonably designed to meet the overall costs of the service provided. The court also found that the portion of fee used to construct and maintain the drainage system was essential to provision of the services.

In an earlier case, *Zelinger v. City and County of Denver,* 724 P.2d 1356 (Colo. 1986), the Colorado Supreme Court denied a class action challenge to the City and County of Denver's Ordinance No. 160, which dealt with fees and service charges assessed for the city's storm drainage facilities. The plaintiffs claimed that the ordinance unconstitutionally denied equal protection and due process guarantees to property owners and also contended the ordinance was an unconstitutional property tax. The supreme court disagreed and affirmed the trial court's decision that the ordinance was rationally related to a legitimate state purpose of financing the maintenance and construction of new storm sewers, and that it established a valid service charge rather than an unconstitutional tax because the funds raised by the fee were not used for general revenue purposes but were segregated and used solely to pay for the costs of the "operation, repair, maintenance, improvement, renewal, replacement and reconstruction of storm drainage facilities."

In *Smith v. Spokane County,* 948 P.2d 1301 (Wash. App. 1997), the state court of appeals found that a fee charged for funding certain "Aquifer Protection Areas" was not an unconstitutional tax and would be upheld if it was reasonable and designed to cover only the costs of the program. In reaching this decision, the court relied upon an earlier Washington Supreme Court decision, in *Teter v. Clark County,* 704 P.2d 1171 (Wash. 1985), which held that charge for a county storm and surface water utility was not a tax but a valid regulatory fee.

In *Vandergriff v. City of Chattanooga,* 44 F. Supp. 2d 927 (E.D. Tenn. 1998), city taxpayers challenged validity of a local stormwater ordinance on various state and federal constitutional grounds. The federal District Court found the ordinance imposed a fee, not at tax, because the charges were based on use of the stormwater system, and applying a portion of fees to construct or expand facilities as well as to defray cost of operating the system was explicitly authorized by state statute.

In *South Carolina v. City of Charleston,* 513 S.E.2d 97 (S.C. 1999), the State of South Carolina brought a declaratory judgment action to determine whether city was authorized to impose stormwater fees on state facilities pursuant to a state statute, S.C. Code Ann. § 48-14-10, which authorized local governments to establish a “stormwater utility” and to fund it either through a fee or a tax assessment. The City of Charleston created its utility by local ordinance, and opted to fund it through a fee. The state argued that although denominated a fee, the charge involved was really a tax. The state supreme court found that the plain, ordinary and unambiguous language of the statute allowed local governments to fund the utility through either a fee or an assessment, and that the city had chosen to use a fee, which could properly be imposed on State property.

In *McCleod v. Columbia County,* 599 S.E. 2d 152 (Ga. 2004), the County imposed a stormwater fee based on impervious area of developed property. Property owners challenged the fee as an invalid tax. Noting that a charge is generally not a tax if it provides compensation for services rendered, the Georgia Supreme Court held in a unanimous decision that the fee was "not arbitrary and bears a reasonable relationship to the benefits received by the individual developed properties in the treatment and control of stormwater runoff."

An earlier, unpublished decision from the Georgia Superior court, *Fulton County Taxpayers Association v. City of Atlanta*, No. 1999CV05897, 1999 WL 1102795 (Ga. Super. Ct. Sept. 22, 1999), came to a different conclusion. However, the City of Atlanta stormwater utility charge, unlike the charge involved in the *McLeod* case, contained no provision for a landowner who has no street frontage or a landowner who has his or her own manner of disposing of stormwater runoff, such as ponds or other systems, to “opt out” or obtain a credit against the stormwater fee. The fee was also struck down because it was similar to a tax

used to raise money for general purposes. The city did not satisfy the court that the funds were dedicated to stormwater and water quality improvements.

In *Church of Peace v. City of Rock Island*, 2005 Ill. App. LEXIS 448 (2005), an Illinois appeals court found that the stormwater fee levied by the City of Rock Island is not a tax and that churches are not exempt from payment of the fee. The court found that, under Illinois law, a tax may be distinguished from a fee by observing that a tax is a charge having no relation to the service rendered and is assessed to provide general revenue rather than compensation. A fee, on the other hand, is proportional to a service or benefit rendered. Using this analysis, the court found the stormwater service charge was clearly a fee, because there was a direct and proportional relationship between imperviousness and stormwater runoff, thus creating a rational relationship between the amount of the fee and the contribution of a parcel to the use of the stormwater system. The court also found that the fee at issue was “voluntary,” because the “opt-out” provisions in the ordinance meant that persons choosing not to avail themselves of the stormwater drainage system provided by the city could do so and avoid paying the fee.

Found to Be a Tax

Stormwater fees have been struck down as invalid taxes requiring explicit voter approval under specific state laws or constitutional amendments (“taxpayer rebellion” provisions) in California and Michigan, and were also rejected in two lower court decisions interpreting a similar provision in Oregon before the later of those decisions was reversed by the Oregon Supreme Court.

In *Howard Jarvis Taxpayers Ass'n v. City of Salinas*, 98 Cal. App. 4th 1351 (2002), the City established a storm drainage fee on all developed property, based on impervious area. Taxpayers challenged the fee as a "property related" fee requiring voter approval under the Article XIII.D of the state constitution, which was added in the 1996 elections as a result of Proposition 218, the “Right to vote on Taxes Act.” The trial court found that the fee met an exception in the constitutional provision for “water and sewer services,” but the appellate court reversed because the fee was not directly based on or measured by use.

In *Bolt v. City of Lansing,* 587 N.W.2d 264 (Mich. 1998), the City established a stormwater fund to pay for sewer separation costs, based on an "equivalent hydraulic area" formula. The Appeals Court (1997) found it was a "user fee" and not a "tax." The Michigan Supreme Court, in a divided 4-3 decision, found that City was charging landowners a “rain tax,” requiring voter approval under the so-called “Headlee Amendment” to the state constitution, because the charge was being used to pay for the capital investment on the utilities and services. On remand to the lower court, the decision was found to be prospective only, and no refunds of previously collected fees were required. That decision was upheld by the Supreme Court in 2001.

However, in *Roseburg School District v. City of Roseburg,* 851 P.2d 595 (Or. 1993), the Oregon Supreme Court found that city's storm drainage utility fee was not a tax on property that would have been subject to the limitations of Article XI.11b of the Oregon Constitution (adopted in 1990 by a initiative petition known as "Ballot Measure 5"). The city had structured the utility fee in an effort to avoid the constitutional restriction, by making it "a fee for service and not a charge against property." The court found it significant that unpaid charges did not become a lien against the property, and that the person responsible for payment could seek a reduction or elimination of the storm drainage service charge by demonstrating that the service was not being used.

An earlier case decided by the Oregon Tax Court went the other way. *Denney v. City of Gresham*, 12 OTR 194, 1992 Ore. Tax LEXIS 7 (1992). In that case the user charge was related to the amount of impervious surface area on a property: $2.75 per month for all "residential property," and $2.75 per month for each 2,500 square feet of impervious surface on all other property, such as multifamily, commercial and industrial. The tax court found that the only way an owner of an improved property could avoid the charge was to destroy the improvements, removing impervious surfaces. The court also found that the charge could not be "controlled" or "avoided" by any practical means.

The City of Roseburg explicitly designed its ordinance to avoid the outcome in *City of Gresham*. The Oregon Tax Court was not persuaded, finding the charge to be a tax as it had in the *Gresham* case. *Roseburg School District v. City of Roseburg*, 12 OTR 329; 1992 Ore. Tax LEXIS 33 (1992). However, the Oregon Supreme Court found the refinements made in Roseburg's ordinance sufficient to distinguish it from the *City of Gresham* case and reversed the tax court's decision.

Voluntary Service and "Opt-Out" Provisions

One element that has been found to influence the question whether a stormwater service charge is a tax or a fee is whether the user has a choice to accept or decline the service (sometimes phrased in terms of whether there is a "voluntary contractual relationship" between the user and the service provider). In the *City of Roseburg* case, for example, the tax court found that it was "unrealistic to speak as if the property had a choice as to whether it allows runoff. Where the charge is being imposed on existing property, the 'choice' which can be obtained only through modification of the property is not a real choice." The tax court was not persuaded by the city's argument that the owner could control the fee by reducing or eliminating the discharge or water from the subject property. (The Oregon Supreme Court avoided the issue, and reversed the tax court on the ground that the Roseburg fee was not imposed upon the owner of real property as a direct consequence of ownership; rather, the fee was imposed on the occupant to whom the city water service was billed.)

In the recent *City of Rock Island* case, on the other hand, the Illinois appeals court found that the opt-out provisions of a similar ordinance were sufficient to make the charge voluntary. The Illinois court held that, "[w]hile it might be cost prohibitive for each plaintiff to construct its own storm water run-off containment system, each would certainly be able to calculate the cost of doing so versus the cost of paying for the use of the City's system. Voluntary participation involves nothing more than weighing the competing costs of participation."

The federal courts have addressed the same issue on several occasions. In *United States v. Columbia, Missouri*, 914 F.2d 151, 155-56 (8th Cir. 1990), the Eighth Circuit found that even the profit component of the city's water and electric utility rates was not an impermissible tax on the federal government, because [t]he United States' obligation to pay the [fee] arises only from its consensual purchase of the City's property; it does not arise automatically, as does tax liability, from the United States' status as a property owner, resident, or income earner. When the United States purchases water, electricity, and related services, and then pays the utility bill, it does so as a vendee pursuant to its voluntary, contractual relationship with the City."

On the other hand, in *United States v. City of Huntington, West Virginia*, 999 F.2d 71, 72-73 (4th Cir. 1993), the Fourth Circuit concluded that a city ordinance imposing a "fire service fee" and a "flood protection fee" on the United States, premised "on the basis of square footage of the buildings" was a tax, and not a user fee, based in part upon the fact that the charge was an "enforced contribution to provide for the support of government." The court found that "liability for the 'user fee' charged by the City arises from the General Services Administration's and United States Postal Service's status as property owners and not from their use of a city service." *Id*. at 74.

In the ongoing litigation involving the stormwater fees imposed by the City of Cincinnati (discussed further below), the courts have sent conflicting signals as to the importance of the "voluntary" nature of the fee. In the original Court of Claims decision, *City of Cincinnati v. United States,* 39 Fed. Cl. 271 (1997), the court held that the storm drainage charge, which was imposed on all property owners within the city and was not the product of a voluntary purchase decision by the federal government, constitutes a tax, not a fee for services, and therefore could not be exacted from a federal entity such as NIOSH.

On appeal, the Court of Appeals for the Federal Circuit agreed that the storm drainage service charge was not imposed as a result of a consensual arrangement between the city and the United States, as would be true in the case of a voluntary purchase of utilities or other services, and found that the stormwater drainage service charge was an assessment imposed on the United States involuntarily, by virtue of its status as a property owner. However, the Court of Appeals did not agree that this fact was dispositive of the question whether the service charge was a permissible fee for services or an

impermissible tax. The Court of Appeals stated that "[t]here may be some instances in which a municipal assessment is involuntarily imposed but would nonetheless be considered a permissible fee for services rather than an impermissible tax." *Cincinnati v. United States*, 153 F.3d 1375, 1378 (6th Cir. 1998).

Whether or not a service charge is mandatory or voluntary is thus a factor to be considered, but is not necessarily determinative of the question whether the charge is a tax or a fee. The Georgia Supreme Court has suggested that whether a charge is voluntary is a factor because, if it is not mandatory, it cannot be a tax. *McCleod v. Columbia County,* 599 S.E. 2d 152 (Ga. 2004) (finding that the county stormwater ordinance was not a tax in part because property owners could reduce the amount of the charge by creating and maintaining private stormwater management facilities).

The reverse, however, is not necessarily true – a charge which is mandatory may or may not be deemed a tax, depending on the circumstances of the particular case. Thus, mandatory fees for various types of municipal services have been upheld by a number of courts in recent years. *See, e.g., Bloom v. City of Fort Collins*, 784 P.2d 304, 304-05 (Colo. 1989) (approving mandatory transportation utility fee); *State of Hawaii v. Medeiros*, 973 P.2d 736, 741-42 (summarizing the declining importance of voluntariness in fees in many state courts); *Hochstedler v. St. Joseph County Solid Waste Mgmt. Dist.*, 770 N.E.2d 910, 916 (Ind. Ct. App. 2002) (approving mandatory recycling charge as a permissible fee); *Rogers v. Oktibbeha County Bd. of Supervisors*, 749 So. 2d 966, 967 (Miss. 1999) (upholding mandatory garbage disposal fee on residents who did not use county's disposal system). *See generally* Reynolds, "Taxes, Fees, Assessments, Dues, and the "Get What You Pay For" Model of Local Government," 56 Fla. L. Rev. 373, (April, 2004).

Fee vs. Special Assessment

The issue whether a stormwater service charge is a "user fee" or a "special assessment," giving rise to different procedural requirements, has arisen in Florida (2003) and Colorado.

In *Gainesville v. State of Florida,* 863 So. 2d 138 (Fla. 2003), the state DOT refused to pay the city's stormwater fee, and the city sued. A settlement was reached in 2001, but when the city sought to validate a bond issue for its stormwater utility in 2003 the state DOT objected, arguing that the fee (based on impervious area using an "Equivalent Residential Unit" formula) was not a "user fee" but a "special assessment" that did not apply to state agencies. The bonds that were issued by the city could not be approved if fees were invalid, since the stormwater fees were pledged as collateral for those bonds. The Florida Supreme Court found that the fees were valid user fees, and the bonds were validated. The city was supported in the Supreme Court by an *amicus* brief

jointly filed by the Florida Stormwater Association and several environmental groups, including Earthjustice and the Audubon Society.

In the earlier case of *City of Cocoa v. School Board of Brevard County*, 711 So. 2d 1322 (Fla. App. 1998), a Florida appeals court found that a stormwater utility fee was neither a "special assessment" nor an "impact or service availability fee," from which school districts were exempted by statute. The trial court had apparently determined that no portion of the fees sought by the city were "user" fees, but the appeals court determined that the record was not sufficient to establish that the school districts were "involuntary" users of the stormwater utility and remanded the case for further proceedings to determine whether the program established by the city was a valid utility established pursuant to the statutory authority granted by the Florida legislature in Fla. Stat. § 403.031(17). That statute authorized the funding of local stormwater management programs "by assessing the cost of the program to the beneficiaries based on their relative contribution to its need," with regular service bills "similar to water and wastewater services."

In *City of Littleton v. State, supra*, both the trial court and the state appeals court had found that the city's stormwater management fee constituted a special assessment under Colorado state law, which could not be charged against the state agencies involved in the case. The Colorado Supreme Court reversed, after reviewing the factors to be considered in determining the nature of a charge imposed by a municipality against property owners within its jurisdiction. Distinguishing between ad valorem property taxes, excise taxes, special assessments, and special fees, the court recognized that the essential characteristic of a special assessment is that it confers some special benefit to the subject property.

In this case, the services for which the fees were charged did not specially benefit the property owned by the agencies. The court stated that "[c]reating the capacity to remove excess water from property and prevent flooding are general services benefiting all property owners. While the performance of these services prevents diminution of the value of land, such services and the facilities necessary to the performance thereof do not directly enhance the value of the property . . . ." Consequently, the court concluded that the city's stormwater charge was not a special assessment, but a service fee reasonably designed to meet overall costs of the service for which the fee was imposed. Although a portion of the fee billed by the city was used to defray costs of constructing and maintaining a drainage system, such costs were found to be reasonably related and essential to the provision of the contemplated services.

Related to Cost of Services

Inquiry into whether the amount of the fee is "reasonable" and directly related to the cost of providing the services rendered has been conducted in cases from Kentucky, Colorado, Virginia, North Carolina and Georgia. One aspect of this

question that is often examined is whether the fees are reasonably related to the actual contribution of the property to the volume of stormwater runoff, or whether all properties are assessed a fixed amount regardless of size.

In *Twietmeyer v. City of Hampton*, 497 S.E. 2d 858 (Va. 1998), the City sued owners of seven residential properties for failure to pay fee based on flat rate. The property owners argued a flat rate fee was not based on contribution to stormwater runoff. The Court found that the city ordinance was not unreasonable because non-residential properties were charged a fee 5 times higher than residential properties ($12.50 per month rather than $2.50 per month).

In one case in North Carolina, the costs of complying with certain elements of U.S. EPA's "Phase II" municipal stormwater permit program were found to go beyond the costs to construct and operate the stormwater drainage system, and the city was ordered to refund that portion of the fee. *Smith Chapel Baptist Church v. City of Durham*, 517 S.E. 2d 874 (N.C. 1999). The City assessed fees on all developed property, based on impervious area. The state Supreme court found in a 1998 opinion that such fees were not covered by a particular state statute, but were nevertheless authorized under the state constitution. However, in its subsequent 1999 opinion after rehearing, the Supreme Court held that the applicable state statute limited fees to the actual cost of providing the stormwater drainage system, and did not cover the entire stormwater management program – in particular, costs incurred solely for compliance with federal environmental regulations (the Phase II stormwater permit requirements). A subsequent amendment to the statute was required to address this issue.

Properties Benefited

The question whether the properties burdened by the fees are receiving a proportionate benefit from the services provided has been examined in Florida (1995), Kentucky (1996) and Alabama.

In the often-cited case of *Sarasota County v. Sarasota Church of Christ*, 667 S. 2d 180 (Fla. 1995), the City imposed a stormwater utility fee on all developed property. The Church argued that the ordinance imposed a tax because it benefited the community at large and church received no specific benefit. The Florida Supreme Court held that the fee was valid because all properties with impervious surfaces benefited from the stormwater services.

In *Kentucky River Authority v. City of Danville, Kentucky,* 932 S.W.2d 374 (Ky. App. 1996), the city argued that it received no benefit from the activities of the Authority. The court disagreed, holding that the preservation of the watershed was a benefit that accrued to all within its boundaries. The court likened the fee to emission fees collected from entities that emit air pollutants and are used to fund the state air program, noting that although there may be no direct or immediate benefit to the payer of the fees, the use of the air and the contamination of it are sufficient to justify the imposition of the fee.

In *Densmore v. Jefferson County, supra*, the Plaintiffs alleged that a county stormwater fee was an unconstitutional tax with no relationship to benefit received by property owners. The Alabama Supreme Court held that the fees were valid because the benefit conferred on property owners need not relate directly to the exact amount paid.

Application to Capital Improvements

Whether or not the fees must be confined to the actual cost of providing stormwater services alone, or whether any surplus can be collected and applied to the cost of system expansion and capital improvements has been litigated in Ohio, Tennessee, Colorado and North Carolina.

In *Wooster v. Graines,* 556 N.E. 2d 1163 (Ohio 1990), the City of Wooster adopted an ordinance to establish a storm drainage utility for maintaining, repairing and improving the sewer system (fees were based on impervious area). The owner of a shopping center refused to pay, claiming the fee was invalid because city accumulated a surplus to fund capital improvements in new areas. The Ohio Supreme Court held that the ordinance was valid because sewer funds were segregated and reserved for future sewer projects in Wooster.

Application of stormwater fees to capital construction costs was also upheld in the *City of Littleton, Vandergriff,* and *Smith Chapel Baptist Church* cases, discussed above.

FEDERAL FACILITIES

The imposition of stormwater fees on federal facilities involves a special consideration of the tax vs. fee issue. The general principle that states cannot tax the United States derives from Chief Justice Marshall's opinion in *McCulloch v. Maryland*, 17 U.S. (4 Wheat.) 316, 4 L. Ed. 579 (1819). Although the immunity of the federal government and its instrumentalities has been the source of often conflicting decisions, "the one constant . . . is simple enough to express: a State may not, consistent with the Supremacy Clause, U.S. Const., Art. VI, cl. 2, lay a tax 'directly upon the United States'. . . . The Court has never questioned the propriety of absolute immunity from state taxation." *United States v. New Mexico*, 455 U.S. 720, 733, 71 L. Ed. 2d 580 , 102 S. Ct. 1373 (1982).

On the other hand, it is well-established law that the United States must pay reasonable user fees. For instance, charges for services from city-owned utilities are clearly fees for which the federal government would be liable to the same extent as any other customer. *See United States v. Harford County, Maryland*, 572 F. Supp. 239, 241 (D. Md. 1983) ("The federal government has . . . recognized its obligation to pay state or county charges based on the quantum of water or sewer services rendered.")

Furthermore, the Clean Water Act contains an express waiver of sovereign immunity for certain pollution-control related fees. Clean Water Act § 313(a) ("Federal facilities pollution control") expressly provides that:

> Each department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal Government . . . shall be subject to, and comply with, all Federal, State, interstate, and local requirements . . . respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity <u>including the payment of reasonable service charges</u>. . . . This subsection shall apply notwithstanding any immunity of such agencies, officers, agents, or employees under any law or rule of law.

Importantly, this waiver applies only to fees or service charges, and not to taxes. As seen in the numerous state cases discussed above, this distinction is often difficult to make in practice. The United States Supreme Court has established a three-pronged test for determining whether fees imposed by local governments on federal facilities are "reasonable service charges" or taxes (*Massachusetts v. United States*, 435 U.S. 444 (1978)):

- Is the fee or service charge non-discriminatory?
- Is it a fair approximation of the cost of the benefits received?
- Is it structured to produce revenues that will not exceed the regulator's total cost of providing the benefits?

Under the *Massachusetts* case, 1) the federal government must not be treated any differently in the enforcement of the fee requirement than other regulated entities; 2) the fee charged must be a fair approximation of the benefits received to be considered "reasonable;" and 3) the fee must be structured to produce revenues that will not exceed the total cost to the state of the benefits supplied. This test has been applied to environmental fees in several cases, most notably the long-running litigation involving the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Department of Energy (USDOE).

That series of cases involved the question of whether certain hazardous waste regulatory charges imposed by New York on federal installations were "reasonable service charges" within the meaning of the sovereign immunity waiver provision in the Resource Conservation and Recovery Act, 42 U.S.C. 6961. In January 1989, NYSDEC brought four consolidated actions in New York State Supreme Court against USDOE to recover unpaid environmental program regulatory charges, including hazardous waste program and waste transporter program charges, assessed by the NYSDEC against ten federal facilities from 1983 to 1989. USDOE counterclaimed for a refund of approximately $ 400,000

and related relief for regulatory charges already paid. Those actions were subsequently removed to the District Court for the Northern District of New York.

Arguing that the waste regulatory charges were unreasonably high, USDOE asserted that in every year between 1983 and 1989, "total waste regulatory charges exceeded [NYSDEC]'s actual services [to the ten federal facilities] by a ratio of approximately nine to one ($1,163,591.58 vs. $ 126,792.13)." The District Court denied both parties' motions for summary judgment because neither party had submitted evidence "as to the value of the overall benefits the facilities receive in light of the programs and services made available to them by [NYSDEC] should the need for such assistance ever arise." *New York State Department of Environmental Conservation v. United States Department of Energy*, 772 F. Supp. 91, 99-100 (N.D.N.Y. 1991).

In later proceedings, the District Court granted NYSDEC's motion for partial summary judgment and denied USDOE's motion for summary judgment. *New York State Department of Environmental Conservation v. United States Department of Energy*, 850 F. Supp. 132 (N.D.N.Y. 1994) ("NYSDEC II"). The District Court explained that the *Massachusetts* test "requires only a rational relationship between the method used to calculate the fees and the benefits available to those who pay them." *Id*. at 143. The Court found such a relationship in this case because (1) larger facilities are more expensive to regulate and require more services than smaller facilities; (2) all services which NYSDEC provides pursuant to these regulatory programs, whether used or not, are available to the United States should they be needed in the future; and (3) the total receipts from these regulatory fees have been substantially less than the actual costs of these programs – all of which demonstrates that NYSDEC's method of calculating its charges results in a fair approximation of the cost of the use of the system.

Following two additional decisions by the district court in 1997 and 1999, the case reached the Second Circuit Court of Appeals. *Jorling v. United States Department of Energy*, 218 F.3d 96 (2d Cir. 2000). At that point, only the reasonableness of the hazardous waste fee was at issue. USDOE did not dispute the first or third parts of the *Massachusetts* test. It acknowledged that NYSDEC's waste regulatory charges were non-discriminatory and were not structured to produce revenues that would exceed the total cost to NYSDEC of the benefits to be supplied. However, it disputed the second part of the *Massachusetts* test, challenging the District Court's finding that no reasonable jury could find that the waste regulatory charges did not meet the "fair approximation" component of the *Massachusetts test*. USDOE argued that the charges cannot meet that component of the test because the charges from 1983 to 1989 exceeded the cost of supplying the services actually received by a nine to one ratio.

The Court of Appeals found that, under *Massachusetts*, a fair approximation of the use of the service adequately serves as a surrogate for an otherwise complicated and expensive attempt to allocate costs. The court cited *Brock v. Washington Metropolitan Area Transit Authority*, 254 U.S. App. D.C. 190, 796 F.2d 481, 485 (D.C. Cir. 1986) for the proposition that "*Massachusetts* did not hold that a user fee must represent retrospectively a close approximation of the actual, historical benefit to the user. Rather, *Massachusetts* held only that the method used to calculate the fee must rationally be designed to approximate prospectively the benefit to the user." The court also found that the *Massachusetts* test applies not only to services used but also to services available for use. Based on these principles, that court found that NYSDEC's waste regulatory charges meet the "fair approximation" component of the *Massachusetts* test, because the method of calculating the hazardous waste program charges was reasonably designed to fairly approximate use of the hazardous waste system's available services, and thereby to approximate the cost of supplying such services to particular generators of waste or operators of waste facilities.

The principles established in the *Massachusetts* case and explored in the *NYSDEC* litigation are currently the subject of ongoing litigation between the City of Cincinnati and the U.S. Department of Health & Human Services (HHS). The National Institute of Occupational Safety and Health (NIOSH), a part of HHS, refused to pay stormwater fees due under a 1985 city ordinance using formula based on size of property and "intensity of development" factor to determine "equivalent runoff units." The city initially attempted to bring suit in Federal Court of Claims based on "implied contract" for services. In *City of Cincinnati v. United States,* 39 Fed. Cl. 271 (1997), the Court of Claims dismissed the claim as an unconstitutional "tax" based on property size rather than services actually used. In *City of Cincinnati v. United States,* 153 F.3d 1375 (Fed. Cir. 1998), the Court of Appeals for the Federal Circuit upheld the lower court's dismissal of the case, but only because there was no "implied in fact" contract between the city and the federal government, and the Court of Claims therefore lacked jurisdiction to hear the case. The Court of Appeals expressly declined to rule whether or not the city's storm drainage service charge was a tax or a fee.

In October 2003, the City re-filed its claim in U.S. District Court, asserting jurisdiction under the Tucker Act and the Declaratory Judgment Act. *City of Cincinnati v. United States,* Case No. 03-731 (S.D. Ohio, filed 10/23/03). The United States filed a Motion for Judgment on the Pleadings in February 2004, arguing *res judicata* and lack of subject matter jurisdiction. In May 2004, the City moved for leave to file an Amended Complaint based on its local ordinance and the waiver of sovereign immunity in CWA § 313. The case was still pending before the District Court for the Southern District of Ohio as of October 2005.

SUMMARY AND CONCLUSIONS

Although stormwater management fees have been upheld in the majority of states where they have been challenged, the passions inspired by the general public perception that any new governmental fee is a disguised and unlawful tax ensures that challenges to such fees will continue to arise. Determining the legality of the financing mechanism chosen for any municipal or county stormwater program will depend upon a close analysis of local state law. Nevertheless, certain general principles emerge from the cases discussed above.

(1) In order for a stormwater service charge to be regarded as a fee, rather than a tax, the local government should be prepared to demonstrate that the overall cost of the program is reasonably related to the value of the service being provided, and that the funds raised are segregated for use by the stormwater program and not for general revenue purposes.

(2) The fee should be structured so that the amount charged to particular properties is proportional to those properties' contribution to stormwater runoff. The distinction may be as simple as a different fee for residential and commercial properties, or as elaborate as a sliding scale based upon "impervious area" or degree of development.

(3) Some provision should be made so that participation in the program can be characterized as "voluntary," whether it is accomplished through an "opt-out" provision for properties with their own stormwater management facilities or a more complex system of credits or offsets based upon the amount of volume actually contributed to the public stormwater system.

(4) In states such as California, Michigan and others with special constitutional provisions governing the imposition of any new tax, it may be wise to seek the requisite voter approval for implementation of local stormwater funding programs even if they are designed and intended to be fee-based rather than tax supported.

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CHAPTER 4

IMPLEMENTING USER-FEE BASED FUNDING

OVERVIEW

The dynamic change which has occurred in the expectations placed on the municipal stormwater program has overwhelmed traditional stormwater program funding. This has driven the exploration of new funding strategies and given rise to the increasing popularity of user fee/utility based approaches.

The breadth of the changes motivating this exploration has required that not just funding mechanisms be explored. The services delivered by the municipal stormwater program, the quality of those services, the degree to which they satisfy local expectations, and the degree to which they satisfy stakeholders needs, become critical elements in structuring user fee based funding. In the eyes of stakeholders, implementing a new stormwater funding mechanism is secondary to receiving good stormwater system service. The performance of the stormwater program, as perceived by the program's stakeholders, therefore, becomes a focal point of the effort to develop a functional stormwater funding program.

Implementation of user fee based funding involves a related set of actions and activities. These occur within a flexible framework that promotes due diligence in five key areas of focus: political, financial, legal, informational and technical. In some communities a simple vote of the governing body is all that is needed to implement a funding mechanism. In these cases, little program education, stakeholder involvement, and background information may be needed to secure the necessary authorization. In most cases, however, a much more involved process is necessary to bring about program and funding actions. This chapter discusses this framework and process.

FORCES DRIVING ACTION

As described in Chapter 1, over the last thirty years stormwater programs have gone through significant shifts in basic philosophy, approach and service expectation. Originally stormwater programs were intent on efficient drainage, taking runoff quickly to nearby streams. Resulting flooding then caused local communities to change their basic philosophy from “efficient drainage” to one of “flood control” through the imposition of detention requirements and stricter floodplain controls.

Later still the concept of “stormwater master planning” began to replace ineffective detention programs. Then, in the late 1980’s stormwater program managers were faced with the need to also address stormwater quality through NPDES and other regulatory programs.

Today there is a convergent set of stormwater program forces that has moved stormwater to a full-fledged urban utility service stature similar to water and wastewater. These forces can vary from community to community, but generally can include:

- ✓ aesthetic and regulatory demands for “greener” environmentally friendly stormwater systems, sometimes without clear definition of what that means, or a track record in concept performance or sustainability;
- ✓ multi-objective disaggregated stormwater system components that integrate conservation and preservation practices, sometimes called, Low(er) Impact Development;
- ✓ integration of stormwater infrastructure planning and design with site layout and function, sometimes called Better Site Design;
- ✓ redevelopment that incorporates “micro-systems” of pollution removal
- ✓ a plethora of commercial and industrial site controls;
- ✓ the need, often mandated through endangered or threatened species considerations, to integrate ecological assessments and designs;
- ✓ mandated public education and involvement in stormwater program conception and implementation, and the emergence of non-profit interest groups;
- ✓ demanding regulatory requirements evolving in a fast changing legal arena, and on again/off again numeric pollutant criteria;
- ✓ ongoing program needs for maintenance and capitalization of the system, often with extended levels of service; and
- ✓ significant reductions in general fund dollars for stormwater programs concurrent with the doubling of stormwater program costs.

THE STORMWATER UTILITY, PROGRAM CONCEPT AND DUE DILIGENCE

Utility Program Concept

The stormwater utility is an umbrella under which individual communities can address their own specific needs in a manner consistent with local problems, priorities, and practices. A stormwater utility provides a vehicle for:

- ✓ consolidating or coordinating responsibilities that were previously dispersed among several departments and divisions;
- ✓ generating funding that is adequate, stable, equitable and dedicated solely to the stormwater function; and
- ✓ developing a program that is comprehensive, cohesive and consistent year-to-year.

A stormwater utility is equitable because the cost is borne by the user on the basis of demand placed on the drainage system. It is stable because it is not as dependent on the vagaries of the annual budgetary process as are taxes. And it is adequate because a typical stormwater program can be financed with charges within the limits of the customer's willingness to pay.

No two successful utilities are identical just as no two cities are just alike. Therefore, it is not prudent to follow a pre-fabricated "one size fits all" approach, but to carefully seek to understand the make-up of the community, its problems, its goals, and its resources. There must be a clear understanding of the community's stormwater related systems, capabilities, and issues.

Some communities have simply attempted to clone a stormwater program or utility rate methodology of another city or county. Some consulting firms have attempted to sell a uniform approach. A local community should carefully guard against such a temptation. A stormwater program, rate structure, or billing methodology cloned from somewhere else rarely can sustain intense scrutiny by a staff, advisory committee, elected officials, or interest groups or the community at-large if the program utility doesn't meet local needs. Such programs often fail.

The real danger of the cloning approach is that it inevitably falls short of meeting the local stormwater program expectations because it is not founded on addressing them. As was mentioned in Chapter 2, the local problems, needs, and circumstances must drive the form, priorities, and pace of the program. The success of leading stormwater utility programs is based on tailoring the program and financing strategies to the local needs and solving real short-term and long-term stormwater problems.

Due Diligence

"Due diligence" is the process of insuring that the community's program and funding expectations will be met. It includes the formulation and execution of a plan with appropriate levels of investigation, establishment of facts, estimation of future prospects, framing of assumptions and risks, and establishment of a plan of action and funding. It can also result in a decision not to act.

Attempted stormwater utility implementations have failed for a number of reasons, most of which have to do with inadequate due diligence. For example, some key reasons given in failure post mortems include:

- ✓ Not understanding the process and cutting key corners
- ✓ Failure to establish stakeholder support
- ✓ Failure to identify and account for hurdles
- ✓ Inadequate legal assessment of the authority for a particular rate structure
- ✓ Failing to work with media
- ✓ Inability to focus the stormwater program on citizen felt needs
- ✓ Inaccurate databases without ability to appeal
- ✓ Poor citizen or customer service
- ✓ Rate structures without rational nexus
- ✓ Rate structures too complex to explain and seemingly inequitable
- ✓ Failure to understand political timing

Due diligence must be pursued along four major areas of concern, or tracks. These tracks, which are foundational to the utility implementation process and which are discussed in the implementation section of this chapter, are as follows:

- ✓ **Public** – are there appropriate levels of involvement of key stakeholders, is the general public handled correctly, is the media appropriately involved, is customer service accounted for, are staff and political leadership elements accounted for and handled appropriately?
- ✓ **Program** – does the program make sense, is it compelling, is it within the community's ability and willingness to pay, does it meet citizen perceptions, is it action oriented?
- ✓ **Finance** – are legal tests satisfied, is it simple yet fitted to the local situation, does it have the perception of equity, are proper steps followed, does it support the stormwater program?
- ✓ **Database** – is the database accurate within legal requirements, is there an appeals process, is it maintainable within reasonable cost constraints, are anomalies accounted for, is customer service appropriate and responsive?

The cost of appropriate due diligence is not insignificant but should be kept in perspective. Experience has shown that, should a stormwater utility fail it takes

five to seven years for there to be a staff and political willingness to make another attempt. The opportunity cost of failure is then five to seven years of lost revenue. For example, for a stormwater utility that raises $2,000,000 per year the opportunity cost of failure is $10 to $14 million. The cost to do a thorough job of due diligence in this example, however, is rarely more than $350,000, one to three months' revenue.

Additional benefits of appropriate up front due diligence include:

- ✓ Better initial and long-term public knowledge and cooperation leading to greater support and participation.
- ✓ A funding rate structure that matches and meets short and long term program needs leading to stable, adequate funding.
- ✓ A stormwater program that can meet both the capital and operations needs of the local community, leading to better services and ability to meet regulatory demands.
- ✓ More efficient long-term database maintenance, leading to lower operating costs and better customer service.

Those communities that have cut corners in due diligence normally find themselves hampered in their ability to manage the database, meet customer expectations, solve flooding problems, meet regulatory needs, and modify the program or utility to meet changing demands. A process can be developed that facilitates such change while maintaining the effectiveness of the stormwater program and the utility.

CREATING MOMENTUM AND A PROCESS FOR PROGRAM ACTION

The ability to bring about action that moves a stormwater program forward and produces the necessary funding, depends on the ability to bring key leaders to an understanding of the problems, and a vision of the solutions. To achieve this understanding and to create such a vision requires a logical and acceptable process which leads a community to action.

Understanding Problems

Understanding of the problems involves building a "compelling case for action". In every community there are good, even compelling, reasons to improve the way stormwater programs are executed. It might be a popular stream that is becoming increasingly impacted, a lack of riparian park space, decaying drainage infrastructure and mounting complaints, unfunded regulatory mandates, local flooding, financial pressures, loss of fish, beach closings, a roadway or bridge collapse, or law suits. Such issues draw the attention and energy of stakeholders and leaders to opportunities for action.

Assembling a “compelling case” is step one in developing this understanding and bringing about action. People in general are motivated along two complimentary courses of persuasion – information (data) and stories. Some people want facts and statistics (data), while others are moved to action by horror stories and pictures. When we begin to quantify the community’s perception of program need or make the case for change and new funding, we seek to address both types of people. Table 4-1 gives some examples taken from successful stormwater utilities.

Information	Stories
• Statistics on repair costs • Cost information • Infrastructure information • Lost revenue or tourist dollars • Regulatory Facts • Backlog information on flooding • Unfunded mandate information	• Flooding pictures • Horror stories • Movies • Testimonials • Environmental or aesthetic appeals • Drawings of a future greenway, trail, etc.

Table 4-1: Building Blocks for a Compelling Case

Building a compelling case and knowing when, how, and to whom to present it is more of a political and technical art form than it is a science. But taking time to build informed consent to move forward and to support program change and new funding methods is vitally necessary.

Vision for the Future

People rarely rally around simply solving problems. It is in creating a vision for what could or should be that causes people to begin to support the concept of a stormwater utility as a vehicle for action.

Building vision is a process of moving from recognizing problems, needs, issues and opportunities to seeing the way things could be. It involves seeing what others have done and showing how practical solutions can create significant improvement in the quality of life.

An artist’s rendering of what an ugly polluted stream could become can help rally people. A seminar or workshop with representatives from other places telling about wonderful changes in their community gets people leaning into change. Sometimes simply showing how problems would be solved brings about a determination to move forward.

Bringing About Action

Leaders often agree that there must be action to bring about recommended improvements but are not sure how to begin. The use of a citizen's stakeholder group is an effective technique which facilitates development of problem understanding and of the vision for the future, and is a useful part of the process for action. Ten to fifteen people who adequately represent key positions or ideas can move together through the process.

Sometimes these meetings are over-controlled by well-meaning facilitators, or a citizen's group is asked to merely react to a fully developed solution. In both cases creativity can be stifled, citizen's can lose interest, and input can deteriorate. But if allowed true input, the group will have ownership of the plan and will often help sell it.

An effective tool in bringing about action is the business plan approach as discussed in Chapter 2. Facts are fine, but process, such as that produced by a stormwater business plan, moves things forward, formulating a road map and structure for action.

Business planning has not been a normal approach for local government. Local government has not typically thought of itself in terms of what it is selling, how it measures success, and who the customer is. A generic business plan asks and answers the following questions:

- Who we are?
- What business are we in?
- What's going on now?
- Where do we want to go?
- How do we want to get there?
- What are the steps to make it happen?
- How will we know when we have arrived and, how can we demonstrate it to someone else?
- How we will pay for it?

The business plan model, which measures goals in "program efficiency" and "program effectiveness", must be somewhat modified for local government use. Resistance to getting lost in too many technical details will help move the business plan to a useful conclusion.

Process Framework

The development of problem understanding and a future vision, and the exercise of such tools and techniques as a stormwater business plan and citizens impact groups require a structured format to insure a successful outcome. In this case, that outcome would be a utility structure for a comprehensive stormwater program. Figure 4-1 illustrates an overall process framework for development of

a utility funding mechanism. Only the first and third steps might be considered absolutely necessary. The steps are:

- ✓ Quick Concept Study – answers the question: "does the proposal make sense", and if the answer is "yes" the work goes forward.
- ✓ Feasibility Study – creates both information and momentum for implementation, and is used as an intermediate step if success is not fairly certain.
- ✓ Utility Implementation – is the process of working in a coordinated and logical way through the details of planning implementation and due diligence.

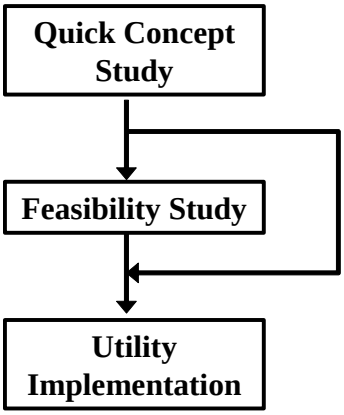


Figure 4-1: Overall Process Framework

PROCESS FRAMEWORK, QUICK CONCEPT STUDY

The purpose of this step is to assess the basic advisability of pursuing a stormwater program and funding assessment with the potential of implementing a stormwater user fee. Designed to be low cost, fast paced, and focused, it:

- ✓ Tests the water with very little political, financial, or emotional investment,
- ✓ Can normally be authorized without an RFP,
- ✓ Operates "under the radar" as an internal quick study,
- ✓ Builds internal vision for going forward,
- ✓ Can happen very quickly, taking only days to complete.

A consultant team or in-house facilitator typically takes the staff through a consideration of the following questions, and the answers leading to both a program and funding direction:

- ✓ What is the local government currently doing in terms of stormwater management?
- ✓ Why should the local government pursue a study and potential funding method like this, what is the compelling case?
- ✓ What stormwater program priorities should guide the local government in the next three to five years?
- ✓ What larger program improvements should be made and what would be the costs? What is the revenue potential of a utility fee or other major revenue source?
- ✓ What are the major hurdles or potential "show stoppers" to going forward?
- ✓ What are the immediate next steps should a "GO" decision come out of this study?

Integrated into this study is the potential for staff presentation of the findings and an educational/informational overview of a stormwater utility funding mechanism.

PROCESS FRAMEWORK, FEASIBILITY STUDY

The purpose of the feasibility study is to assess the local government's existing stormwater management program, to make recommendations for future directions and changes, and to assess the feasibility of funding the program with a stormwater utility (user fee) and other methods.

Figure 4-2 illustrates a typical "roadmap" for the feasibility study.

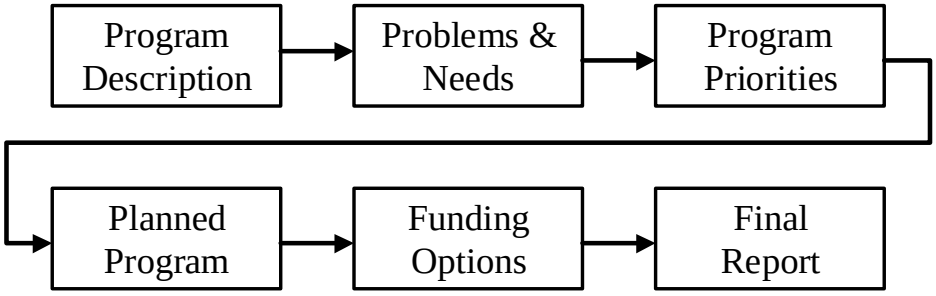


Figure 4-2: Feasibility Study Roadmap

Typically a group of citizens and staff are taken through a consideration of the following questions, the answers leading to both a program and funding direction:

- ✓ What is the local government currently doing in terms of stormwater management?
- ✓ What are the stormwater related problems, issues, needs, resources, and opportunities currently faced by the local government?
- ✓ What stormwater program priorities should guide the local government in the next three to five years?
- ✓ What specific program improvements should be made and what will be the costs?
- ✓ What is (are) the best way(s) to pay for these program improvements?
- ✓ How should the funding method(s) be implemented?

The feasibility study is used when there is an inclination to go forward with a stormwater utility but sufficient support has not been developed to insure adoption of a utility ordinance. The feasibility study essentially accomplishes the first few steps in establishing a stormwater utility without the commitment from elected officials to make the final decision.

The feasibility study can be a worthwhile endeavor because it:

- ✓ is low risk; even if implementation of a utility is found infeasible, the study is a success because it accurately determined a “no go” decision was best;
- ✓ tests the water before committing to a user fee, giving political leaders a sense of safety because the approach is phased and involves others in the “go” decision;
- ✓ provides broader backing and wider support among the community and brings them into the process early;
- ✓ builds momentum and support toward a “go” decision through logical consideration of program needs and concerns;
- ✓ provides an early warning of hurdles and pitfalls;
- ✓ saves time and money because implementation costs can be defined and may be lowered by anticipation and planning; and
- ✓ develops sufficient legal due diligence to allow for borrowing of the implementation costs, with later payback from the user fee revenue stream.

The advantage of this kind of feasibility study over some other approaches is its initial focus on problem solving. The focus of the feasibility study is not just revenue generation but program improvement. This initial concentration on

identifying and solving problems is key, and follows the process for bringing about action discussed previously.

Often the use of a citizen's group serves as the vehicle for taking the local government through the business plan approach and the roadmap in Figure 4-2. This can be accomplished in four to seven meetings and can be very participation oriented.

Other forms of stakeholder participation in the feasibility study can involve:

- ✓ citizen review of a previously completed consultant study where it is presented in a series of meetings with comment sought;
- ✓ public forums where issues are openly discussed by a panel with questions and input sought from the audience; or
- ✓ study groups where a specific need, such as flooding, is investigated leading to solution concepts and identification of funding needs.

PROCESS FRAMEWORK, UTILITY IMPLEMENTATION

Regardless of the use of a feasibility study, the implementation of a successful user fee follows four "tracks" of activity. Figure 4-3 outlines these four tracks in an overall utility implementation flow chart. It is crucial that these four tracks are coordinated and timed to occur as shown. While there are almost infinite variations on this figure, the key activities within the figure are all important and should not be skipped.

For larger communities there can be a manager for each of the four tracks. For smaller projects a single manager can handle multiple tracks, though it often makes sense and increases project success for each track to have an experienced expert in the lead.

The Public Track

Though not resulting in an "operational" part of the utility, this track serves the whole process. It involves four basic phases: planning the public involvement and information process; conducting the involvement and public education process; carrying out the implementation campaign; and monitoring utility implementation and customer service.

Often a citizen's stakeholder group is involved. A citizens group can assist in the work of all four tracks and is particularly useful in establishing policy and priorities and to serve as eventual proponents of the recommended action.

Stormwater utilities are rarely infeasible technically, and legal constraints can usually be overcome. It is in development of public, stakeholder, and political

support that the difficulties often arise. Thus the Public Track is often the key to success of utility development efforts.

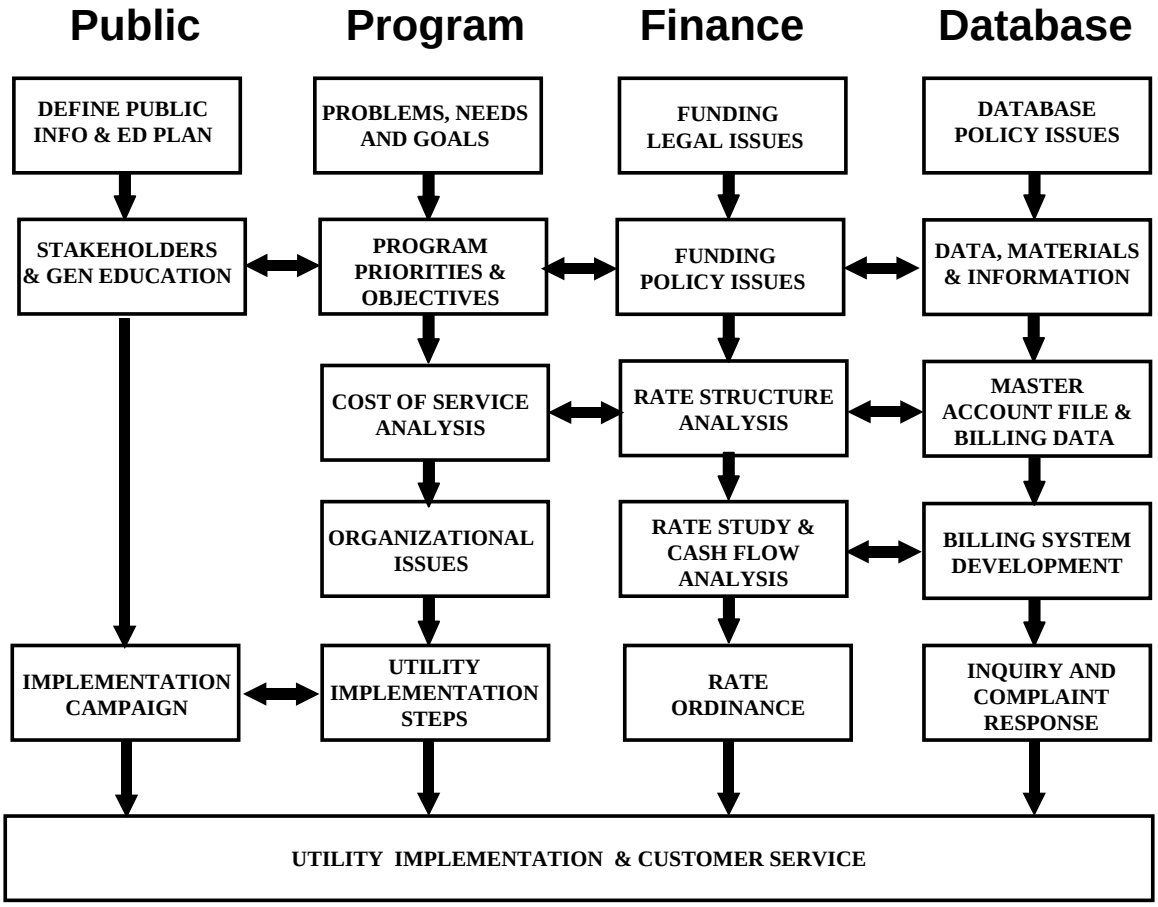


Figure 4-3: Utility Implementation Approach

It is important to remember that there are many "publics" in a local community, and that each has a stake or special interest in a stormwater utility with reasons to both support and oppose it. The following are examples:

"Public"	"Special Interest"
✓ Developers	Regulatory and Financial
✓ Environmentalists	Stormwater Quality, Habitat
✓ Neighborhoods	Flooding, Convenience, Property Values
✓ Clubs	Participation, Voice
✓ Social, Ethnic, Economic	Locations, Jobs, Costs
✓ Tax Exempt Entities	Utility vs. Tax
✓ Political Leaders	Timing, Message, Process
✓ Media	Is it "News"?
✓ Commercial/Industrial Entities	Costs, Credits, Service
✓ Technical Specialists	Standards, Criteria and Procedures

Early in the process, preferably during a feasibility study, a Public Information and Education Plan (PI&E Plan) which asks the following questions should be developed. This plan serves as the roadmap for the work of the Public Track.

- ✓ Who is the public?
- ✓ What is the message?
- ✓ When do we send the message?
- ✓ How is the message sent?
- ✓ What is the emergency response when trouble occurs?

Well crafted information, strong media involvement, a speakers' bureau, videos, citizen speakers, billboards, mailers, and public meetings, have all been used in effective public information programs. There is no one right approach as each community and sub-element within the community, may obtain its information and make decisions differently. In one, key decisions are made by leading business leaders. In another the council may make the decisions with little input. In one community environmental interests prevail; while in another, solving flooding is key. In some places environmental justice and the economically disadvantaged are primary, while for others it is not. Thus, it is important to understand the character and makeup of the community.

The Program Track

This track assesses the basic problems, needs and goals, establishes program priorities, lays out a three to five year program, develops a costing of that program, and finally, sets up implementation steps. The program is the final determinant of the revenue plan, utility rate and rate structure, although due regard must be given to the customer's willingness to pay for stormwater given other demands on citizens' resources.

The program is also what sells the utility concept, and it is the Program Track process which addresses the most fundamental of questions. How do we convince citizens and stakeholders of the need for an alternate funding source? Or, how do we craft a stormwater program that meets the needs of the local community without exceeding available funding?

The program track begins by identifying the compelling case discussed previously (problems/needs). This is translated into three to seven key program priorities and the new stormwater program is formulated with a cost of service analysis, into a detailed three to five-year program plan. Longer term planning in less detail is also useful.

Normally, for multiple jurisdiction utilities, the governance questions must be addressed in a preliminary way, early in the process. But it is normally prudent to address organizational and management issues at the end of the Program Track. It is better to first focus on the functions of the stormwater program rather on who

might perform them. This defers potential organizational issues to the end where they are more easily resolved by the completed program planning information.

The basic elements of a stormwater management program, which must be addressed by the Program Track, include both operational and financial functions. These might include:

- ✓ Operations and Maintenance
- ✓ Regulation and Enforcement
- ✓ Engineering and Planning
- ✓ Capital Construction
- ✓ Administration and Finance
- ✓ Regulatory Compliance
- ✓ Billing and Collections

The final assessment and planning step in the Program Track is the identification of the steps required to implement a utility. Those steps include a determination of the mix of revenue types to be used, the structure of the utility rate and the administrative functions which will implement and support the utility. These factors/elements are addressed in more detail in Chapter 2 of this guidance. The legal foundations of the revenue mix are addressed in Chapter 3 and are a principal focus of the Finance Track of the Utility Implementation Approach shown in Figure 4-3 of this chapter.

The Finance Track

The Finance Track sets up the legal and financial basis for the stormwater funding program. In this track the planning process examines legal parameters of the revenue options, explores and establishes policies which will govern the revenue program, analyzes factors which will determine the structure of the rates to be levied, determines the revenue needed, and develops ordinances needed to implement revenue policies, rates, enforcement and equities.

It is in this track that fundamental questions concerning financing of the stormwater program are addressed. Who should pay for the stormwater program? What is the appropriate cost share to be borne by each benefited segment of the community? When or how frequently should payment occur; and what mix of revenue types or methods should be used to accomplish this payment such as fees, assessments, taxes, and/or utility?

In addition to these policy questions, the Finance Track also addresses legal questions. What revenue authority already exists? What legal authority is needed to implement the desired revenue mix; and what legal foundation is needed to support the levy of each of the individual revenue types (nexus, benefits, service)? A more detailed discussion of these issues is found in Chapter 2 and 3 of this guidance.

It is very important to have established a logical and rational nexus for each revenue policy decision, for the rates to be charged, and for ancillary charges, credits, and offsets. The Finance Track establishes the myriad of basic financing policies needed. Then, based on appropriate legal authorities and foundations, and on program input, it moves from development of a revenue structure to meet the program needs, to a rate structure study and cash flow analysis and finally to an ordinance.

It must be stressed that the Finance Track must work in support of the Program Track. The development and implementation of a stormwater funding program in general, and a utility in particular, must be intricately linked to the functions, goals and beneficiaries of the stormwater program to assure both equity and adequacy of the revenue levies. Revenue levies not consistent with benefits or services received; or not adequate to address identified heeds, will quickly lose community support.

The Database Track

The Database Track has application to many stormwater revenue types, but is of foundational importance to the implementation of a stormwater utility. This tract has five main purposes:

- ✓ to determine the appropriate database and fields,
- ✓ to develop the master account file,
- ✓ to develop a mechanism to deliver the bill to the customer,
- ✓ to determine database maintenance processes, and
- ✓ to monitor customer service.

The Database Track is that portion of the planning process in which the decisions made in the preceding tracks are used to create the administrative infrastructure which will compute the revenue levy for each parcel, deliver the bill, record the payment, and monitor the results. The process involves policy assessment and development, evaluation of database options, design of the master account file and selection of a billing and record system. A database can also provide the means to track complaints and service deficiencies. During the Database Track, the revenue program policy decisions made in the Finance Track are given form and application, producing an actual revenue levy on real properties.

The master account file is a derivative of the rate methodology selected. For example, an impervious rate methodology requires the estimation of the impervious surfaces on each parcel. However, the availability of data could also influence the rate methodology decision. Should, for example, land use data be available then it might make sense to construct a rate methodology that uses development intensity factors to reflect the impervious fraction. In some cases the tax assessors file has sufficient number of relevant fields and accuracy to allow for a surrogate of development intensity without a lot of hand work. Addressing these decisions necessitates the connectedness of the Database

Track and the Finance Track as shown in Figure 3. An expanded discussion of rate methodologies is found in Chapter 2.

Some data sources may not be helpful. GIS coverage's, not made to generate stormwater billings and "impervious coverage's", may not contain all the impervious areas of properties. Often they simply approximate buildings and use lines to outline parking lots. Also, parcel information, scanned from paper files, is often warped in relation to the real world. The database developer must search for the best available information or develop information from scratch.

Newer methods involving satellite imagery are coming into popularity for larger areas, low tree cover, and limited budgets. There are, however, significant accuracy problems and the success of such a method depends on the image processing skills of the technician as much as technical specifications of the imagery.

There are generally four options for billing systems. The most common is to use an existing utility system, such as water or wastewater. This has advantages in that stormwater looks like water and wastewater and the charge is clearly a fee for service, not a tax. Another advantage is that delinquencies are low, and it may be possible to turn off water for partial payment of the combined bill even though the customer may have intended to pay the non-stormwater portion of the bill.

Billing the fee on a tax bill may have advantages and disadvantages as well. Using the tax parcel file has the advantage that stormwater is essentially a parcel-based function, creating a direct relationship to the vast majority of the parcels. A disadvantage is that the tax bill is mailed once per year for the majority of properties complicating program cash flow.

The stormwater bill can be placed on another type of utility bill (e.g. electric) but that typically lacks a clear nexus. The last option is to create a stand-alone billing system. This has all the advantages of control and focus, and all the disadvantages of high cost and lack of ability to enforce collections.

Recently local communities are looking at integrating the database support of many of their functions related to infrastructure and customer service. For example, some, or all of the following functions can use overlapping databases:

- ✓ Utility Billing systems
- ✓ Geographical Information Systems
- ✓ Dedicated Stand-alone Systems
- ✓ Maintenance Management Systems
- ✓ Customer Service Systems
- ✓ Complaint Tracking
- ✓ Accounting and Financial Management
- ✓ Property Tax Systems

Depending on the rate methodology the following fields may be required in the database:

Occupant	Impervious area*
Owner	Parcel ID number
Service address	Runoff coefficient*
Property address	Equivalent stormwater units*
Customer type	Customer account number
Land use code*	User fee
Gross area*	Optional fee or information fields

[* Factors which are required for various stormwater fee rate methodologies.]

POLICY ISSUES

The implementation of user fee or utility based funding for stormwater has numerous policy implications. The policies aggregate around the key issue of deciding how service charges should be implemented and applied to specific properties in a consistent and fair manner.

Timing of policy analysis is also important. Some issues must be decided early in the process, such as the extent to which a utility is to be the sole, primary, or secondary revenue source. Other issues will be addressed much later, such as the choice of the billing systems. Still other issues will not arise until the utility is functioning, such as the disposition of specific appeals and requested rate/levy adjustments.

Thought must also be given as to who will make specific policy decisions. The Council formally adopts through ordinance or policy edict many of the major policies which guide the municipality's stormwater revenue program. Although policy-making in the highest sense is reserved to the Mayor and Council, day-to-day policy decisions are, in fact, often made at several levels. .

The Mayor may make some policy decisions based on Council positions. Other policy decisions are made by municipal management and staff administrators pursuant to general directives spelled out by the Mayor and Council. It is important to recognize the need for and functioning of this dispersed policy-making environment, and create a defined hierarchy for the review of important issues. The following is a sample of possible decision levels. Issues which could be decided at each level must be determined by each community.

- ✓ key staff and consultants
- ✓ other involved staff
- ✓ advisory committee
- ✓ manager's office
- ✓ municipal council/mayor

An initial screening of issues for the purpose of weighing their significance and determining the appropriate decision level must consider the following:

- ✓ impacts of policy decision alternatives on costs and manpower;
- ✓ the potential impact on the equity of the utility rate;
- ✓ the relationship of each specific issue to other policy issues;
- ✓ the priority and timing associated with the issue given the municipality's objective of implementing alternative funding for stormwater management,
- ✓ the appropriate level(s) of municipal government at which the issue should be addressed and resolved.

Policy issues in the development of a stormwater utility can be divided into those dealing primarily with program, funding, and billing technical issues. Following is a list of typical policy issues in these three tracks:

Program Related Policy Issues (Program Track):

Program Mission	Major Program Priorities
Program Service Description	Service Area
Extent of Service	Levels of Service
Stormwater Quality Strategy	Organization and Staffing
Privatization	Interlocal Agreements and Responsibilities
Relationship with other Programs	Public Input or Advisory Groups
Public Relations	

Funding Related Policy Issues (Finance Track):

Types of Stormwater Services Funded	Basis for Cost Distribution
Prior Investment	Future Use of Stormwater Systems
Accounting Method	Rate Methodology
Basic Funding Methodology	Modification Factors
Secondary Funding Methods	Overall Funding Strategy
Credits	Equivalent Residential Unit (ERU) Base
Public Streets and Property	State and Federal Property

Billing Related Policy Issues (Database Track):

Billing and Collection Methods
Independent Database system Tie-in
Appeals and Adjustments
Collections and Delinquencies
Property Liens
Management Reporting
Use of other Databases
Number and Type of Data Fields
Rounding and Ranges
Impervious Measurement Accuracy
Customer Service Procedure
Information to Put on Bill
Billing Cost Allocations
Case Exceptions Including:
  Multiple Owners
  Multi-Story Condominiums
Consolidated Billing
New Stand-alone System
Modification of Existing Billing System
Billing Period
Water or Tax Bill Tie-in
Enforcement Procedural Issues
Master Account File Development Process
Accuracy Requirements
Resolution Procedures for Discrepancies
Impervious Area Methodology
Use of Street Centerline Data
Master Acct File Database Maintenance and Updating Process
Billing Owners or Tenants
Undivided Interest, Common Areas
Stormwater Only Accounts
Use of GIS, Mapping or CADD

SCHEDULE

Figure 4-4 illustrates a typical schedule using the four track process for utility establishment. The schedule shows that a comfortable time frame is 18 months from start to finish. The “M” letters indicate milestone meetings.

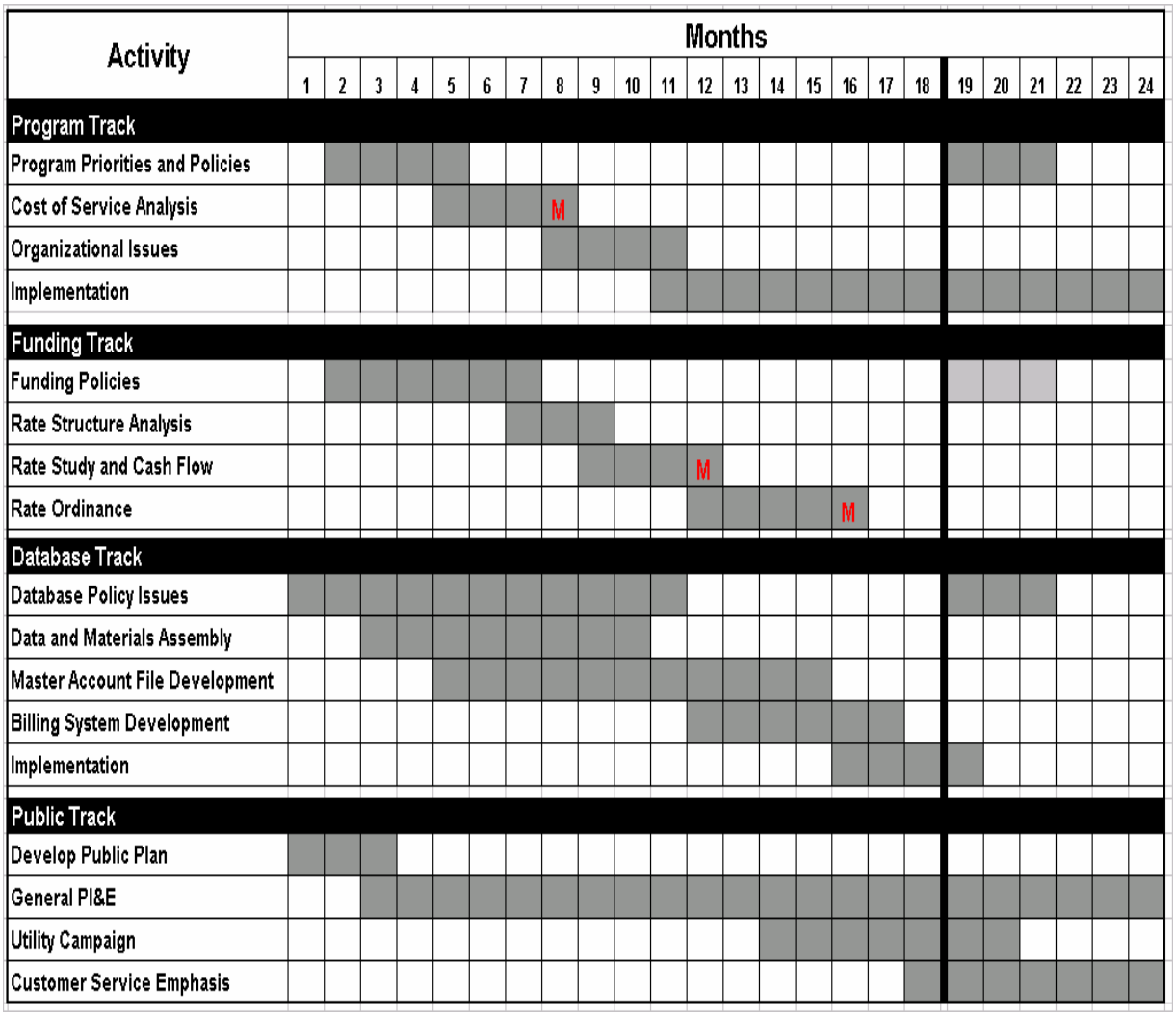


Figure 4-4: Utility Implementation Schedule

The critical path through the process can shift due to the requirements for citizen involvement, political timing, billing timing, and database development.

APPENDIX

EXAMPLE STORMWATER UTILITY PROGRAMS

CITY OF BELLEVUE, WASHINGTON

Keynotes

- The Bellevue stormwater management program was one of the first in the United States (established in 1974) and also the first to give equal consideration to water quality and quantity (flood) control.

- Bellevue's Storm and Surface Water Utility provides a full range of capital infrastructure and operational services, primarily through its in-house staff. In addition to roadway drainage systems, it is responsible for an extensive stream system outside road rights-of-way. It also provides an erosion and sediment control program.

- The Bellevue Utility is governed by the City Council and administered by professional staff as part of a consolidated Utilities Department (water, wastewater, stormwater management, and solid waste).

- Funding of the Bellevue stormwater program is primarily derived from a user fee.

- Key funding policies include:

    - a user fee rate methodology based on gross property area and a factor reflecting the intensity of development of each property, with residential fees being discrete to each property and ranging from less than $3/month to more than $20/month;
    - retiring debt from an earlier very aggressive bonding program that constructed capital infrastructure improvements to the urban stormwater systems in the city.
    - A forward looking R& R funding program to replace infrastructure as it nears the end of its usable life (now pay-as-you-go R & R fund)

  Key operational practices include:

- consistent, watershed-based, master planning of stormwater systems with emphasis on water quality and quantity control and aquatic wildlife habitat management; and
- stormwater management functions performed by a staff responsible only for stormwater management, including NPDES permit compliance.

Community Profile

Bellevue is a city of 117,000 citizens. It is the business and cultural center of an area of more than 250,000 referred to in local parlance as "The Eastside", in reference to its location on the east shore of Lake Washington across from Seattle. Two major highway bridges cross Lake Washington to connect The Eastside with Seattle and thousands of people commute across the bridges each morning and evening. Bellevue is just 10 miles by road from Seattle across either bridge, and has emerged in the past twenty years as a business center in its own right. It has a daytime population of 172,000, with approximately 131,000 jobs, and is home to five of the top twenty-five publicly-traded business corporations in Washington State. Other major corporations such as Microsoft and Costco are headquartered in nearby Eastside communities.

Bellevue is a relatively young community, both in terms of history and demographics, although its population is aging now that the suburbanization has spread even farther east toward the Cascade Mountains. The current median age is Bellevue is 37, up from 28 just 25 years ago. It is an affluent community with high quality of life expectations, and ranks second in Washington State in both retail sales and property values. The per capita income is approximately $42,000/year.

Founded as a community in 1869, Bellevue was incorporated as a city government in 1953, with a population of less than 3,000. As suburban sprawl emanated from Seattle and multi-lane highway bridges spanned Lake Washington, Bellevue quickly transformed from a market crop agricultural area (primarily fruits and vegetables) to the local business center for The Eastside area. It became a preferred address in the region and underwent rapid suburban development in the 1960's. By 1970 the population had reached 60,000.

The City expanded to its current 31 square miles through several annexations. As it grew, the City absorbed more than a dozen special-purpose agencies that provided local water and sewer services to the neighborhoods that now comprise Bellevue. These formed the basis of its Utilities Department. The City assumed governance responsibility for a full slate of urban community services, including stormwater management. However, other than storm sewer system construction improvements built by residential subdivision and commercial developers and in association with road construction projects, the community did very little stormwater management until about 1970.

Fortunately, the City had developed so rapidly that most of its open streams remained and served as the primary drainage conduits for stormwater runoff. Unfortunately, by 1970 the increased runoff from new pavement and roof tops was overtaxing the capacity of the natural channels that had evolved over thousands of years. Runoff was also causing extensive erosion, sedimentation in the streams, pollution of Lake Washington, and local flooding problems.

Formation Process

The Bellevue Storm and Surface Water Utility is generally regarded as the first stormwater utility in the United States. It was established in January, 1974. A master account file was developed and service fees were initiated as the primary funding mechanism later that year. The Utility was charged with developing and implementing a comprehensive program strategy that would address both water quantity control and water quality protection. Its first priorities were to enforce erosion and sediment control standards and prepare watershed master plans for system capitalization in nearly a dozen small drainage basins in the city.

Service Area

The Bellevue Storm and Surface Water Utility is responsible for stormwater management, flood control, and erosion and sediment control throughout the City's 31 square mile incorporated area.

Role and Program

Bellevue's Utility has broad authority for all aspects of stormwater quantity and quality management. Much of the success the Bellevue Utility experienced is attributed to the detailed program strategy that was assembled by the staff following its formation in 1974 and continuously refined since. It has provided a clear, cohesive vision of the City's objectives and priorities, and drove the transition in organization and funding. The program strategy proved to be critically important in retaining the support of the City Council when the initial service fee (1974) was challenged by citizens and businesses who perceived it to be "just another tax".

During the 1970s the Utility prepared a Drainage Master Plan (capital projects only) and initiated a program to acquire properties and easements and build the facilities identified in the Plan. The Plan consciously sought to preserve the open drainage system by limiting the peak flow of runoff into and through the streams. Engineering estimates suggested that significant savings would result if the open system could be retained by installing regional detention storage facilities at various points along the watercourses. That analysis proved correct, despite rapidly inflating land prices that drove costs up quickly.

The regional detention control strategy was augmented by regulatory standards requiring on-site detention on new development and aggressive soil erosion control measures. The design standards reduced post-development peak runoff to approximately the same as pre-development conditions. Implementation of the

Utility, plus the Master Plan project, justified the initial assembly of the City's geographical information system (GIS), which was then incrementally expanded to serve other City programs.

Other priorities were also addressed while the Master Plan was being developed. The Utility staff immediately became directly involved in land use and development reviews. Routine maintenance of drainage systems was significantly increased. In the late 1970s the City became the largest grantee of the National Urban Runoff Program (NURP), the Environmental Protection Agency's first major investigative study of water quality/stormwater runoff relationships. This placed Bellevue on the leading edge of stormwater quality management in the United States. It also attracted cooperative projects and funding from other state and federal agencies, most notably for stream monitoring and system construction. The Bellevue stormwater program continues to be one of the most highly regarded in the United States. The Utility service fees have evolved through several iterations, and are now relatively more sophisticated and precise than most.

Following the initial formation and implementation period, the Utility continued to expand its programs and build capital projects during the 1980s and 1990s. The infrastructure improvements identified in the initial Master Plan and subsequent updates were completed. A remedial maintenance program was initiated to repair and replace aging drainage systems before they failed. Aggressive development review and inspection efforts were instituted. Bellevue now has eleven major regional detention sites with 650 commercial and 335 neighborhood detention facilities in residential subdivisions. There are also several hundred on-site detention systems located on commercial properties. Several of the regional and neighborhood systems are wetlands that contribute environmental benefits as well as flood control during storms.

The maintenance program attained a fully preventive level of service within ten years. It was rigorously programmed, and remedial repairs became increasingly important as the systems aged and deteriorated. A permanent citizens' advisory commission was established to provide the City Council with community perspectives on stormwater issues. Public information and education morphed into public participation, with "stream teams" composed of interested citizens conducting various projects and activities to protect and improve the City's many small stream corridors. Volunteers are trained to collect scientific data at low cost for monitoring and adaptive management purposes.

One incident dramatically demonstrates the success that Bellevue achieved through its utility. In 1990 the Puget Sound region in western Washington State was struck by an intense and extended rain event over the four-day Thanksgiving holiday weekend. More than $20 million of flood damage occurred in other parts of King County, which is the 1,200 square mile governance jurisdiction that includes Seattle, Bellevue, and other cities. Snohomish County (immediately

north of King County) had more than twenty bridges damaged. One of the multi-lane Lake Washington floating bridges was under repair at the time. Stormwater invaded the floating structure and caused it to sink in rather dramatic fashion. Replacement of the bridge cost over $200 million.

In spite of such widespread problems during this extended storm event, Bellevue's stormwater system worked so effectively during and following the storm that the City did not even have to call out its maintenance crews in response to any problems. Several of the Utility's regional detention systems filled to their capacity, but they worked as designed together with the privately owned commercial systems and overflow was minimal. The drainage and stream systems absorbed the impact without major damage.

Governance Structure

The Bellevue Storm and Surface Water Utility program is guided by policies set by the seven-member City Council. Overall city administration is directed by a professional city manager who supervises a number of major departments including Utilities.

Organization and Staffing

The stormwater management program in Bellevue is administered by the Utilities Department, which also provides water and wastewater management services. The staffing level for stormwater management has been relatively constant for the last decade, fluctuating between 45 and 50 full-time equivalent (FTE) positions.

Funding

The Bellevue Utility is supported primarily by periodic user fees charged to virtually all properties in the city, including the roads and highways. The Utility's annual operating budget now is approximately $6 million. Capital expenditures for the latest fiscal year (FY 2003/2004) were budgeted to be $2 million on projects having a total estimated cost of $21 million. Several of the capital projects are long-term, incremental efforts to stabilize lengthy sections of stream channels and replace aging infrastructure. Total annual expenditures from the Storm and Surface Water Utility fund are nearly $10 million, including debt service payments on capital improvement bonds.

The initial service fee was based on impervious area, and billed only developed properties. In response to the citizen's committee formed to examine the fee concept in 1975, the City shifted to a rate methodology based on gross area and development conditions of every property. As a result, both developed and undeveloped properties are charged for stormwater management in Bellevue. The City Council has also enacted several rate increases over the years as the program revenue requirements grew.

Regardless of whether a property is in residential or commercial use, the rate methodology employs increments of one hundred (100) square feet to calculate the fees for each property, resulting in highly discrete charges. Service fees for single-family residential properties now range from less than $3 to more than $15/month, with a typical charge of approximately $10/month. The Utility is fully self-supporting and has never received allocations of general City revenues. A majority of its revenues are generated by the service fees, but the Utility also continues to receive federal and state grants and loans in support of specific activities and facilities. It also sponsors cooperative projects with private developers, other public agencies such as the local school district and neighboring general governments, and homeowners' associations in residential neighborhoods.

Inter-governmental Cooperation

The Bellevue Utility works closely with other jurisdictions in the region, but its physical location on a ridge between two major lakes reduces the degree to which it shares watersheds with neighboring cities and King County. The development of one major regional detention area illustrates the type of cooperation that the Utility has been able to obtain from other agencies. The Municipality of Metropolitan Seattle (Metro) (now King County) wished to locate its Eastside Transit Maintenance Facility in Bellevue in the mid-1970s because of the site's favorable central location. The City required that Metro (which coincidentally was also the wastewater treatment provider for the Greater Seattle area) preserve a small stream that traverses the property. Utility staff worked with Metro to optimize the use of the site for bus maintenance while also enhancing the stream corridor and installing containment controls to provide peak flow attenuation in the stream. Much of the collaborative effort was directed toward water quality management. Today, the utility works with other jurisdictions to develop capital facilities, protect water quality, manage lakes, and enhance aquatic habitat.

Public Participation

Public participation has been a hallmark of the Bellevue Utility since its inception in the late 1960s. A group of citizen activists approached the Bellevue City Council in 1969, requesting that the City government initiate studies and other actions to solve emerging drainage problems. They were especially concerned with the environmental impacts on the streams, their habitat, and riparian resources. The City Council appointed several of the citizens to an advisory committee to recommend a strategy for meeting with the challenge. Over the next three years the committee reported back to the City Council with a series of recommendations, the most significant of which (in hindsight) was that the City should establish a dedicated source of funding for its stormwater management program. The recommendations emerged as Bellevue's Storm and Surface Water Utility early in 1974.

In response to complaints about the initial user fees, a second citizen advisory committee was established that included several critics of the service fees, one of whom was challenging the Utility in court. That committee reviewed the initial decision to form the Utility. They concluded that the objectives, program strategy and policies were appropriate and recommended that the City continue with the service fee approach, but that citizens vote on the funding. This reassessment of the concept was pivotal in the ultimate success of the Utility concept in Bellevue. In their report to the City Council the committee cited the strategic plan developed for the Utility as a principal reason for supporting the concept. A series of advisory elections followed, which guided the evolution of the service fee funding methodology.

The public's participation in the work of the Bellevue Utility continues to be a hallmark of the community's approach and a key factor in its success. A permanent Storm and Surface Water Utility Commission formed in the late 1970's. It now guides Utility policy and advises the City Council on program and funding decisions not only for stormwater management issues, but for other utility programs as well. Volunteer groups are sponsored by the Utility and provide support for stream protection, collection and disposal of household waste and hazardous materials (paint, etc), and multiple use of riparian corridors along the City's streams.

CITY OF CHARLOTTE/MECKLENBURG COUNTY, NC

Keynotes

- The Charlotte/Mecklenburg County approach to stormwater management relies on centralized funding and regional programs for large systems combined with local management of minor stormwater systems and associated program elements. The County and individual towns have a high degree of self-determination in deciding the service level to be provided by local systems and programs, funding, and assignment of functional activities.

- Mecklenburg County provides the smaller towns with the option of a menu of available services, but the decision to use the County, City of Charlotte, in-house, or privately contracted vendors resides with the individual local entities. The City of Charlotte has a Phase 1 NPDES permit and the County and smaller communities have a Phase 2 permit.

- North Carolina statutes allow both counties and cities to establish stormwater utilities and adopt service fees to fund stormwater quantity and quality control efforts. However, a specific limitation in the statute prohibits creation of overlapping county and city utilities. Initially, the City of Charlotte established a utility. A year after, the utility was restructured to provide a countywide utility, with complementary programs run by the City and County to avoid any conflict with the statute.

- The Mecklenburg County Stormwater Utility is governed by the Board of County Commissioners and administered by professional staff. The City of Charlotte also has a substantial stormwater management program governed by the City Council and administered by the City Engineering and Property Management Department. Other City departments such as the Department of Transportation are also important players since they often provide maintenance of the stormwater systems in the roadways. City and town councils in the smaller communities in Mecklenburg County govern their local stormwater programs.

- Funding of the Charlotte/Mecklenburg County stormwater program is primarily supported by a composite stormwater service fee that includes both major (draining larger than one square mile) and minor (draining less than one square mile) components. The individual towns more often employ a blend of funding from several sources.

- Policies are adopted by the Board of County Commissioners and the city and town councils in the respective communities that are involved in stormwater management. Key funding policies include:

    - a composite regional major and minor service fee based on a consistent impervious area rate methodology;
    - County control of the major component of the composite service fee; and
    - local governance (county/city/town) control of the local component of the minor service fee.
    - the City of Charlotte has initiated a very aggressive bonding program to construct $198 million in improvements to the local urban stormwater systems in the city over five years.

    Key operational practices include:

    - consistent, watershed-based, planning of stormwater systems;
    - centralized stormwater quality management, including NPDES permits; and
    - a stormwater services menu provided to smaller entities by the County
    - Billing and collections and customer service are provided throughout all jurisdictions countywide by the City of Charlotte.

- Stormwater management staffing in the County and towns varies widely. Mecklenburg County and the City of Charlotte have relatively large and skilled staffs capable of managing both stormwater quantity and quality programs, while the smaller towns typically have few staff and rely on the County, City of Charlotte, or private vendors to provide contracted

services. The combined Charlotte/Mecklenburg County staffing exceeds 150 full-time equivalent positions.

Community Profile

Charlotte/Mecklenburg County is the largest urban center between Washington D. C. and Atlanta. Major businesses include banking, transportation, distribution, communications, and manufacturing. The City of Charlotte, Mecklenburg County, and smaller neighboring towns have collaborated in the development of one of the most highly regarded stormwater management programs in the United States.

Mecklenburg County is the core of a six-county metropolitan area that has a total population of 1.5 million. Approximately one half reside within Mecklenburg County, with 650,000 people residing in the City of Charlotte. Only 70,000 Mecklenburg County residents live in areas that are not within incorporated cities or towns.

The County encompasses about 526 square miles, nearly 280 of which are in Charlotte. Charlotte and the smaller towns in the County have adopted policies for on-going annexation. It is anticipated that there will be no remaining unincorporated areas of the County within a decade or so, but County government will continue to provide designated services such as floodplain management county-wide.

Mecklenburg County established a storm drainage district early in 20th century which built and maintained large, open-channel drainage systems to serve those portions of local watersheds with a tributary area of more than one square mile. Improved channels were provided throughout the County, regardless of whether the channel was located in an incorporated city or town government or in the unincorporated area. Of course many of the channels crossed the jurisdictional boundaries of the cities, towns, and county.

Improvement and operation of drainage systems to serve areas smaller than one square mile in the incorporated jurisdictions were left up the local government. The City of Charlotte and the smaller towns were nominally responsible for the small watershed systems. The County improved and maintained the smaller systems in the unincorporated area. Many of the smaller systems were installed by developers as residential subdivisions and commercial projects were constructed. This approach was employed for over seventy years, with mixed success. The larger channels tended to be funded adequately and were improved from time to time, while the smaller systems were largely ignored unless specific problems developed.

Today Mecklenburg County and the City of Charlotte manage different but complementary stormwater programs. The City and County work together in order that services to the community will not be duplicated. The County remains

responsible for managing FEMA regulated floodplains and their channels county-wide. This is comprised of a network of "named" large creeks (like McMullen Creek, Little Sugar Creek, and Briar Creek) that drain watersheds larger than one square mile. The City of Charlotte and the smaller towns are responsible for maintaining the smaller creeks and tributaries that feed into the large creeks. Both the county and town stormwater programs provide services for drainage pipes, ditches and drains on public property and within easements on private property in their respective jurisdictions.

Formation Process

Formation of the Mecklenburg County stormwater utility involved a relatively complex, and occasionally contentious, process that spanned over three years. This was in large part a function of local politics, but the North Carolina legislative authorization for stormwater utilities heavily influenced the process.

Initially, the County and City of Charlotte attempted to cooperatively identify a mutually agreeable approach to instituting a utility. An advisory committee comprised of County, City, and diverse interest group representatives met for more than a year to assess how local needs might best be addressed. Unfortunately, they reached a stalemate regarding which entity should be the lead management entity. This reflected the past history and differing needs of the County and City.

Since the early 1900's, Mecklenburg County had provided and maintained drainage improvements along creeks throughout the County below the point where the tributary area totaled 640 acres (one square mile). Such regional systems were locally termed the "regulated floodways". Drainage systems serving smaller watersheds in the unincorporated areas were also the responsibility of the County, but the cities and towns were responsible for the local drainage systems within their jurisdictions. The City of Charlotte Department of Transportation had maintained its urban stormwater systems associated with roads for many years, but drainage systems located outside road corridors had not been aggressively managed or maintained. When discussion of the utility option began in 1989, the County's principal priority was to enhance its regional systems, while the City's priority was to improve the local drainage systems. Both entities were concerned about their upcoming NPDES permits at that point.

North Carolina legislation was adopted in the late 1980's which allowed counties and cities to establish stormwater utilities. However, it specified that only one entity could establish a utility where two or more local entities provided drainage systems and services. Because Mecklenburg County managed the regulated floodways throughout the County, including areas in incorporated cities and towns, the County staff wished to have a utility that was county-wide. However, there was some reluctance among the County Commissioners to lead that approach. Once it was clear that a cooperative approach was not moving

forward, the City of Charlotte determined that it could not defer its solutions and would institute a stormwater utility to support its local drainage system programs including funding for compliance with Phase I stormwater requirements. The City utility was instituted by the City Council and service fees were initiated in January, 1993.

Once it became clear that the City was proceeding independently, the County Board of Commissioners determined that it would proceed with formation of its utility. This caused both entities to revisit the issue of a single county-wide utility. It was determined that the County utility would supplant the City utility as a legal entity when it was formally instituted in 1994. The structure and control of budgets, rates, and fees was a key to this agreement. This process was facilitated by the fact that the County and City had retained the same consultant team to assist both parties from the beginning of the process. That enabled the entities to arrive at consistent governance, rate, and program decisions, and implementation of the master account files and billing systems was eased.

Another aspect of the County and City of Charlotte negotiations involved the provision of services in the smaller towns that surround Charlotte. In order to obtain their agreement to participate in regional solutions and application of County utility service fees within their jurisdictions, the County agreed to extend control over many key policy issues such as rates to their elected Councils.

A permanent, nine-member Storm Water Advisory Committee (SWAC) is appointed by the Charlotte City Council, Mecklenburg County's Board of Commissioners, and Town Councils of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville. SWAC members represent diverse neighborhood, business, institutional, and environmental interests.

Service Area

The total area of Mecklenburg County is approximately 526 square miles. The City of Charlotte is approximately 280 square miles of the County, while the smaller six towns collectively contain (or maintain through Extra Territorial Jurisdiction) the remaining area of the County. North Carolina annexation laws allow aggressive annexation policies to be pursued by cities and towns. At the time the stormwater utility was being formed Charlotte and the satellite cities and towns had reached separate agreements on their respective spheres of influence which will control future annexations as urban/suburban development occurs. The County remains essentially a rural services provider, and the city and towns are urban services providers. Annexations tend to occur each year to two as urban/suburban development spreads into the unincorporated areas. This has directly influenced the initial division and gradual shift of stormwater management responsibilities.

Pursuant to state legislative limitations, the Mecklenburg County stormwater utility is the single, county-wide stormwater utility and encompasses the

incorporated areas by inter-governmental agreement. The individual cities and towns are stormwater service agencies within their respective jurisdictions, but utility service fees to support their programs are levied by the Board of County Commissioners.

It was decided that the County and, to a lesser degree, the City of Charlotte would support the smaller cities and towns stormwater management efforts by offering a "menu" of services to them. Since Mecklenburg County remained responsible for the regional drainage facilities throughout the County and also for the rural drainage systems in the unincorporated areas, it was judged to be best suited to provide those services to the smaller towns. Since the City of Charlotte performs street drainage maintenance, it was determined that it would offer similar services to the smaller cities and towns, though most currently maintain those systems in-house. (It should be noted that county governments in North Carolina do not operate road systems. There are state highways and city streets and highways only – no county roads. Thus, the State of North Carolina Department of Transportation is an important player in road-associated stormwater management in unincorporated areas of the state and is also responsible for some roads within incorporated cities and towns.)

One of the most notable differences in stormwater services in Charlotte/Mecklenburg is that systems located outside road rights-of-way and easements are also maintained by the City if "public water" is present. That includes runoff from any public street or property. This policy enables the City to actively manage nearly all of the drainage systems rather than just those components located in roadways. As a result, the County and municipal stormwater programs apply much more effort to stream protection and enhancement than in most communities.

Role and Program

Mecklenburg County and the City of Charlotte both continue to have substantial stormwater management roles and programs. The County has an engineering and operational staff geared to management of major drainage systems serving watersheds of more than one square mile and rural drainage systems serving smaller watersheds in the unincorporated areas. The City of Charlotte has a stormwater engineering staff in the City Engineering and Property Management Department and an operational staff in its Department of Transportation. Charlotte has a Phase 1 NPDES permit, which is supported by contracted County forces that provide water quality monitoring and data management. The County and towns have a Phase 2 permit.

Although the County focuses its program on the larger creeks, the role of both agencies is primarily urban stormwater management simply because the area is now extensively urbanized. Flood protection is an important objective, but the area is subject only to small drainage system flooding rather than major river flooding along the Catawba River, which traverses the County. The Catawba is

controlled by a series of dams and impoundments such as Lakes Norman and Wylie. The County's efforts focus on the regulated floodways of the major creeks throughout the County. Drainage systems in the unincorporated areas that are not within road corridors are also managed, but these are a lower priority. The State of North Carolina Department of Transportation is responsible for roadway drainage systems throughout the unincorporated area, and for some systems in the incorporated cities and towns.

Mecklenburg County recently consolidated several previously dispersed functions into a Land Use and Environmental Services Agency (LUESA). Its scope of responsibility includes floodplain management, stormwater services, water quality, land development, zoning, groundwater protection, on-site wastewater management, private water well permits, and others that were integrated in a Water and Land Resources organization. The County's objective in consolidating these programs in one operating unit is to ensure a clean and livable environment through the protection and enhancement of water and land resources.

The County's program also provides floodplain management county-wide. Federal flood insurance provisions mandate that floodplains be delineated where tributary watershed areas exceed 640 acres, which corresponds to the drainage area definition employed by Mecklenburg County for the major streams management program throughout the cities, towns, and unincorporated areas. The program relies on regulations that limit intrusions into the floodplain. The County's Water and Land Resources group maintains the flood insurance mapping for the entire County. Improvements to and maintenance of the major drainage channels carried out by the County provide effective flood control during most storms. The County also performs floodplain and stormwater service inspections for the cities and towns and is responsible for the small drainage systems in unincorporated areas.

The City of Charlotte program focuses on local drainage systems both within and outside road corridors. Its program heavily oriented toward infrastructure management, and the City recently initiated a capital improvement program that will invest $198 million in construction of system betterments to the local urban stormwater systems over the next five years, utilizing bonds and service fees.

Governance Structure

Mecklenburg County has a single, county-wide stormwater utility governed by the nine-member Stormwater Advisory Committee created for the purpose of levying varying service charges across the County and seven municipal jurisdictions. The utility service fees within incorporated areas are levied pursuant to inter-governmental agreements with the respective city and town councils. Decisions on program content, level of service fees, and how to provide service (in-house, inter-agency, outside contract, etc) in the incorporated areas are the province of the cities and towns. The seven city and town councils set the stormwater service

fees applicable to improvement and maintenance of the smaller systems within their limits, and the County Council adopts them as part of their rate methodology.

This stormwater management governance structure has now been in place for over a decade, and has enabled all of the local jurisdictions to perform stormwater management at the level desired by their local elected officials. Most of the smaller towns simply use the same rates that the County applies in the unincorporated area, although the Town of Davidson has opted to charge a lower service fee.

Organization and Staffing

The organization and staffing of the stormwater management units in Mecklenburg County, the City of Charlotte, and the smaller satellite cities and towns varies greatly. The County and City of Charlotte have in-house staffs of approximately thirty and seventy-five people (respectively) with the full range of engineering and operational skills required to administer their respective programs. Both also make substantial use of outside consultants and contractors. In addition, the City stormwater program pays the City's annually to maintain drainage systems located in roads. The smaller towns' stormwater staffs range from a portion of one full time equivalent position to several people dedicated to the stormwater management function. They rely heavily on the County, City of Charlotte, and outside contractors for engineering and operational support. Day to day activities associated with NPDES compliance, including extensive monitoring, is provided primarily by the County.

The differences in and dispersion of responsibilities among the County and the towns has resulted in the creation of some innovative concepts. For example, the City of Charlotte developed a program to expedite construction of small capital projects and remedial repairs. A list of pre-qualified local construction firms is maintained, and unit price bids are obtained annually for certain common activities and materials. When a complaint about a drainage problem is received, a City stormwater inspector determines the priority ranking of the problem. If it is in a high priority category (such as home flooding, street flooding, or other safety issue), a qualified vendor on the list is called in, any required engineering is done immediately (often in the field), and a work order is issued. This program enables the City to respond to many complaints within 30 to 60 days, which has gained high community and City Council approval. The County has a similar program.

Funding

The County stormwater utility service fee is the primary source of funding for stormwater management in Mecklenburg County. The total stormwater budget for all entities in Mecklenburg is over $85,000,000. A large part of this is for capital betterments to the systems primarily within the City of Charlotte. The

City's budget for capital projects in the current fiscal year is over $40 million, and the City's annual stormwater operating budget is an additional $32 million.

A consistent impervious area rate methodology is used throughout the County, with a flat rate for single-family detached residential properties and an equivalency unit of 2,613 square feet of impervious coverage applied to all other properties. Single-family residential customers are billed for one equivalent unit. The equivalent unit flat rate applied to single-family residential customers for the regional component of the program is $1.06/month throughout the County. The local stormwater program elements provided by the County and City and towns are funded by a separate rate component.

Because Mecklenburg County has a composite fee comprised of the regional system component and local fees determined by the City and towns, the rates vary by jurisdiction. Charlotte and Mecklenburg County have a dual flat-rate user fee for single-family residential properties, with the break being at 2,000 square feet of impervious coverage. The City's current single-family charges are $5.18/month and $6.72/month. The County's are $3.33/month and $4.03/month for the local component of the rates in the unincorporated areas. The local component of the rates applied in the other towns range from $.30/month to over $2.00/month.

Additional funds have also been appropriated for stormwater management by many of the entities, resulting in some novel blending and dedication of resources. For example, even after its utility service fee was adopted, the Charlotte City Council decided to continue to appropriate approximately the same amount from general revenues for stormwater management as was previously budgeted (about $5 million annually). Those funds were specifically assigned to water quality programs to avoid a potential problem within the state authorizing legislation (which was later rectified by statute). This allowed the City's initial service fee rate to be approximately sixteen (16) percent lower than would otherwise have been required to meet the cost of services and facilities. After the stormwater utility had been in place for three years, one-half of the general revenue support for stormwater management was incrementally reduced over a four year period, which transformed the City's general government capital program. The City continues to make a general fund contribution to the stormwater program..

Inter-governmental Cooperation

The strong emphasis on local control of the small-watershed programs combined with the regional responsibilities of Mecklenburg County has resulted in a great deal of collaboration and mutual support by the participating entities. Financial management offers a good example. Administration of the service fee master account file billing and collection is provided by the City of Charlotte's Finance Department. Accounting for the individual programs is performed separately by each entity.

This approach extends to engineering and operational functions as well. The County and City of Charlotte perform master planning and engineering for watersheds and drainage systems, often by employing outside consultants. Because the local watersheds cross many jurisdictional boundaries, this function commonly involves and benefits the smaller towns as well. The City of Charlotte is undertaking a $198 million capital projects program that will construct new drainage systems, improve existing facilities, and repair known deficiencies over five years. Some improvements will be done outside the City to attain the most efficient solutions to problems within Charlotte, resulting in incidental service benefits to other entities. The County and City of Charlotte operational forces also provide various services to the smaller towns per operating agreements or on an ad hoc basis at their request. The County performs over $1 million of monitoring, analysis, and data processing services for the City's Phase 1 NPDES compliance program. The water quality programs, including NPDES compliance efforts, also involve the County, City of Charlotte, and satellite communities in many cooperative efforts such as public education.

The City and County have also consolidated stormwater customer service. Service requests are coordinated through a single telephone contact number, [704] 336-RAIN (which translates to [704] 336-7246). Regardless of which local governance jurisdiction a person resides in, he or she can file complaints or inquiries and receive service assistance from the customer service center.

The Charlotte/Mecklenburg stormwater program receives support from several federal and state agencies for various program components. For example, the United States Geological Survey (USGS) operates a dense hydrologic data-collection network of seventy two (72) rain gauges and forty five (45) stream flow gauges within the city and County. The network of gauges provides valuable data for the documentation and interpretation of water-resources information, including rainfall and flooding events. During a rain event, data is transmitted from these gauges to base stations located at USGS and the Charlotte Mecklenburg Government Center (CMGC) where developing flood conditions are monitored by emergency services staff. In addition to rainfall and stream level data, four stations in the system are also set up to continuously collect water quality indicators such as temperature, conductivity, PH and dissolved oxygen levels in a stream. The cooperative program with the USGS has been in place without interruption since 1961.

Public Participation

Perhaps one of the most outstanding features of the Charlotte/Mecklenburg experience has been the high level of on-going public participation in the stormwater utility program from its formative stage. The County and City of Charlotte assembled a community advisory group and a technical guidance committee to assist with the feasibility investigation when they first considered a combined program. The City continued that effort with a committee of more than

twenty persons representing diverse interests as it formulated its initial utility concept. The County then initiated its own utility implementation effort, again with support and guidance from a committee.

Prior to its initial stormwater utility billing, the City conducted an extensive (and costly) public education program to explain the purpose of the stormwater utility and service fee concept. They also introduced the program to the media in the city with factual materials, and obtained strong support from the editorial board of influential local newspaper. Prior to the initial billing, notifications were sent to the largest ratepayers and explanations of the fee and its associated credit system were provided in several general and personal meetings with businesses and the local Chamber of Commerce. As a result, the Chamber of Commerce supported the utility program with its membership. A series of public information brochures were prepared and placed in public buildings, and articles highlighting drainage problems in the city were placed in the print media. A guest commentary article authored by the City was printed in a weekend edition of the major Charlotte newspaper.

After a detailed study of billing alternatives, the City decided to append the stormwater service fee to the Charlotte/Mecklenburg Utilities Department water and sewer billing as a separate line item. On the day the first stormwater service fee billings were mailed, a ground-breaking ceremony was held for a construction project to resolve a highly-visible, long-standing drainage problem. It received heavy coverage by local television news programs. The message of the day was that the City had begun to address its substantial backlog of known drainage problems, “And, by the way, you (i.e., the public) will be receiving a new line item on your utility bill to support this effort”. It might have easily been “There’s a new fee in town. What are they doing with your money?”

The City also prepared very well for public response to the initial service fee billing by assembling and training a cadre of special customer service agents, retained through a temporary employment agency. A contact telephone number was printed on the billings to direct calls to this group of specialists, relieving the potential burden on the utility billing customer service staff that normally responded to water and sewer billing inquiries. The twelve special customer service agents were retained for sixty days, or two full billing cycles. As the inquiries tapered off, the number of special agents was reduced accordingly, with all inquiries eventually being shifted to the in-house customer service staff, who had also received training on the proper responses to various questions.

In total, the City of Charlotte spent approximately $250,000 (in the early 1990s) to educate the community about the local stormwater needs and utility program, and prepare for the initial service fee billing. This represented approximately two weeks of the utility service fee revenue stream at that time, but resulted in a high level of public acceptance. There was (of course) some opposition by tax-limitation advocacy groups, but the high level of accountability provided by the

dedication of funding dispelled most of their objections. Within two years, a City Council member who represented that interest tax-limitation group stated publicly that, if every City program was as well run as efficiently and responsively as the stormwater utility, there would be no need for tax-limitation advocacy.

The high level of community education and involvement continues, with many educational materials, activities, and actively-involved support groups. The City commonly provides hyetographs from its rain gauging network on its website following severe rainfall events that cause flooding. This has educated the general public regarding the high variability of intense thunderstorm rainfall that occurs across Mecklenburg County, and reassures the public that the staff is aware of what is happening. The City's stormwater capital improvements program, funded in large part by sale of bonds, also features extensive public education and participation programs, such as Adopt-A-Stream and Storm Drain Marking.

CITY OF TULSA, OKLAHOMA

Keynotes

- The Tulsa Stormwater Management Utility was founded in response to a devastating one-day urban drainage system flood that killed 14 residents and did nearly US$200 million damage to public and private properties in 1984.

- Tulsa's Stormwater Management Program provides a full range of capital infrastructure and operational services. In addition to roadway drainage systems, it is responsible for an extensive stream system outside road rights-of-way. The City has a Phase 1 NPDES permit.

- Since forming its Utility, Tulsa has received over $100 million in federal support for capital infrastructure improvements, removal of structures from flood-prone areas, and hydrological data gathering.

- Funding of the Tulsa day-to-day stormwater program is primarily derived from a user fee.

- Key funding policies include:

    - a user fee rate methodology based on the impervious area of each property, with residential fees being a single rate;
    - use of general obligation bond sales and sales tax revenues to fund construction of capital infrastructure improvements; and
    - aggressive pursuit of federal grants and loans to supplement local resources.

Key operational practices include:

- watershed-based master planning of stormwater systems throughout the City, with emphasis on flood control; and
- stormwater management functions performed by in-house staff, including NPDES permit compliance.

Community Profile

The City of Tulsa was incorporated as a municipality in 1898. With the discovery of oil in nearby Red Fork in 1901, Tulsa grew quickly and reached a population of more than 7,000 by 1907. After Oklahoma became the 46th state in the United States in 1907, the City voters adopted its first city charter on July 3, 1908. The City was governed by three elected commissioners from 1909 through 1989, when the voters amended the charter to adopt a mayor/council form of government. The Mayor is now elected every four years (at large) and nine City Council members are elected to two-year terms from geographic districts.

Tulsa lies in the heart of a fertile forested region of rolling hills in northeastern Oklahoma. It is the second largest city in Oklahoma, located 90 miles northeast of the state capital, Oklahoma City. The average annual rainfall is thirty-nine (39) inches. The region is sometimes referred to as “Tornado Alley” in recognition of the severe storms that often occur in the Spring. Violent windstorms are often accompanied by extraordinarily intense rainfall, which has been a key factor in Tulsa’s stormwater management problems and search for solutions.

The land area of the City today is approximately 198 square miles. It has a population of 392,000. The economy of the community is highlighted by higher education (seven universities), energy, telecommunications, and transportation/warehousing. Tulsa has an in-land deep water port located on the McClellan-Kerr Arkansas River Navigation System, offering a Foreign Trade Zone, two industrial parks and liquid and dry cargo storage.

Tulsa has grown up with flooding. Some consider it a “poster child” example of the stormwater management struggles that local governments experience. Many of the causes of Tulsa’s problems are a function of its location: the city is on a major river (the Arkansas), in a region of violent storms, and was initially developed on the American frontier, where one had a right to do as he (or she) wished with the land - including building structures in inappropriate, flood-prone locations.

Local flood records are sparse before 1900. In 1908, only a year after statehood, Arkansas River flooding at Tulsa caused $250,000 in damages (over $25 million in 2004 dollars). By 1920, the town had outgrown its raw, boomtown youth. As riches mounted from the oil industry and investors and speculators poured in, Tulsa grew into a wealthy city of 72,000. But development edged ever closer and closer toward the river banks. On June 13, 1923, the Arkansas River

flooded Tulsa's waterworks, caused $500,000 in damages ($20 million in 1994 dollars), and damaging homes leaving 4,000 citizens homeless. City fathers responded with Tulsa's first land-use plan, which envisioned upland boulevards and housing. In the lowlands, such as the Mingo Creek riparian stream corridor east of town, the plan indicated there would be generous parks and recreational trails.

Significant flooding occurred again in 1943. In response to the flooding, the U. S. Army Corps of Engineers (COE) built levees around Tulsa's oil refineries along the Arkansas River as a World War II national defense measure. By 1950, in the post-war building boom, housing fanned out onto the floodplains to the south and east of the downtown area. Land that had periodically flooded with little harm now was awash in wave after wave of development and, periodically, urban flooding. By the late 1950's, flooding of newly developed subdivisions along the Arkansas River spurred calls for flood control. In 1964, the COE completed Keystone Dam on the Arkansas River, fifteen miles upstream from Tulsa. For years to come, Tulsans would believe that the Arkansas River was forever tamed.

Tulsa enjoyed another economic boom based on energy resources in the 1960s, when the city's population grew 25 percent. Tulsa's rapid growth resulted in the paving and piping of vast areas of pastures and meadows, and new buildings continued to spill into the lowlands along the creeks and streams that etch the area. The rapidly urbanizing Mingo Creek watershed was annexed to the city in 1966. Localized floods struck every two to four years during the 1960s and early 1970s, but the response was classic “flood relief”: emergency response and recovery, reconstruction as quickly as possible, and denial of the possibility that damaging floods could reoccur. Victims petitioned for neighborhood flood control, with limited success.

A flood in the Spring of 1970 caused $163,000 in damages in the rapidly developing Mingo and Joe Creek watersheds. The City responded by joining the federal government’s National Flood Insurance Program's (NFIP) "emergency program" and promising to adopt federal floodplain regulations. In August 1971, the NFIP issued its block rate maps. A month later, floods hit Flat Rock, Bird and Haikey Creeks inundating many suburban neighborhoods once again. In December that year, Bird Creek flooded again. Tulsa joined the NFIP's "regular" program, adopted a new 100-year flood standard, and promised to regulate floodplain land use.

In April and May, 1974 floods left $744,000 in damages (over $6 million in 2004 dollars) on Bird Creek. Violent storms June 8 of that year caused widespread flooding on Joe, Fry, Haikey and Mingo Creeks, with more than $18 million in damages ($80 million in 2004 dollars). On September 19, 1974 Mingo Creek flooded yet again. For some citizens, it was the third flood in less than a year. Angry, drenched victims waded out of the floods to demand help from City

officials. They contended the City wasn't enforcing its NFIP regulations. They tried to halt development, to avoid deeper flooding until existing problems could be solved. Developers objected strenuously. Thus began a community debate over floodplain management, locally called "Tulsa's great drainage war," that was destined to last more than a decade. The city responded with a plan to widen part of Mingo Creek, including clearance of 33 houses in the most flood-prone area. The houses were removed just before the next flood in May, 1976.

The May, 1976, flood marked a milestone in Tulsa's search for solutions. A three-hour, 10-inch deluge was centered over the headwaters of Mingo, Joe and Haikey Creeks. The resulting flood killed three citizens and caused $40 million in damages ($140 million in 2004 dollars) to more than 3,000 buildings. By this time, the victims were becoming skilled lobbyists and gathering sympathizers citywide. They virtually stormed City Hall to demand solutions. Newly elected city commissioners responded with a wave of actions. They enacted a floodplain building moratorium; hired the city's first full-time hydrologist; developed comprehensive floodplain management policies, regulations and drainage criteria; enacted stormwater detention regulations for new developments; instituted a fledgling flood alert and warning system; and began master drainage planning for major creeks. In 1978, an earth change (erosion and sediment control) ordinance was also adopted, giving the city control over alterations to Tulsa's landscape, including floodplains and stream channels.

In the early 1980s the federal United States government developed the federal Inter-agency Hazard Mitigation process to curb repetitive flood losses. After flood disasters, federal teams were dispatched to identify hazard mitigation opportunities, i.e., ways to make the response to each disaster reduce the scope of the next one. The mitigation concept focused on correcting the causes of losses, including removing, raising, or flood proofing the most vulnerable of the damaged buildings. Tulsans worked with the Federal Emergency Management Agency (FEMA) to develop the process. Tulsa's early exposure to the new FEMA mitigation program was to have a significant impact on the city's response to future floods.

On the three-day weekend marking the Memorial Day holiday in May, 1984, the worst flood in Tulsa’s history struck. After a muggy Sunday a stalled cool weather front produced thunderstorms that dumped some fifteen (15) inches of rain overnight in just twelve hours. The rainfall was centered over the Mingo Creek watershed, but also extended across most of the city. The results were disastrous. The flooding killed 14, injured 288, damaged or destroyed nearly 7,000 buildings, and left $180 million in damages ($425 million in 2004 dollars). The Mingo Creek corridor alone accounted for $125 million of the damages. It was truly a localized, urban stormwater system flood. Local streams flooded while the nearby Arkansas River remained well below flood levels.

Problems continued in the years following despite formation of Tulsa's stormwater utility in 1985. In 1986, a major flood of the Arkansas River tested the new stormwater management program. It also served as a reminder of the finite protection provided by the Keystone Dam upstream from the city. Between September and October 1986, unrelenting upstream rains filled the Keystone Reservoir to capacity, forcing the COE to release water at the rate of 310,000 cubic feet per second. Downstream flooding was inevitable. At Tulsa, a privately maintained levee failed, causing $1.3 million ($5million in 2004 dollars) in damages to 64 buildings. The City fielded its hazard-mitigation team and cleared 13 substantially damaged structures, and more widespread damage was avoided.

Formation Process

A newly elected mayor and street commissioner had been in office for only 19 days when the Memorial Day flood struck in May, 1984, but both knew the issues well. In the darkest hours of their community's worst flood, they pledged to make their response reduce the likelihood that such a disaster would ever be repeated. Before daylight, they had assembled the city's first Flood Hazard Mitigation Team to develop the City's strategy. Within days, a new approach to Tulsa flood response and recovery was born.

The flood response effort was only the beginning. A unified stormwater program was created, with City leaders committing to make Tulsa flood-safe. As ultimately completed, the program included relocation of 300 flooded homes and a 228-pad mobile home park, $10.5 million in flood control works, and $2.1 million for master drainage plans. The total capital program topped $30 million, mostly from local capital sources, flood insurance claim checks, and federal funds.

The devastation of the 1984 flood persuaded Tulsans that a coordinated, comprehensive stormwater management program was needed from the rooftop to the river. A Department of Stormwater Management was established in 1985, centralizing responsibility for all city flood, drainage, and stormwater programs. A stormwater utility fee was established by ordinance in 1986 to fund the program. The utility fee ensured stable funding for maintenance and management, independent of fickle political winds. The service fee ordinance allots all fee revenues exclusively for floodplain and stormwater management activities. Over several years an extensive system of recreational greenways was created along the Mingo Creek and other streams, providing bicycle and walking paths as well as green space areas. When the Memorial Day flood devastated Tulsa in 1984, the City had 57 detention ponds. By 2000, there were 85 detention ponds plus many other stormwater facilities including improved conveyance channels.

Service Area

The Tulsa Stormwater Utility is responsible for stormwater management throughout the City's 198 square miles.

Role and Program

Simply establishing a stormwater utility could not instantly correct Tulsa's stormwater and flooding problems. A comprehensive, long-range stormwater program strategy was formulated by the utility staff, coupled with extensive capital infrastructure master planning during the 1980s. The City's objective was to manage stormwater both within public rights-of-way and easements and along the many creeks that drain the hilly terrain of the community.

The Public Works Department, in conjunction with a Stormwater Drainage Advisory Board and numerous citizen groups, developed a phased implementation program for projects identified in the City's basin drainage plans. The projects were funded in part by a combination of stormwater fees, sales tax revenues or bond issues. Construction of the improvements identified in the master planning project proceeded quickly based on the assured funding capability provided by the stormwater service fee. The City was also able to obtain more than $100 million of COE funding for various capital improvements to the stormwater systems.

By the early 1990s, FEMA ranked Tulsa first in the nation for its floodplain management program, allowing Tulsans to enjoy the nation's lowest flood insurance rates. The program was also honored with FEMA's 1992 Outstanding Public Service Award; and the Association of State Floodplain Managers has twice given Tulsa its Local Award for Excellence. This represented a significant turn around in just eight years following the devastating flood of 1984. Since adoption of the FEMA community rating system, Tulsa has had one of the best ratings including a 2.0 rating in 2005.

Today, Tulsa's floodplain and stormwater management program is based on respect for the natural systems. It is nationally regarded as a pacesetting program, and includes comprehensive watershed management, dedicated funds for maintenance and operation, a prototype flood alert system, and a $200 million capital improvements program.

Tulsa's drainage systems have not been tested by a catastrophic rainfall since 1986, but the system has handled less intense rainfall events well. City leaders believe improved maintenance, continuing capital projects, stringent regulations, and aggressive citizen awareness programs will reduce but cannot entirely eliminate future flood losses.

A powerful testimony to the program is that, since comprehensive regulations were adopted in 1977, the city has no record of flood damages to any building that complies with those regulations. Implementation of the user-pays service fee funding is also given enormous credit by staff and elected officials because it enabled the City to elevate its capital investment and operational expenditures to a level that complements regulatory measures by resolving inadequacies in the systems that had existed for decades.

Tulsa has instituted an aggressive floodplain program. The City's long experience with flooding showed that the National Flood Insurance Program's minimum standard is insufficient for Tulsa. Therefore, the city's regulations exceed NFIP's standard in several important ways. The NFIP floodplain maps are based on existing development. However, unless plans and regulations are based on future watershed urbanization, new development may well flood as uphill urbanization increases runoff. Tulsa enforces the NFIP minimum regulations and maps to retain eligibility for federal flood insurance but, in addition, the City enforces its own more extensive maps and regulations. Those regulations are based on ultimate watershed urbanization as forecast in the City's comprehensive plan.

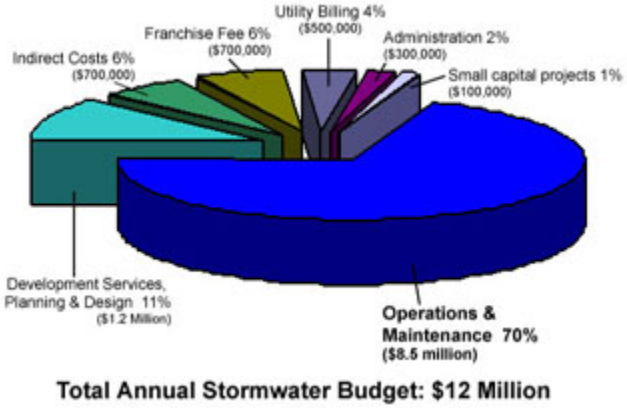
The Tulsa stormwater program is much more than flood control. The City is also building parks in the floodplains, sports fields in stormwater detention basins, and greenway trails on creek banks. It has forged strong partnerships with federal and state agencies. Tulsans now enjoy the lowest flood insurance rates in the country, and the community is reaping benefits from national awards and favorable publicity. Tulsa's progress has been called an example of what can happen when a community fully commits to solving urban stormwater problems.

Organization and Staffing

The City staff was reorganized following a City Charter change in 1989 that substituted the mayor/council for a government for the commission approach. A new Department of Public Works consolidated all public works services, including stormwater management, but the dedicated stormwater service fee funding was retained. Today, stormwater management is an accepted and integrated part of the city's services.

Funding

The City's stormwater management program budget has ranged from $12 million to $14 million during the past three years. Current service fees are based on impervious area and are set at $3.49/month per "equivalent service unit" (ESU). The ESU is defined as 2,650 square feet of impervious coverage, representative of the average condition on single-family residential properties. Service fee revenues total over $12 million. Where does the stormwater fee money go?



Expenditures for the City's FY 2002 are shown in the pie chart to the left. As it shows, stormwater fees are used primarily for maintenance of stormwater detention facilities, stream channels, pumping stations, culverts, ditches and other drainage facilities. After storms and when needed at other times, crews remove material blocking stormwater flow in channels and detention sites. On average, the City crews clean more than 22 miles of ditches and clear about 5 miles of drainage pipe each year. They remove tons of silt from channels and reconstruct eroded earthen channels.

Inter-governmental Cooperation

Tulsa assists the suburban satellite communities that surround it in their stormwater management efforts, but most of its attention to inter-governmental cooperation has involved federal agencies that offer funding for specific priorities such as flood protection and hydrologic monitoring and analysis.

Public Participation

The City of Tulsa involved the community in many of the major decisions as it formulated and implemented its stormwater utility program and associated funding mechanisms. A citizen advisory committee guided the initial response to the devastating flood in May, 1984, which included assembling a consulting team to assist with utility feasibility analysis and implementation.

Once the utility was formed and user fees were in place, the citizen advisory group shifted its attention to the content of the program and, especially, the capital improvement planning to address flooding problems. They have continued to be a major political force in support of the utility. The City also instituted a variety of community education and involvement initiatives aimed at improving flood emergency awareness, water quality management, and utilization of water resources in the riparian corridors.

LOUISVILLE/JEFFERSON COUNTY (KY) METROPOLITAN SERVICE DISTRICT (MSD)

Keynotes

- The Louisville approach involves a consolidation of flood control and stormwater management with a regional wastewater collection and

treatment program provided by the Metropolitan Sewer District, or MSD. Most of the smaller cities and towns in Jefferson County do not perform stormwater management functions.

- The MSD was authorized by special state legislation in 1946, and established by Jefferson County and the City of Louisville. The MSD service area is virtually county-wide. Its Board is appointed by the now consolidated Metro government council which directs the amalgamated County and City.

- MSD is funded principally by wastewater and stormwater service fees, which are independently structured, billed, and accounted for.

- Stormwater service fee attributes include:

    - an impervious area rate methodology;
    - a flat rate charge for single-family residential properties; and,
    - differential rates for other properties based on an impervious area equivalency unit.

- Key operational practices include:

    - watershed-based master planning throughout the County;
    - a consolidated NPDES permit administered by MSD; and
    - a broad range of functions that include a major flood control program responsible for approximately 29 miles of levees and protection works and fifteen large pump stations along the Ohio River.

- The MSD has a staff of more than 600 that performs both wastewater and stormwater administrative, engineering, operational, regulatory, and infrastructure improvement/management functions. The staff is extensively cross-trained to obtain efficient operations.

Community Profile

Louisville, 365 square miles and population 700,000, is the largest city in Kentucky. It is located on the south shore of the Ohio River, and was founded in 1778 by frontier explorer and military hero George Rogers Clark. It is located in Jefferson County, which is named for Thomas Jefferson, who was the Governor of Virginia when the city was founded and later served as the third President of the United States. It soon became a major shipping center along the Ohio River, which reaches almost 1,000 miles into the Midwest of the United States. Among other noteworthy claims to fame, it is the home of the Louisville Slugger baseball bat and hosts the Kentucky Derby, one of the premier annual horse races in the world. The county and city governments were recently consolidated into a “metro” government as provided for by state law.

As a community located on a major river, Louisville has always been concerned about flood control and stormwater management. Repetitive major flooding incidents of low areas along the river led eventually to the construction of more than 20 miles of flood protection levees and large pump stations beginning in the early 1900s. In the 1980's local officials determined that effective management of both the major flood control works and the smaller urban drainage systems required a consolidated program. The Louisville/Jefferson County Metropolitan Sewer District (MSD), then the regional wastewater service provider, was tapped to take over all stormwater management responsibilities.

Following detailed studies, MSD adopted a dedicated stormwater service fee to fund a full range of stormwater management and flood control services and facilities. The MSD stormwater service fee is separate from the agency's wastewater fee, though the staff is extensively cross-trained to efficiently perform both functions. The user fee has been tested in court and sustained at the Kentucky Court of Appeals level. MSD's responsibilities have been expanded to include stormwater quality in recent years in response to federal NPDES requirements.

Formation Process

The MSD was formed by the City of Louisville and Jefferson County pursuant to a state authorizing statute. Shifting the County's and City's flood control and stormwater management responsibilities to the MSD was accomplished by actions of the Board of County Commissioners and City's Board of Aldermen. The political decision to shift flood control and stormwater management to MSD was essentially made before the program and funding development and implementation work began, which enabled the process to be completed in just eight months. There was very little public participation in the formation process, though a concentrated effort to inform and educate the public about the new service fees was initiated immediately prior to the first MSD stormwater service fee billing.

Jefferson County had more than ninety cities and towns when the stormwater management function was appended to the MSD wastewater program. Towns of the fourth, fifth, and sixth class (per population as specified by state statutes) had no option whether or not to be included in the MSD stormwater program. Cities of the third and second class had statutory authority to decline to be included, but there were no second class cities in the County at that time (1986). A few of the third class cities declined to be included, and still are not. This created gaps and inconsistencies in stormwater services across the County as MSD's program grew. Those gaps still create some problems for both MSD and those cities.

Service Area

MSD's stormwater service area is now approximately 280 square miles and encompasses nearly all of Jefferson County. It is similar to but not precisely the

same as the wastewater collection and treatment service area. Substantial portions of the former City of Louisville have combined wastewater/stormwater sewers. Outlying areas have separated sewers and many open drainage components (creeks, ditches, roadside drainage).

Role and Program

MSD has two major program responsibilities, wastewater collection/treatment and stormwater management/flood control. Flood control is particularly important because Jefferson County is located on the Ohio River. Large areas of Louisville were historically flooded by the Ohio River, and an extensive system of flood protection levees and pump stations was constructed following the flood of record in1937. Maintenance of the flood protection works was originally a county responsibility under U.S. Army Corps of Engineers oversight. That function was transferred to MSD along with stormwater management responsibilities. MSD also assumed responsibility for development-associated erosion and sediment control programs, though it does not have land use authority.

Governance Structure

MSD has a seven member Board of Directors, included a chairperson, appointed by the Louisville/Jefferson County Mayor and Metro Council. The MSD Board guides policy and sets service fee rates.

Organization and Staffing

MSD has an appointed administration and a substantial staff of over 600 management, engineering, operational, and support personnel. It has reduced staff count from more than 860 in 1995 in part by outsourcing some operations. MSD continues to perform many stormwater management functions in-house. Outside contracting is used to attain greater efficiency or when special expertise or equipment is required. The engineering and operational staffs are highly cross-trained to perform both wastewater and stormwater services.

Funding

The wastewater and stormwater components of the MSD program are funded by separate service fees that are independent and dedicated to each purpose in terms of rates, revenues, expenditures, and accounting. The current single-family residential stormwater service fee is $4.70/month. Rates are based on impervious area, and an equivalency unit of 2,500 square feet is used to normalize non-residential charges to the single-family residential flat rate. Each equivalent unit on developed non-residential properties is charged $4.70/month. Consistent with MSD's wastewater rate practices, the stormwater service fee rate is adjusted annually to meet budget projections. Total stormwater service fee revenues in Fiscal Year 2006 (July 2005) are expected to be nearly $26,700,000.

Inter-governmental Cooperation

Because MSD provides a centralized flood control/stormwater management program for nearly all of Louisville/Jefferson County, the need for inter-government collaboration is low in comparison to the other communities cited in this guidance document. Coordination with the cities that opted out of the MSD stormwater service area is sought, and MSD performs many planning, public education, and other development review functions that are beneficial to those cities.

Public Participation

MSD's stormwater program was initiated with little public participation, but the agency has sought out public involvement in many aspects of its stormwater services over the years since then. Infrastructure management, most notably construction and remedial repair programs, is administered by teams that work closely with local elected officials and community groups to prioritize and undertake projects. Community relations are facilitated by a telephone hot line for service inquiries and complaints, and a designated staff is assigned to assuring effective response to customers. The staff maintains close contact with elected officials as capital improvement and remedial repairs projects are developed and undertaken. MSD also conducts numerous community involvement efforts associated with stormwater quality programs, and has developed brochures and other materials that are available throughout the community.

SARASOTA COUNTY (FL) STORMWATER ENVIRONMENTAL UTILITY

Keynotes

- The Sarasota County approach provides a strong, centralized stormwater management planning, improvement and operations program conducted by a large staff of more than 120 persons, with additional support for related activities performed by about 50 employees of other County work groups. The primary objectives of the Stormwater Environmental Utility are to reduce flooding, improve surface water quality, and attain responsible development practices.

- A Florida Supreme Court decision in 1996 determined that the Sarasota County stormwater charge is a special assessment rather than a service fee. As such, it is subject to the standards applicable to assessments, which emphasize the apportionment of special benefit (that not available generally to all) and rational nexus rather than the reflecting the demand burden (cost of service) imposed by each person or property on the public stormwater systems and programs.

- Sarasota County is a charter county governed by a five-member Board of Commissioners and directed by a professional County Administrator. The Public Works Business Center includes the Stormwater Environmental Utility. There are four cities in Sarasota County. The city of Sarasota relies on the County to improve its drainage system and perform most stormwater operations. The other three cities retain responsibility for local stormwater systems.

- The Sarasota County stormwater utility is funded by benefit assessments on properties in the County and by inter-governmental agreement in the City of Sarasota. The assessments have three components that are consistent across the service area, and one component (system capitalization) that is variable by watershed. The benefit assessments are billed on the County's property tax bills.

- Under constitutional changes adopted in 1968, Florida counties may adopt charters that give local elected officials great latitude in determining the functions of their county and the preferred method of funding. Sarasota County has adopted such a charter. The Florida Statutes Chapters 125 (County Government), 163 (Intergovernmental Programs), 197 (Tax Collections, Liens, and Sales), and 403 (Environment Control) also specifically enable both cities and counties to establish utilities and adopt service fees and special assessments, or otherwise influence how they organize for and fund stormwater management. The Florida Statutes also enable counties to use such other revenues as they determine to be appropriate, or guide their manner of doing so.

- Key policies adopted by the Board of Commissioners and practices instituted by the staff are applicable throughout Sarasota County and in the City of Sarasota. Core funding policies include:

  - Capital investments will be funded by benefit assessments peculiar to each watershed; and
  - funding of customer service and administration, master planning, and maintenance will be funded by benefit assessments that are the same for all watersheds.

  Key operational practices include:

  - watershed-based master planning has been conducted throughout the County (26 watersheds), and capital improvements are being made;
  - centralized stormwater quality management is performed by the County stormwater utility to ensure compliance with the local NPDES permit; and
  - a flood protection and response program is provided county-wide.

- Sarasota County has a large staff (120 +/-) within the Stormwater Environmental Utility and also allocates substantial portions of other employees' time to stormwater management activities (50 +/-). Master planning is contracted to private vendors.

Community Profile

Sarasota County is located on the Gulf of Mexico on Florida's West Coast approximately sixty miles south of Tampa. It was formed when Sarasota County separated from Manatee County in 1921. The area was first homesteaded in the 1840's, but true development did not occur until the railroads arrived at the beginning of 20th century. Citrus fruit growing, other agriculture, and tourism were the basis of the economy for many years, and the County was the winter home of the famed Ringling Brothers circus for decades. The County has become a regional healthcare and commercial business center since the end of World War II.

Sarasota County encompasses 620 square miles and has a resident population of 340,000. The population swells significantly during the winter months when many "snow birds" flee the harsh winters of the Northeast and Midwest United States for the balmy climate of Florida. There are three incorporated cities and one town in the County.

Stormwater management in Sarasota County was not a high priority before the 1980's, when the County increased regulatory activities in response to the pressures of urban/suburban development and the problems associated with drainage in a low-lying coastal community. A Stormwater Environmental Utility was formed in 1989, and studies led to the adoption of a user fee. Sarasota County's stormwater utility is perhaps best known for a Florida Supreme Court decision in 1996, which found that the County was authorized by state statutes to establish the utility and enact a special assessment to support capital improvements and operational programs.

Formation Process

Sarasota County's initial stormwater management program was an outgrowth of its Aquatic Plant Control Department, which was consolidated into the Transportation Department in 1981. In 1989 the Board of County Commissioners established the Stormwater Environmental Utility. An inter-governmental agreement was signed with the City of Sarasota in 1991 and revised in 1997.

Service Area

The Sarasota County stormwater service area encompasses the unincorporated portion of the County plus the city of Sarasota. The County is not responsible for areas lying within other incorporated municipalities in the County.

Role and Program

The Stormwater Environmental Utility is responsible for the County's NPDES permit, and performs master planning for those portions of watersheds that lie wholly or partially in the County. However, it does not perform monitoring associated with the NPDES permit. The Utility is also responsible for capital improvements to and maintenance of the stormwater systems in the unincorporated areas and within the city of Sarasota. County programs are limited to those facilities located in publicly-owned properties and rights-of-way and those within dedicated easements. Systems located on private property and not subject to easements are the responsibility of the property owners. The Utility is also responsible for regulation of the use, storage, and disposal of sediments, herbicides, and other materials, and performs public relations, customer service, development review, and administration of the master account files for benefit assessments. Street sweeping is done by the Road and Bridge Division (Public Works) using sweepers purchased by the Stormwater Environmental Utility. Water Quality monitoring and enforcement is performed by the County's Environmental Services/Pollution Control Department.

Governance Structure

The Stormwater Environmental Utility is a separate account unit operating as a division of the Public Works Business Center. It is governed by the five-member Board of County Commissioners and is within the County Administrator's organizational control.

Organization and Staffing

As a division of the Public Works Business Center, the Stormwater Environmental Utility interacts extensively with other County units. The Utility staff numbers 120 (+/-), and it also financial supports a portion of the personnel expense associated with nearly 50 other County employees whose roles involve them in various aspects of stormwater management.

Funding

The Stormwater Environmental Utility budget in 2005 is approximately $20,000,000, with about $6,000,000 being for capital projects. Funding for the Stormwater Environmental Utility is derived primarily from a composite special benefit unit assessment that has four components. The benefit assessment is based on a calculation methodology that takes both pervious and impervious areas on each property into account. An equivalency unit approach is employed that has several rate classifications for residential properties and individual charges for non-residential that reflects the hydrology of each property. The equivalency unit is referred to as the "Equivalent Stormwater Unit", or ESU, and represents an "effective impervious area" of 3,153 square feet.

The ESU was determined by statistical analysis to be the average condition on single-family residences in the County, i.e. the total area and condition of an

average single-family residence burdens the stormwater systems and programs in the manner attributable to 3,153 square feet of impervious coverage. The effective impervious area for non-residential properties is determined by applying a formula that considers both impervious and pervious areas on each property and the conditions present in each case. For example, the pervious areas of citrus groves and orchards are treated differently than pervious areas in pasture or meadow because of the land management practices in the citrus groves and orchards which alter the hydrology. “Urban pervious” surfaces, such as contoured mown lawns, have a much higher effective impervious value than other pervious conditions.

Three benefit unit assessment components are uniform throughout the service area, customer service (administration), master planning, and maintenance. The customer service benefit assessment is a fixed value for each account rather than a charge per ESU, and is presently $3.20/year. The master planning and maintenance benefit unit assessments are uniform throughout the County, and are based on the number of ESU on each property. The master planning assessment is currently $17.92/ESU/year, and the maintenance assessment is $59.33/ESU/year. On average, a medium size single-family residence is assessed $80.45 annually for these three components of the benefit assessment, or approximately $6.70 per month.

The capital infrastructure investment component of the benefit unit assessment is reflective of the costs in each designated watershed, and currently varies from $12 to $141 per ESU per year across the County. The result is that the total assessment applicable to comparable properties in different watersheds may be significantly different.

Credits are provided for in the County’s assessment methodology, primarily in relation to the capital improvement benefit assessments. Calculation of the credits is based on three factors, runoff quantity, runoff quality, and peak discharge rate. The stormwater assessments are billed annually along with the County’s property taxes. Collection of delinquent billings is accomplished by a lien process similar to that applicable to property taxes.

Inter-governmental Cooperation

The Sarasota County stormwater program is closely coordinated with the cities’ programs in the area, especially in terms of NPDES permit compliance, master planning and construction of major systems, and flood control/emergency response. The city of Sarasota has contracted with the County to provide stormwater management services, but three other municipalities retain responsibility for management of the local drainage systems in their communities.

Public Participation

Public participation is focused primarily on NPDES education/involvement mandates, master planning, flood and emergency awareness, and capital project construction. The Utility conducts two public meetings during the master planning process (26 watersheds), and local meetings in areas where capital projects are to be built. The staff also makes presentations at the request of neighborhood association, professional organizations, and special interest groups. The County also responds to inquiries from the city council in the City of Sarasota.

STORMWATER UTILITY FEES

CONSIDERATIONS & OPTIONS FOR INTERLOCAL STORMWATER WORKING GROUP (ISWG)

May 2005

New England Environmental Finance Center

TABLE OF CONTENTS

(Click on to go to section)

1. INTRODUCTION

2. SELECTED RESEARCH FINDINGS

3. CONSIDERATIONS & OPTIONS
Explanation
Table: Summary of Considerations
Evaluation of Options

4. ANALYSIS OF COSTS/REVENUES

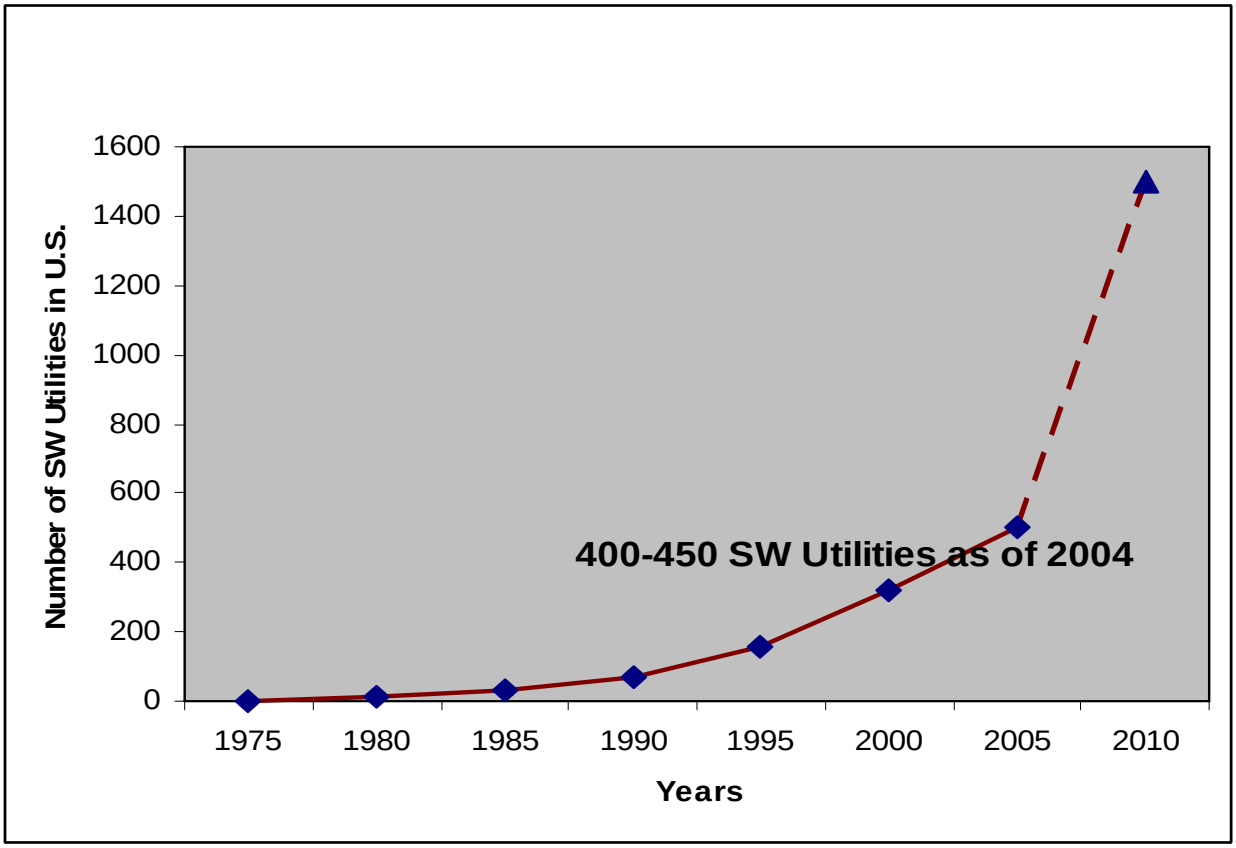
5. NEEFC OBSERVATIONS

6 CASE STUDIES

7. APPENDICES
A. ON-LINE RESOURCES
B. EXAMPLE OF ISWG RECOMMENDATION

1. INTRODUCTION

Stormwater utilities are a concept whose time seems to have arrived. Established by relatively few communities in the 1970s as a method of funding flood control measures, stormwater utilities now exist in over 400 municipalities and counties throughout the United States. During the next 10 years, their numbers are expected to swell dramatically – by one estimate to over 2,000 by the year 2014.

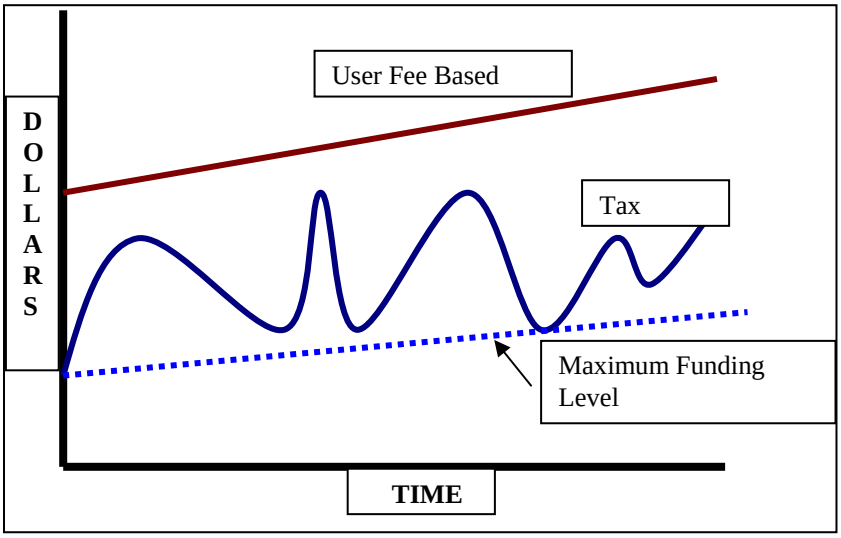


The reasons for this growth are multifold. Federal stormwater regulations passed in the 1980s (Phase I of the National Pollutant Discharge Elimination System Program, or NPDES), motivated many larger communities to seek alternative funding sources and organizational structures. And the Phase II NPDES requirements that now apply to smaller communities (21 in Maine) will be a driving force in the rapid growth of stormwater utilities during the next 10 years.

Federal requirements have provided the impetus for communities to reexamine funding alternatives, but the stormwater utility concept seems to be catching on quickly because it is a good one. While other options exist to General Fund support of stormwater programs, the utility approach has been identified in a number of analyses as the most equitable and effective approach to stormwater financing. As more and more communities establish stormwater utilities and sing their praises, this conclusion is being verified on the ground.

Stormwater utilities have the following benefits:

- They provide a stable, dedicated and adequate funding source for stormwater programs, which tend to get short shrift under the General Fund allocation process. With a reliable and sufficient funding source in place, stormwater managers can systematically address needs, instead of deferring them;
- They offer a more equitable system for raising revenues for stormwater management – basing fees on actual runoff impact, rather than property value. Under a stormwater fee system, non-profits and other tax-exempt entities that contribute stormwater are generally charged just like other properties. In general, user fees have the affect of shifting some of the burden of managing stormwater from residential to other properties; and



- They have potential to positively effect behaviors, especially when fees are based on impervious surfaces, or a system of credits are put into the system. At the very least, they raise awareness about the connection between human development activities and polluted runoff.

A primary challenge with implementing stormwater fees is gaining public acceptance and approval. In a political climate where anything that looks, sounds or smells like a new tax is viewed with suspicion, creating new public funding sources is no mean feat. Communities that have been successful have put considerable resources into educating both the public at large and decision-makers about the merits of user fees and stormwater management in general.

A second challenge is to fashion an approach to stormwater fees that works well for Maine communities. Difficult decisions must be made regarding a number considerations such as how the fee is to be structured, to whom and where it will apply and what expenses it will cover. For each of these considerations, a range of options exist. In some cases, the lessons learned from other communities provide guidance on the merits of particular options. But there is no "best" model that works well in all type of regions and communities. To quote a recent article on stormwater utilities: "…there is no cookbook solutions when designing a stormwater utility. Each community must make its own recipe from a list of possible ingredients…"

There are no cookbook solutions when designing a stormwater utility. Each community must make its own recipe from a list of possible ingredients…"

The focus of this report is providing guidance to decision-makers on the development and implementation of a stormwater utility. The heart of report is Section 3, which evaluates the pros and cons of different stormwater utility considerations. The report also includes selected research findings and case studies. Finally, the report includes a series of observations from the author, based both on the selected research that has been conducted and the author's own experiences with Maine local government.

2. SELECTED RESEARCH FINDINGS

Following are selected research findings on stormwater utilities, collected mostly in the review of information available on-line. An impressive amount of materials already exists on this approach, and it is likely to grow as more communities develop and adopt stormwater utilities and user fees.

General

- Stormwater utilities have been in existence since 1970s, but recently there has been a dramatic increase in their number.
- As of 2004, over 400 stormwater utilities exist nationwide.
- The initial impetus for enacting stormwater fees was flood control. Now NPDES requirements are an important driving factor.
- By one estimate, there will be over 2,000 stormwater utilities by 2014.
- Florida has the most stormwater utilities (over 100). High concentrations also exist in Washington, Oregon and California.
- Florida conducts a survey of its utilities every two years – perhaps the best source for trends and issues facing utilities.

Utility Organization and Administration

- Nationally, 54% of stormwater utilities are established as an independent organization and 33% are established within Departments of Public Works. In Florida, 66% are established within Departments of Public Works.
- Over 70% of stormwater utilities are funded by stormwater fees only.
- About 70% of utilities combine stormwater bills with some other bill. About 20% send out with tax bill, and less than 10% send out separate bill.
- In addressing non-payment of fees, most utilities nationwide use lien on property; most utilities in Florida shut-off other utilities.

Stormwater Rates/Funding

- Average monthly charge for residential properties is in $3-$4 range per month for existing utilities ($36-$48 per year).
- A number of experts concur that $3 per household per month ($36 annually) represents a "psychological" threshold over which residents are less likely to support a fee when it is first introduced.
- Most utilities use impervious surface as the basis for determining fees (80% in Florida; 60% nationwide).
- Nationwide, over 80% of utilities claim fees cover either "most urgent" needs (30%) or "most" needs (55% -- lower percentages in Florida). Less than 20% say that fees meet "all" needs.
- Most stormwater fee structures exempt public roads (70% nationally, 60% Florida). Just over 50% of all utilities exempt undeveloped lands, including agricultural lands.

Legal Defensibility

- In Florida, about 12% of stormwater utilities have faced legal court challenges.
- Of those challenged:
  - Fee sustained or settlement reached: 46%
  - Case pending: 23%
  - Fee not sustained: 8%
- National survey in 1996 indicated 16% of utilities had faced legal challenges.

Identified Key Factors in Success

- Careful upfront planning as to goals of the utility and the steps needed.
- A well conceived and implemented public outreach campaign that involves both education and participation.
- Education of and involvement by key public officials.
- Presence of a staff "champion" – a person involved in all aspects of work and became focal point and major cheerleader for utility.
- Use of knowledgeable consultants is key in some cases.

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3. STORMWATER UTILITY CONSIDERATIONS AND OPTIONS

There are multiple considerations involved in the establishment of a stormwater utility and user fees. This document focuses on 11 that are viewed as particularly important. They are:

1. **Start-up Strategy**: how the fee system is phased in – whether as a simplified interim system or as a more refined, comprehensive approach.

2. **User Fee Structure**: how fees are to be applied to the customer base, particularly the approach for residential versus non-residential properties.

3. **Approach to Multi-Family Units**: how multi-family residential housing units are treated under the fee system.

4. **Fee Basis and Data Collection:** what the fee is based on, i.e. actual versus estimated impervious area, and what information needs to be collected.

5. **Organizational Structure:** how the utility is organized within the municipal government.

6. **Fee Collection**: how customers are billed.

7. **Implementation**: the extent to which stormwater programs are implemented on the regional or local levels.

8. **Expenses covered:** what stormwater related expenses are funded by the fee.

9. **Geographic coverage:** whether the fees will apply to just the "NPDES regulated area" within the communities or town-wide.

10. **Exemptions:** which, if any, types of properties will be exempt from the fees.

11. **Credits:** whether reductions in fees will be offered landowners who take specific steps to manage stormwater or provide other benefits.

The table on the next page lists each of these considerations, with a series of possible options posed for each. **The different lettered options are intended to be reviewed separately for each consideration (reading from right to left), not as a preferred package of options (reading from top to bottom).** Using the analogy of a restaurant menu, the ISWG should consider all the listed "dish" options listed for each "course" consideration, ultimately aiming to reach agreement on what to order – based both on which dishes are most appetizing and how they complement the overall meal.

For your convenience, the table includes selected links (identified by underlines) that allow the reader to move quickly from the listed consideration to the evaluation of the options. As **fee structure** may be the focus of much of ISWG's discussion, links also are provided from the options listed in the table for this consideration and the detailed evaluation of each option. You may also find it helpful to use the *Document Map* feature (found under the *View* Menu in Microsoft Word) to move around the report.

Table #1: Stormwater Utility Considerations

#	Consideration	Option A	Option B	Option C	Option D	Option E	Option F
1	**Start-up strategy**	Starting with simplified fee structure and refining later	Starting with more refined fee structure				
2	**Fee structure**	Flat rate for residential; flat/tiered rate for non-residential	Flat rate for residential; variable rate for non-residential	Tiered rate for residential and non-residential	Tiered rate for Residential; variable rate for non-residential	Variable rate for all use classes (simple)	Variable rate for all use classes (complex)
3	**Multi-family approach**	Treat entire complex like a non-residential property	Represent as a percentage of 1 ERU, e.g. .6	If a tiered residential structure is used, put m.f. in "small" class	Treat every unit as one single-family property.	Some other option	
4	**Fee basis and data collection**	Lot Area	Lot Area in conjunction with generalized factor to estimate impervious surface or runoff impact	Lot-by-lot measurement of impervious surface (usually by use of aerial photos)	Use of other data to estimate impervious surfaces	Some other option	
5	**Organizational structure**	Separate utility	Within existing utility or municipal department	Organized mainly as an enterprise fund for financing purposes that relies on existing entities and resources			
6	**Fee collection**	"Regional" collection by Portland Water District or other established entity	Local collection: use of existing billing system: e.g. tax or sewer bills	Local collection: use of new billing system	Some other option or combination		
7	**Implementation: regional versus local**	Formal regional structure	"Adhoc" regional structure	Mostly local implementation (with some joint use of educational materials)	Some other option or combination		
8	**Expenses covered**	All components of stormwater system, including capital projects and CSOs	Everything except CSOs and major capital improvements	Just NPDES II requirements	Some other option or combination		
9	**Geographic coverage**	Individual boundaries of SM4 towns	Urbanized portions of SM4 towns covered by NPDES II requirements	Some other option or combination			
10	**Exemptions**	No exemptions	Roads and selected other public uses	Undeveloped land	Agricultural lands	Other exemptions	
11	**Credits**	No credits	Credits for reducing stormwater flow off-site	Credits for improving stormwater quality	Educational credits	Other credits	

CONSIDERATION #1: START UP STRATEGY

OPTION A: STARTING WITH SIMPLIFIED FEE PROR TO ADOPTING A MORE REFINED FEE STRUCTURE
VERSIS
OPTION B: STARTING WITH MORE REFINED FEE STRUCTURE

BACKGROUND

A number of communities with stormwater fees started off with simplified rate structures – usually a flat rate approach – and then refine them later on. Examples include Eugene, Oregon and Fort Wayne, Indiana. The thinking behind this strategy is to gain acceptance of the concept of a stormwater utility and user fees by starting with a very simple fee structure, which can be refined later. Other communities choose to spend the upfront time and effort creating a refined system that they can sell to the public as a final product.

OPTION A: STARTING WITH SIMPLIFIED FEE STRUCTURE

PROS

- Allows public an opportunity to get use to the concept of a stormwater user fee prior to building in refinements.
- Avoids the need of collecting extensive data on impervious surfaces or other factors prior to adopting approach.
- May allow educational focus to be on why a stormwater fee is needed and how we all contribute to the problem (instead of focus on intricacies of fee structure).

CONS

- If there is the perception the fees are rushed through without due consideration, there may be a backlash.
- While the simplified structure is in place, it may be more likely to be legally and politically.
- Once the provisional system is adopted, it may difficult to change to a more refined system.
- Even a simplified approach (such as tiered system for nonresidential) will still require considerable data gathering to establish thresholds.

OPTION B: STARTING WITH A REFINED FEE STRUCTURE

PROS

- Can be presented as a thoroughly-considered and well-conceived approach, rather than an interim measure.
- Avoids some of the “cons” of Option A involving legal and political defensibility, and difficulty of changing the system once something is in place.

CONS

- Typically requires 18-24 months to develop and pass a refined system – a lot of time and money for a fee structure that still may not gain approval.
- Would not have some the “pros” of Option A: particularly in avoiding need for extensive data gathering and being able to initially sell and administer a relatively simple system.

CONSIDERATION #2 FEE STRUCTURE

OVERALL BACKGROUND

Deciding how user fees are to be structured is perhaps the most critical and difficult decision involved with establishing a stormwater utility. This consideration has implications for a number of issues including cost, ease of administration and understanding, equity and legal defensibility. Because of its importance, fee structure is given particular emphasis in this report.

A review of some of the 400 communities with stormwater utilities reveals many themes and variations in how user fees are structured. To keep the evaluation simple, the focus of Consideration #2 is on how fees are charged for the two main use classes distinguished in most stormwater fee systems: residential and non-residential. Six different rate structure options are identified under this consideration, based on whether a *flat*, *tiered* or *variable* rate scheme is used for the two main use classes.

Flat fees: A uniform fee is charged for all the properties in a use category. Many communities, for instance, employ a flat rate for residential properties in which all homeowners are charged the same amount.

Tiered fees: Fees increase in steps, depending on whether the property falls within a particular size range, based on the amount of impervious surface or some other factor. A typical tiered approach creates *small*, *medium* and *large* categories for residential properties, charging a different fee for each class.

Variable fees: Fees increase incrementally based on the amount of impervious surface or some other factor. An example of such fee structure would be one in which a property is charged $3 per month for every 2,000 square feet of impervious area.

For residential properties, the most common type of fee structures are flat, tiered and variable. For non-residential properties, the most common type of fee structures are tiered and variable. As far as overall composition of fee structures, residential flat fees and non-residential variable fees are common combinations. In general, fee structures for non-residential properties are either the same type or more refined than residential properties. For instance, research did not uncover any communities that couple tiered residential fees with flat non-residential fees – or variable non-residential fees with tiered non-residential fees.

The table below summarizes the main fee structure combinations, identifying the 6 general options.

OPTION	**RESIDENTIAL (Single-Family)**	**NON-RESIDENTIAL**	**COMMENT**
A	FLAT	FLAT	Combined into one option, since pure "flat" approaches are rare.
A	FLAT	TIERED	
B	FLAT	VARIABLE	
C	TIERED	TIERED	
D	TIERED	VARIABLE	
E	VARIABLE (Simple)	VARIABLE	
F	VARIABLE (Complex)	VARIABLE	

While the treatment of residential and non-residential properties is a pivotal issue regarding fee structure, it is not the only one. The structure of fees can also vary according to how they treat multi-family units (often considered differently than single-family properties), what factors are used as the basis for the fee (e.g. impervious surface versus lot area), what types of uses, if any, are exempt from the fees, and whether credits are offered in certain circumstances. To avoid putting too many options on the table at once, however, these considerations have been "decoupled" from Consideration #1 and are treated separately and later on in the report.

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CONSIDERATION #2: FEE STRUCTURE

OPTION A: FLAT RATE RESIDENTIAL
FLAT OR TIERED RATE NON-RESIDENTIAL

BACKGROUND

Under a flat rate system, all property owners within a particular use category pay the same amount in fees. Union, Ohio, for instances, has a fee structure with annual charges of $36 for residences, $72 for commercial properties and $118 for industrial properties. Preliminary research indicates, however, that relatively few utilities use a flat rate for non-residential properties, except as an interim measure while developing a more refined system. More common is a *tiered* approach in which non-residential properties are classified, usually by use and size of impervious area or some other factor, with all properties within a specified range charged the same fee. Valparaiso, Indiana is a good example of this approach.

VALPARAISO, INDIANA (50 miles east of Chicago)

Population: 25,500 Land Area: 10 square miles
Fee Established: 1998 Amount collected annually: $520,000

Classification/Tier	Fee Amount
Single Family	$3/month, or 36/year
Non-residential < 10,000 sf impervious	$3/month, or 36/year
Non-residential 10,000-40,0000 sf impervious	$12/month, or $144/year
Non-residential 40,000-160,000 sf impervious	$48/month, or $576/year
Non-residential >160,000 feet impervious	$96/month, or $1,152/year

PROS

- Reduces data collection needs – requires only rough impervious surface calculations to set non-residential classes.
- Easy to explain and for public to understand.
- Easy to administer.
- Might be adopted as an interim system, while more refined approach is developed.

CONS

- May be vulnerable to legal challenges as nexus between fee and volume of stormwater generated is weak, particularly for non-residential users.
- May be challenged politically by residential users who feel they are subsidizing large commercial uses.
- Essential "ceiling" for non-residential parcels may keep revenue stream relatively low.

FINAL NOTES

- Union, Ohio first considered a system based on impervious surface, but judged it to be too labor intensive for a small community. Also more than 95% of city was residential and impervious surfaces on most parcels were fairly uniform.
- Valparaiso system uses uniform rates for different classes, but classes justified as multiples of typical single family parcel – modified ERU approach.
- Both Union and Valparaiso are NPDES II communities.

OPTION B: FLAT RATE FOR RESIENTIAL; VARIABLE RATE FOR NON-RESIDENTIAL

BACKGROUND

Under this approach, residential properties are charged a flat rate, while non-residential properties are charged a variable rate that increases according to the amount of impervious surface or some other site factor.

The majority of communities that have adopted stormwater fees use this general approach, with many variations regarding how fees as calculated and structured. One approach is to charge non-residential uses a set amount per square foot of impervious surface (e.g.. $10 per 1,000 sq. feet per year). More commonly, utilities establish a basic unit of measurement, based on the typical amount of impervious surface of a residential parcel – which often ranges from 1,500 to 3,500 square foot. This unit is often referred to as the *Equivalent Residential Unit* (ERU). Non-residential properties are then charged according to how many ERU they contain (dividing their impervious surface by the area of 1 ERU). The fee structure used by Sanford, Florida is a good example of this approach

Sanford, Florida (near Orlando)

Population: 38,291 Land Area: 19.1 square miles
Fees established: 1991 Amount collected annually:$1.5 million

Type of property	Fee
Residential	$48/year
Non-Residential	$48/year/per ERU 1 ERU currently equals 2,126 square feet of impervious surface

PROS

- Offers more equity that flat or tier fee system for non-residential properties.
- Less vulnerable to legal challenge – approach has been upheld in court cases.
- Avoids having to collect comprehensive info on residential properties, which typically comprised more than 80% of land uses.

CONS

- Initial information gathering needs still substantial.
- Having one class of residential uses may lead to challenges, i.e. owner of very small lot unhappy to be paying the same as the owner of a "trophy" home."
- ERU concept initially difficult for some ratepayers to understand.

FINAL NOTES

- The amount of impervious surface in an ERU varies from community to community. Most are in 1,500 to 3,500 square foot range.
- In Sanford, Florida, fee applies to government-owned properties, including those owned by city.

OPTION C: TIERED RATE FOR RESIENTIAL AND NON-RESIDENTIAL

BACKGROUND

The approach of having a tiered structure for both residential and non-residential properties is not widely used by stormwater utilities. Many communities avoid creating residential tiers because of the considerable data gathering involved; ones that do in the interest of equity or political expediency often couple it with a more refined variable approach for non-residential uses (See Option D). Nevertheless, the approach does offer some distinct advantages, not the least of which is a system that is quite understandable and straightforward. Washington, North Carolina has such as system.

Washington, North Carolina

Population: 9,583 Land Area: 6.5 square miles

Fees established: 2002 Amount collected annually: $360,000

Residential		Non-Residential	
Impervious Surface Area	**Monthly Charge**	**Impervious Surface Area**	**Monthly Charge**
Up to 1,517 s.f.	$2.00	201 to 600 sq. ft.	$10.00
1,518-2322 s.f.	$3.00	601 to 20,000 sq. ft.	$20.00
Greater than 2,322 s.f.	$4.00	20,001 to 40,000 sq. ft.	$40.00
		40,001 to 100,000 sq. ft.	$50.00
		Greater than 100,000 sq. ft.	$100.00

PROS

- Tiered residential structure provides more equity than flat rate.
- Tired residential approach may buy more political support for approach.
- Tiered non-residential easy to understand and administer
- Use of ranges requires less precise impervious surface mapping – some time and cost savings.

CONS

- Establishing tiered residential rate more time intensive and expensive than flat rate – may not be worth it in light of relatively small differences in runoff impact for residential properties.
- Since collecting specific data on non-residential properties is necessary to classify into tiers, it may be just as easy to use a variable approach – which provides more equity.
- Essential "ceiling" for non-residential parcels may reduce revenue stream, and create legal/political vulnerability.

FINAL NOTES

- Fee in Washington, South Carolina initially established to pay for new capital improvements to system, with thinking that it will eventually pay for maintenance to existing system as well.

OPTION D: TIERED RATE FOR RESIENTIAL; VARIABLE RATE FOR NON-RESIDENTIAL

BACKGROUND

This approach is similar to Option C, except that residential properties are classified into different tiers, based on amount of impervious surface or some other factor. A good example of this approach in Griffin, Georgia, which has two tiers for residential uses. Other communities use three tiers (small, medium or large), and/or have a separate rate for multi-family units.

GRIFFIN, GEORGIA (40 miles south of Atlanta)

Population: 25,000 Land Area: 15.5 square miles
Fees established: 1997 Amount collected annually: $1.2 million

Category	Fee
Small Single-Family Residential (Parcels < 1,600 square feet)	$1.77 per month, or $21.24 per year (60% of the rate for one ERU)
Large Single-Family Residential (Parcels > 1,600 square feet)	$2.95 per month, or $35.40 per year (100% of the rate for one ERU)
Non-residential parcels	$2.95 per ERU per month, or $35.40 per ERU per year (ERU value set at 2,200 square feet of impervious surface)

PROS

- Provides residential owners more equity than options A or B.
- Less vulnerable to legal challenge.
- Threshold between different classes of residential uses might be established without having to do comprehensive calculations for every residential parcel.

CONS

- Information gathering needs substantial.
- The added time, expense and administrative complexity involved in adding tiers for residential uses may not be worth it (in light of the relatively small difference in impervious surfaces between different residential properties as compared to non-residential properties).

FINAL NOTES

- Griffin spent $180,000 in planning and creation of its stormwater utility.
- Griffin is NPDES II community
- Griffin's Public Works Director, Brant Keller, has been a prominent champion of the stormwater utility movement, and may be a good resource person/speaker if Maine decides to move ahead with the approach.

OPTION E: VARIABLE RATE FOR ALL (OR MOST USES): SIMPLIFIED APPROACH

BACKGROUND

Under this approach, all or most classes of uses are charged a rate that varies according to the amount of impervious surface or some other factor. There are no flat rates or tiers. A goal of such type of rates structures is to be as equitable as possible, with an effort to accurately assess properties according to their actual stormwater impact. Toward this end, some of these approaches can become quite complex, factoring in such considerations as pervious surfaces, location within a watershed or drainage area, or water quality. However, a considerable range of alternatives exists in terms of complexity and comprehensiveness, and some approaches, while requiring extensive data gathering, are quite simple in their application. The option considered here is one such simplified approach; option F explores more complex variable rate approaches.

As many experts believe that the extent of impervious surface is the best indicator of a site's overall stormwater impact, some communities base their stormwater fees – both residential and non-residential – on the actual impervious area of each property. Arvada, Colorado is one of these.

Arvada, Colorado (suburb of Denver)

Population: 102,153 Land Area: 57 square miles
Fee Established: 2001 Amount collected annually: $2.1 million

The current monthly stormwater fee is **$1.12 per 1,000 square feet** of impervious surface ($13.44 per 1,000 sq. ft. per year)

Examples of how this fee would be applied:

- Single-family residence with 2,800 s.f. of impervious surface: $3.14/month, or 37.68 annually
- Commercial use with 20,000 s.f. of impervious surface: $22.40/month, or $268.80 annually.

PROS

- Easy to explain and to determine (if accurate impervious surface info available).
- Closest to "you pave, you pay" approach, and may ultimately be deemed as most fair, once rate payers are educated about the impact of impervious surfaces.
- Creates a direct incentive for all users to reduce impervious areas.

CONS

- Of approaches already considered (Options A-C), requires most in the way of data collection and ongoing updating of information.
- May incur a significant amount of administrative expense as rate payers (esp. home owners) reduce or increase impervious surfaces by relatively small amounts.

FINAL NOTES

- Residential users in Arvada pay an average of $3.51 per month.
- Community conducted strong educational campaign prior to adoption, and significant outreach continues.

OPTION F: VARIABLE RATE FOR ALL (OR MOST USES) MORE COMPLEX APPROACHES

BACKGROUND

The amount of impervious surface on a property, while a good overall indicator, is not the only factor involved in how much a particular parcel contributes to the overall stormwater problem. Some communities have tried to develop fee structures that consider some of these other factors. Ann Arbor, Michigan, for example, looks at both impervious and pervious areas, multiplying each established hydraulic response factors to determine how many "hydraulic acres" are on a site. Some utilities provide different rate structures according to where the structure is in the watershed. Others add a water quality component in which the rate is multiplied by factor, based on typical pollutant loading for the particular land use.

Ann Arbor Hydraulic Acre Approach
(Example of its application to hypothetical one acre of land)

Area in Acres	Hydraulic Response Rate Factor	Hydraulic Acreage
.6 impervious	.95	.57 impervious
.4 pervious	.2	.08 pervious
		.65 total
0.65 Total Hydraulic Acres x $38.88 (service charge rate) = $25.27 per quarter		

As an example of how refined (and complex) a communities fee structure can be, Boulder, Colorado calculates the amount of pervious, semi and pervious surface on each parcel, categorizes parcels into 5 classes based on the resultant runoff coefficient, has separate charges to account for capital projects versus O & M expenses, and has an additional charge according to which drainage basin the parcel is located in.

PROS

- Such systems are probably the most equitable since they aim to accurately determine the amount of stormwater running off each site.
- Such systems are probably the most legally defensible because of the tight nexus between the fee and runoff impact.

CONS

- Generally require extensive information gathering.
- Precise measurement of residential properties may not be worth the effort.
- May be too complex for citizens to understand.

FINAL NOTES

- Communities with more complex rate structures are generally larger communities (NPDES I) with large staffs and hefty stormwater budgets.
- Some of the complexities within rate structures are driven more by data collection issues – see Consideration #3.

TABLE B: FEE STRUCTURE BENEFIT ANALSYIS

RATE STRUCTURE OPTION	EQUITY	SIMPLICITY (For public and decision-makers to understand)	DATA COLLECTION NEEDS*	COST/EASE OF ADMIN.	LEGAL DEFENSIBILITY
A: Flat Res. Flat/Tiered Non-res.	Poor/Poor+	Excellent	Excellent	Excellent	Poor
B: Flat Residential Variable Non-Res.	Fair	Good	Good-	Good	Fair+
C. Tiered Residential Tiered Non-Res	Fair-	Good	Fair	Good	Fair
C. Tiered Residential Variable Non-Res.	Good	Fair+	Fair	Fair	Good
D. Variable all classes: Simplified	Excellent	Fair+	Poor	Poor	Excellent
E. Variable: all classes: Complex	Excellent+	Poor	Poor	Poor-	Excellent

* Assuming options use parcel-by-parcel measurement of impervious surface and/or other factors as opposed to using generalized calculations (see Consideration #3).

CONSIDERATION #3: APPROACH TO MULTI-FAMILY UNITS

BACKGROUND

Multi-family units are treated in a variety of ways in stormwater fee structures. In general, they do not fit neatly within the flat, tiered and variable approaches that are discussed in Consideration #2, and are thus easier to evaluate as a separate consideration.

There are several unique characteristics of multi-family units that make developing a viable fee structure challenging. One is the considerable range of building and project types that are encompassed by this term: high-rise apartments, townhouses, triple-deckers, duplexes, condominium units and others. At one end of the spectrum, a large apartment complex with a common parking area has very similar site characteristics to a commercial office or retail establishment. At the other end, many residential communities with condominium ownership are much more similar to single-family dwellings.

Another characteristic is that, for many types of multi-family facilities, residents do not own their units – bringing up the question of whether fees are charged to the property owner or to individual tenants. In condominium-type arrangements, residents typically own their dwelling, but parking facilities and other areas are owned in common. In this case should the individual owners be charged or should the homeowners association receive a lump bill?

OPTION 1: TREAT WHOLE COMPLEX LIKE NON-RESIDENTIAL PROPERTY

Under this option, the buildings and grounds of an apartment complex or other multi-family development are treated like a non-residential property, with the fee based on how many ERUs or square feet of impervious surface are present on the entire property. For rental units, the bill typically goes to the landlord; for condominium units, the bill might go to the homeowners association.

PROS

- Simplifies billing, and avoids needing to apportion fees among individual multi-family units.
- Fee based on impervious surface or some other site factor, not as a derivation of single-family rate – probably the most equitable.

CONS

- In some residential communities with condominium ownership, individual units much more similar to single-family residences – may be easier to charge each individually.
- Bills going to landlords or property owners tends to insult multi-family residents from stormwater management education and awareness efforts.

OPTION 2: TREAT AS FRACTION OF SINGLE-FAMILY RATE

Recognizing that a typical multi-family unit has less stormwater impact than a typical single-family unit, some communities set fees for multi-family units as a fraction of single-family fees. Iowa City, Iowa, for example, treats all single-family units as 1 ERU, charging these properties $2 per month, and all multi-family units as .5 ERU, charging each $1per month.

PROS

- Easy to administer – all units pay same fee.
- Avoids having to collect data on each multi-family property.

CONS

- Doesn't account for significant differences in different types of multi-family units, e.g. apartment buildings with multiple floors and relative to more spread out developments.
- In general, may overestimate impact, except for spread-out multi-family complexes.

OPTION 3: IF A TIERED RESIDENTIAL APPROACH IS USED, TREAT AS "SMALL" RESIDENTIAL PROPERTY

For communities that have a tiered residential fee structure that establishes "smaller" and "larger" categories or "small," "medium" and "large," one option is to treat all multifamily units as "small" residential uses.

PROS/CONS

- Similar to pros and cons of Option 2. Actual degree of how equitable this approach is dependent on how what actual fees are set for small residential class.

OPTION 4: CHARGE THE FLAT SINGLE FAMILY FEE PER UNIT

To keep things simple, some communities charged all residences the same fee per unit – whether they are single or multi-family. The rationale is similar to charging a flat fee for all single-family properties: that the difference in impervious surfaces (and overall stormwater impact) is relatively small (800 - 2,000 sf), especially compared to non-residential uses, and that creating variable fees may not be worth the trouble. Even for relatively small apartment units (i.e. 500 sf), one could argue that area taken up by parking, building areas used by all tenants and other common areas increases each units share of overall impervious surface – and stormwater impact.

PROS/CONS

- Similar to those for Options 2 and 3 except in degree. Probably the most simple to administer, but may be the least equitable.

CONSIDERATION #4: FEE BASIS AND DATA COLLECTION

BACKGROUND

Closely linked to the structure of fees is the consideration of what information is to be used as the basis for that fee structures. The majority of stormwater utilities use impervious surface as the basis for their fees. But others use lot area, lot area in conjunction adjusted by generalized factors based on land use type, or some other approach.

In general, these different approaches to information can be used to create any one of the fee structures discussed in Consideration 2. One can, for instance, use lot sizes to create either tiered or variable approach for some or all use classes. Communities that use lot sizes in conjunction with generalized factors often maintain a flat rate for residential properties, and apply formulas to nonresidential properties resulting in a variable rate.

The decision on what information to use as a fee basis has significant implications regarding the cost of data collection, ease of administration, legal and political defensibility and other factors.

OPTION A: PARCEL SIZE

Under this approach, fees are apportioned according to the size of the parcel, with larger parcels paying a higher fee. Rock Island, Illinois for example, uses the following tiered approach:

Gross Parcel Size	Fee
0-6,000 sf:	$2.82 month
6,000-18,000 sf.:	$4.39 month
18,000-87,000 sf,	$5.49/month
Larger than 87,000 sf	$4.39 per 28,000 sf/month

Sioux City, Iowa uses a straight variable rate of $2.50 per 10,000 square feet of lot area per quarter.

PROS

- Simple to collect/maintain information.
- Simple to administer.
- Only requires updating as new parcels are created or parcel sizes change.

CONS

- Poor nexus with actual stormwater impact – treats 1-acre paved lot the same as 1-acre undeveloped lot.
- May be vulnerable to challenges, both legally and politically.
- Creates no disincentive to pave.
- Seems to “punish” large landowners who keep land undeveloped.

OPTION B: PARCEL SIZE IN CONJUCTTION WITH GENEARLIZED FACTOR(S)

This approach has many variations. A common approach is to use lot size in conjunction with a pre-determined a runoff coefficient aimed at estimating runoff impact for different land use types. North Augusta, South Carolina, for example, establishes a base residential unit (in their case a 1/3 of acre lot with a runoff coefficient, termed the C-Factor, of .35), and this base is used to compute the number of ERUs per gross land area for different non-residential classes of land.

Property	C-Factor	ERUs per gross acreage (derived from base res. unit)	Gross Acreage of Sample Parcel	Total ERUs in parcel	Annual Fee (at $48/per ERU per year)
School	.52	5.28	2	10.56	$ 506
Shopping Center	.76	6.58	5	32.9	$1,579
Gas station and convenience store	.83	7.17	1	7.17	$ 344

In the above example, residential properties are charged a flat fee of $48 per year regardless of whether they are larger than 1/3 acre. Some communities apply the approach to residential properties, which are typically given factors in the .25-.35 range. This factor is then applied to lot size to determine the actual fee.

PROS

- Allows creation of fee structure without needing to collect parcel-specific information other than gross size and land use.
- Less labor intensive and expensive than a parcel-by-parcel analysis of impervious surface.

CONS

- This approach can be quite inaccurate in estimating actual site conditions – and ultimately runoff impact – especially for non-residential lots.
- If applied uniformly to residential properties, C-factors may accurately reflect runoff impact on small lots, but not for larger mostly undeveloped lots.
- May be vulnerable to political and legal challenges.
- Can be complicated to explain to public and to express in stormwater utility ordinance.

OPTION C: ACTUAL MEASUREMENT OF IMPERVIOUS SURFACES

Although the actual measurement of impervious surfaces is labor intensive, the majority of newer stormwater utilities use this approach – at least for non-residential properties. Most use GIS and aerial photography, with some ground verification. Costs for doing this can vary tremendously, depending on what resources and capabilities the community already had.

PROS

- According to many experts, imperviousness is the best overall indicator of stormwater impacts.
- Actual measurement of impervious surfaces (as opposed to estimating) provides an accurate and defensible basis for fees – less likely to be challenged, legally or politically.
- Technological improvements with GIS and remote sensing have made actual measurement of impervious surfaces on a parcel basis less daunting.
- Having accurate impervious surface data helpful for other planning/engineering purposes.

CONS

- Initially, much more labor intensive and expensive than option A: requires collection of site-specific data.
- More technically involved than other options
- Data needs constant updating as impervious surfaces added.
- Unpaved, but otherwise impervious or semi-impervious surfaces are more difficult to identify from aerials.

OPTIONS D: ESTIMATION OF IMPERVIOUS SURFACES

Actual measurement of impervious surfaces using aerial photos and GIS can be a time-consuming and relatively expensive process – at least if the chosen fee structure involves a tiered or variable rate for residential properties. An alternative is to try to estimate impervious surface based on other existing or easily obtainable parcel-specific information. Using assessment records that indicate the size of building footprints and other data may be the most promising option. These estimates of impervious surface may be accurate enough if the community opts for a tiered approach in which all properties within a range of surface area pay the same fee.

PROS

- Offers a cost-effective alternative to digitizing maps.
- For residential properties, building footprints typically comprise >than 80% of impervious surfaces.

CONS

- Assessing info generally doesn't include info on amount of impervious surface in parking areas, drive etc – less effectively as a tool for non-residential structures.
- Some assessment information on building footprints out of date.
- Info needs to be updated.

CONSIDERATION #5: ORGANIZATIONAL STRUCTURE

BACKGROUND

Stormwater utilities can be organized in a variety of ways. Most are established either as stand-alone entities or incorporated into an existing municipal department such as public works. For communities that wish to create the utility solely as a legal and financial mechanism, there are other organizational options as well.

OPTION A: INDEPENDENT "STAND ALONE" ORGANIZATION

Under this option, an entirely new entity is created. This approach is often used by communities that intend to have an extensive stormwater management program that requires more resources than existing departments can provide. Nationally, about 54% of stormwater utilities are formed this way . While it is difficult envision individual MS4 communities in Maine each establishing independent stormwater utilities with new administrative capabilities, a regional organization might be created through interlocal agreements that formalize coordination on all or some of the functions of a typical stormwater utility.

PROS

- Unifying stormwater management under one entity may allow effort to be focused and avoid duplication.
- A regional entity might allow more of a watershed focus.

CONS

- Forming a new entity may be unnecessary in light of availability existing resources at the regional and local levels.
- Forming a new entity may be politically unpalatable

OPTION B: ORGANIZED WITHIN EXISTING UTILITY OR MUNICIPAL DEPARTMENT

Under this arrangement the utility become part of another department or utility, most commonly the municipality's Public Works Department. This arrangement occurs about 40% nationally (76% in Florida). This type of stormwater utility often shares some of its staff with other programs but maintains its own primary staff and budget.

PROS

- Takes advantage of existing administrative capacity and resources.
- Avoids political problem of creating a new entity.
- Public works or engineering department already responsible for many stormwater-related duties.

CONS

- Formal creation of a new subdepartment may be unnecessary if functions already taken care of under existing structure.

OPTION C: ORGANIZED PRIMARILY AS A LEGAL AND FINANCIAL ENTITY

Under this arrangement, the primary purpose of the utility is to provide a legal and financial structure for creating a dedicated fund – rather than creating an administrative unit. User fees are put into an enterprise fund or restricted bank account, and are used to fund existing and new programs related to stormwater management. This approach is most often used by smaller communities, which are mainly interested in the financial benefits of a stormwater utility.

PROS

- Provide a dedicated funding source without the need for creating a new administrative unit or function.
- May be the most politically acceptable option if concerns exist about creating new "bureaucracy."
- Collected revenues can be dispensed to various departments/or contractors to implement stormwater related tasks.

CONS

- Unless a particular department or person is given responsibility for the utility, there may be lack of follow-through and coordination.
- Potential for lack of accountability regarding how money is dispersed.
- A lost opportunity, perhaps, to give the new utility organizational identity to better draw attention to stormwater management.

CONSIDERATION #6: FEE COLLECTION

BACKGROUND

Research indicates that fee collection is a significant issue for communities considering the establishment of a stormwater utility. Since stormwater fees tend to be in the $3-$4 per month range for residential properties, billing costs have potential to significantly chew into this revenue. The consensus among those with experience is that it is best to piggy-back on an existing structure rather than trying to establish a new billing system.

Many communities use the billing systems of existing utilities (water and wastewater). This approach, however, can have a strong bearing on Consideration 6: Geographic Area, because rural areas are less likely to be served by public sewer and water. Faced with the prospect of having to develop a separate billing system for rural residents (or billing them on their tax bill), some utilities decide to just apply their stormwater fees to the more urbanized area served by public sewer and/or water.

OPTION A: USE OF NEW OR EXISTING REGIONAL BILLING SYSTEM

PROS

- If there is an existing regional structure, avoids the costs and administrative burdens of creating a new system.
- A regional billing system offers significant economies of scale.
- A private billing company could be hired by competitive bid to serve multiple towns.

CONS

- No existing regional entity may exist, particularly for residents who aren't on public sewer and/or water.
- Some customers may prefer to get bill from the municipality rather than regional entity or private billing company.

OPTION B: USE OF EXISTING LOCAL BILLING SYSTEM

PROS

- Using existing billing system much less expensive than creating separate billing.
- Customers may be more accepting of a new charge on an existing bill than receiving a new bill and also prefer to get local bill.

CONS

- For some communities, the tax bill is the only existing mechanism for billing all of its citizens. If tax bill is used, more difficult to argue that stormwater fee is not a tax.

OPTION C: USE OF NEW EXISTING LOCAL STRUCTURE

PROS	CONS
• Fee can be properly explained as a separate charge, and not confused with tax bill. • Opportunity for targeted educational materials on stormwater and the need for the fee. • To reduce costs, billing could take place on a quarterly or annual basis.	• The most expensive alternative. The billing cost per customer may represent a significant portion of the fee, particularly if billed on a monthly basis.

CONSIDERATION #7: IMPLEMENTATION: REGIONAL VERSUS LOCAL

BACKGROUND

Stormwater runoff does not follow municipal boundaries. Most experts agree that regional stormwater planning that focuses on watersheds and drainage basins is the wave of the future. For the present, however, we must contend with the realities of our existing political structure, with its focus on home rule and lack of strong regional structures.

As the work of the Interlocal Stormwater Group (ISWG) has demonstrated, many aspects of stormwater management are well suited for an interlocal approach. The group has developed a joint approach in creating a 5-year Stormwater Management plan in accordance with the federal NPDES II requirements, and as that plan is implemented, significant opportunities exist for additional coordination. Implementation of other stormwater management measures may best handled on a town-by-town approach, although sharing of resources and expertise seems possible in most instances.

OPTION A: FORMAL REGIONAL

Parts of the country with strong county government have been able to fold stormwater management into their regional approach of planning and providing for services and facilities. Areas with multi-town sewer or water districts have also successfully added stormwater to the mix. In Maine, it is possible that larger utilities such as Portland Water District could assume some implementation responsibilities, as could the Soil and Water Conservation Districts, Regional Councils or non-profits such as the Casco Bay Estuary Project. The Interlocal Stormwater Working Group itself may eventually need to transform itself into more of a formal structure with increased staff resources and administrative responsibilities.

PROS

- In the long term, there may be a need to develop a formal regional arrangement to sustain stormwater management efforts in a systematic way.

CONS

- At the current time, the ad-hoc approach being used by the ISWG is working well – why change it?
- Effective stormwater management still requires community-specific engagement – turning it over to a third party may not serve this purpose well.

OPTION B: AD-HOC REGIONAL

This is the approach currently being used by the Interlocal Stormwater Group. There is no formal organizational structure. The group is problem/task focused, and works on issues of mutual self-interest. Meetings are generally held once a month. Several subcommittees are charged with following through on specific projects/tasks.

PROS

- The approach has been very successful to date – if it ain't broke….
- The approach is flexible – allows communities to address issues of mutual concern.
- Allows a regional focus without the political baggage of creating "another layer of government."

CONS

- Issue of whether existing level of interest and productivity are sustainable in the long-term. The group itself seems to recognize this issue in its efforts to hire a coordinator.

OPTION C: LOCAL

To date, implementation of stormwater management plans has largely been a local function in many communities throughout the country. The larger NPDES I communities, often isolated from one another geographically, have forged ahead independently in upgrading their stormwater management measures. While NPDES II is more likely to affect multiple communities in a region – creating more opportunities for coordinated action – some stormwater measures may remain best implemented on the local level.

PROS

- Some stormwater management measures may be best managed at the local level, e.g. street cleaning and catch basin maintenance.
- In some instances, it may be easier for a community to proceed with an implementation measure rather than to try to coordinate with others.

CON

- In general, a go-it-alone approach is more labor intensive, duplicative and expensive than a coordinated, interlocal approach.
- Even for implementation aspects such as system maintenance and inspection, there may be opportunities for joint purchasing of services and equipment sharing.

CONSIDERATION #8: EXPENSES COVERED

BACKGROUND

For many communities, the original impetus for adopting stormwater fees was/is impending NPDES requirements. Most communities, however, use the revenues generated from these fees to fund a wide variety of stormwater-related expenses – many which were formerly funded by General Fund revenues.

The stormwater fees collected by communities nationwide are generally sufficient to cover most O&M costs associated with stormwater and meeting the Five Minimum Measures of the NPDES II program. Fewer communities have been successful at covering the costs of all stormwater-related costs – including large-scale capital projects.

OPTION A: ALL COMPONENTS OF STORMWATER-RELATED SYSTEM INCLUDING CAPITAL PROJECTS AND CSOs.

PROS

- Provides stable, dedicated funding source to address existing and future needs in a systematic way (avoids fickleness of annual budget prioritization).
- Because of substantial shifting of financial burden off of general fund, the utility fees can be "sold" primarily as a *transfer* of charges rather than an additional charge.
- If fees inadequate to meet large capital needs in short-term, utility can use existing resources to bond.

CONS

- Without charging high fees or doing substantial bonding, may be difficult to raise adequate fees to cover all stormwater related expenses.
- If creation of stormwater utility and adoption of fees is coupled with large capital improvement "wish list," may scare people off.
- There may be some merit in starting off with a stormwater program in which most expenses are covered, and then adding more once public acceptance is better gauged.

OPTION B: ALL COMPONENTS OF STORMWATER SYSTEM EXCEPT MAJOR CAPITAL IMPROVEMENTS AND CSOs.

PROS

- Covering these type expenses is usually possible if modest fees are charged.
- Still has potential to cover items now covered with general funds, e.g. street cleaning and other maintenance, and to be touted as reducing reliance on general fund.

CONS

- If capital projects aren't given dedicated source, may be less likely to be protected during tight budgetary times.
- Public tends to be most supportive of fees when they see tangible improvements – such as capital projects.

OPTION C: JUST NPDES II REQUIREMENTS

PROS

- May be much easier to "sell" the concept as a response to an unfunded government mandate.
- Would allow fees to be minimal.
- Program could be broadened and fees increased as public acceptance grows.

CONS

- Creates an *artificial* separation between NPDES required programs and things communities are doing and will be doing anyway to better address stormwater problems.
- Unless fees set very low, usually revenues exceeds expense for meeting minimum NPDES requirements – allowing for broader program to be funded.

CONSIDERATION #9: GEOGRAPHIC COVERAGE

BACKGROUND

The NPDES II regulations apply only to urbanized areas of the MS4s towns with bonafide stormwater systems. All properties in a community, however, contribute to stormwater runoff, including those in rural areas. Some communities with stormwater utilities apply their fees only areas served by utilities (public water, sewer and/or stormwater). Others apply fees community-wide.

OPTION A: INDIVIDUAL BOUNDARIES OF MS4 TOWNS

PROS

- From a scientific/technical basis, makes sense, as all properties contribute to stormwater runoff.
- Approach may also be perceived as more fair, as all residents share the burden.
- Besides the stormwater runoff of property, all residents also used road system and engage in behaviors that impact stormwater quantity and quality.
- Avoids "punishing" people who choose to live in compacts areas and "rewarding" those who choose to live on the large lot in the country.

CONS

- Rural landowners may have particular difficult seeing how the fee has any relationship to them, as no stormdrain system exists in their neighborhood.
- The natural features of many rural lands provide stormwater detention and filtering – charging these landowners a fee may be deemed unfair.
- Charging rural landowners may require new billing system, unless put on tax bill (See Consideration #5).

OPTION B: URBANIZED PORTIONS OF MS4 TOWNS COVERED BY NPDES II REGS.

PROS

- May be easier to build public support for fee when property owners can actually see a system that needs obvious maintenance and upgrading.
- Billing may be vastly simplified if it can be added to existing water or sewer bill.

CONS

- May be perceived as punitive toward those who choose to live in compact areas.
- Creates the impression that only those living in built-up areas contribute to stormwater problems.
- Limits amount of revenue that fees can generate.

CONSIDERATION #10: EXEMPTIONS

BACKGROUND

As all properties (with perhaps a few exceptions) contribute to stormwater runoff, it can be argued that all properties should be charged under a fee system. It is difficult to argue that a parking lot that serves a church or school should be treated differently than an identical lot that serves a commercial property. On the other hand, certain improvements such as roads constitute essential infrastructure that benefits the public. It also may make little sense to charge public entities that will in turn pay their fees with general fund revenues. Finally, it can be argued that undeveloped lands have a far less significant stormwater impact than developed ones, and should be exempt from fees.

OPTION A: NO EXEMPTIONS

PROS

- At least from an ideal standpoint, it is consistent to charge all property owners – as we all contribute to stormwater problems.
- Under this approach, there are no exemptions that reduce the amount of revenue collected or that make the system complicated.
- Residential and commercial users are often more supportive of stormwater fees when they feel that public and non-profit owners are being charged as well.
- Even undeveloped lands generally contributes some stormwater to the overall system.

CONS

- Roads and other essential public infrastructure provide benefits that counteract their stormwater impact.
- If publicly owned facilities and lands pay are required to pay fees, the money will likely just reallocated from General Fund revenues or some other source.
- There may be a number of uses/types of lands that either (1) do not create much if any stormwater runoff, or (2) it is politically expedient to exempt them.

OPTION B: EXEMPT ROADS AND SELECTED OTHER PUBLIC USES

PROS

- Roads are essential infrastructure; their benefits more than outweigh their stormwater impacts.
- For a municipality, paying fees on roads and other town-owned properties is tantamount to paying itself. For any public entity, the funds to cover the fees would likely come from the General Fund.
- Exempting private roads may avoid administrative and political headaches.

CONS

- Roads do contribute significantly to stormwater runoff.
- Fees on at least private roads could generate substantial revenues, and be a disincentive for excessive road building in new subdivisions.

OPTION C: EXEMPT UNDEVELOPED LANDS

PROS

- Undeveloped lands, particular large blocks of them, can help to mitigate stormwater impacts, particularly as they function to divert, store and filter stormwater.
- If the focus of the fee is on impervious surface, it is difficult to then charge owners of land with no impervious surfaces (or an extremely low ratio)
- It may be politically expedient to exempt these users as well.

CONS

- Undeveloped properties are the source of significant stormwater runoff in some cases.
- As users of the community's road system and other services, even owners of parcels with no or little stormwater impact, still contribute to the overall problem.

OPTION D: EXEMPT AGRICULTURAL LANDS

PROS

- One could argue that those engaged in agricultural are dealing with enough challenges and uncertainties without hitting them with a new fee.
- One could argue that those engaged in agriculture should be rewarded, not punished, for keeping land open. Conversion of farmlands to subdivisions creates significant impervious surfaces and alters natural drainage patterns.
- Agricultural lands managed according to BMPs have far fewer negative stormwater impacts, and can even function as retention areas within the neighborhood.

CONS

- In some cases, agricultural operations can create significant negative stormwater impacts, particularly regarding water quality.
- It may be more difficult to convince other property owners that they should pay their far share when they see a class of potential high-impact users exempted.

CONSIDERATION #11: CREDITS

BACKGROUND

Consistent with the thinking that stormwater fees can not only create a dedicated revenue source, but also provide an incentive to change behaviors, some communities have incorporated credits into their fee structures. Probably the most common credits are for the installation of on-site measures that detain or filter stormwater.

OPTION A: NO CREDITS

PROS

- Keeps fee structure simple to understand and to administer.
- Doesn't reduce revenue stream.
- Communities have had very mixed results with credits – it is often less expensive for owner to pay fee than to undertake actions to be eligible for the credit.
- If impervious surface used as basis for fee structure, it provides a built-in incentive to pave less.

CONS

- If a goal of stormwater fees is to change behaviors, credits provide an incentive.
- Credits often help to "sell" a stormwater program to the public and engage them in the stormwater management process.

OPTION B: CREDITS FOR STORMWATER ATTENUATION

A typical credit system provides fee reductions for measures that attenuate stormwater as measured relative to pre-development conditions. For example, maintaining volumes at predevelopment levels might warrant a 40% reduction, and maintaining them 10% below predevelopment levels might warrant a 60% reduction. A few credit systems focus more on the maintenance of systems – providing a credit for system that are annually certified by a professional engineer to be functioning correctly

PROS

- Can be an incentive for property owners to seriously address stormwater management on their property.
- Allows users to actively participate in the goals of better managing stormwater.
- Could be used as an incentive for better maintenance of on-site detention and other systems.

CONS

- Most state and local requirements already require stormwater detention – credit would be rewarding them for something they are already required to do in many cases.
- It may be cheaper for owner to pay stormwater fee than install measures or pay for regular inspections.
- Credits have potential to significantly reduce revenue stream, particularly if large non-residential users take advantage of them.

OPTION C: CREDITS FOR STORMWATER QUALITY

The focus of most stormwater fees is stormwater quantity, not quality. Although a few examples exist of stormwater fee structures that factor in quality concerns, this can make the system quite complex. More utilities try to address quality by providing a credit. High Point, North Carolina, for example, provides a 20% fee reduction for properties that direct stormwater into BMPs focused on improving water quality. The BMP must be referenced in the city's ordinance and designed to reduce suspended solids by 80%.

PROS

- Provides a way for stormwater quality to be addressed without making overall fee system too complex
- A credit for stormwater quality may help in NPDES permitting.

CONS

- Measures to improve the quality of stormwater running off a site may be expensive – making it cheaper for owner to pay the full fee.
- Could cut into revenue stream if many users take advantage of it.

OPTION D: EDUCATIONAL CREDITS

Some utilities provide credits to education institutions that agree incorporate stormwater-related topics into their curricula. Lake County, Ohio, for instance, provides up to a 15% credit to schools that agree to devote at least a minimum specified amount of time teaching students and employees about stormwater issues, and posting/distributing pertinent information and materials.

PROS

- Provides a novel way to broaden education and outreach effort.
- Provides a way of enlisting the help of educational institutions in raising awareness.
- Educational institutions may be more likely to work cooperatively, even if the credit doesn't pay for the added program.

CONS

- Unless effort is coordinated, efforts by individual schools may be redundant or haphazard.
- The credit may not provide enough of an incentive for the school to meaningfully participate.

4. ANALYSIS OF COSTS AND REVENUES

The process of developing and implementing stormwater utility fees can be a daunting one, particularly in convincing the public that a new fee system is warranted and political leaders that the proposal is worthy of their initial and continuing support. As preliminary discussions unfold with elected officials and others, the following three questions may be particularly important to answer. First, is the amount of revenue this new system likely to be raise worth the energy and "political capital" involved in getting a system through the process? Second, will the amount of fees raised be adequate to cover the stormwater improvements needed, either by the community or by the ISWG collectively?" And third, to what extent do stormwater fees reallocate the funding of stormwater-related costs, particularly by bringing in the tax-exempt sector? The analysis presented below is aimed at providing information that will help to answer these questions.

Revenue from Residential Properties

Most communities that adopt stormwater fees, at least initially, charge residential properties owners in the range of $3-$4 a month, which amounts to $36-$48 per year. A few communities charge less; a considerable number charge more. For the sake of simplicity, the analysis below assumes a fee structure in which all residential property owners are charged a flat fee. This approach may somewhat overstate revenues in communities that have a significant number of apartment and multi-family units, and which employ a fee structure in which individual units are charged less than single-family residences. On the other hand, a fee structure that uses different residential tiers might generate somewhat higher revenues, as the system would capture higher fees from some of the larger residential properties.

Table 1: Potential Revenue From Residential Properties

		Annual Revenues Generated Under Different Residential Flat Fees Scenarios		
	No. of Households (2000)	**$3 month**	**$3.50 month**	**$4/month**
Portland	29,722	$1,069,992	$1,248,324	$1,426,656
South Portland	10,042	$361,512	$421,764	$482,016
Westbrook	6,855	$246,780	$287,910	$329,040
Freeport	3082	$110,952	$129,444	$147,936
Gorham	4,868	$175,248	$204,456	$233,664
Windham	5,543	$199,548	$232,806	$266,064
Scarborough	6,471	$232,956	$271,782	$310,608
Cape Elizabeth	3,501	$126,036	$147,042	$168,048
Yarmouth	3,438	$123,768	$144,396	$165,024
Falmouth	3,956	$142,416	$166,152	$189,888
Cumberland	2,560	$92,160	$107,520	$122,880
Saco	6,773	$243,828	$284,466	$325,104
Biddeford	8,616	$310,176	$361,872	$413,568
Auburn	9,794	$352,584	$411,348	$470,112
Total	$105,221	$3,787,956	$4,419,282	$5,050,608

Revenue from Non-Residential Revenues

For fee structures that will use a tiered or variable fee structure for non-residential properties, estimating potential revenues from such properties is less easily accomplished. To do this with a high degree of accuracy, one would need to measure the amount of impervious surfaces for all non-residential properties in each community. Assessing information may allow rough estimates to be made, but it seldom includes information on the amount of parking, driveways and other hardscape on the site. Communities with GIS capabilities may be in a better position to make such estimates, although it may require digitizing impervious surfaces on each tax lot, which can be time consuming.

The analysis below is intended to provide a very rough estimate of what sort of revenues might be expected from the non-residential sector. The estimates of non-commercial acreage for each community are "soft" numbers, based on review of valuation information and comprehensive plan inventories, as well as the researcher's own knowledge of these communities.

Table 2: Potential Revenue From Non-Residential Properties

				Annual Revenues Generated Under Different Non-Residential Rates		
	Rough estimate of developed non-residential acreage	**Rough estimate of impervious area (50% of total acreage)**	**Estimated # of ERUs (at 1 ERU = 2,500 square feet)**	**$3 per month per ERU**	**$3.50 per month per ERU**	**$4 per month per ERU**
Portland	2,800	1,400	24,394	$878,170	$1,024,531	$1,170,893
South Portland	2,400	1,200	20,909	$752,717	$878,170	$1,003,622
Westbrook	1,400	700	12,197	$439,085	$512,266	$585,446
Freeport	800	400	6,970	$250,906	$292,723	$334,541
Gorham	400	200	3,485	$125,453	$146,362	$167,270
Windham	1,200	600	10,454	$376,358	$439,085	$501,811
Scarborough	1,000	500	8,712	$313,632	$365,904	$418,176
Cape Elizabeth	80	40	697	$25,091	$29,272	$33,454
Yarmouth	200	100	1,742	$62,726	$73,181	$83,635
Falmouth	350	175	3,049	$109,771	$128,066	$146,362
Cumberland	80	40	697	$25,091	$29,272	$33,454
Saco	800	400	6,970	$250,906	$292,723	$334,541
Biddeford	800	400	6,970	$250,906	$292,723	$334,541
Auburn	1,400	700	12,197	$439,085	$512,266	$585,446
Total	13,710	6,855	119,442	$4,299,895	$5,016,544	$5,733,193

Because the acreage numbers are probably conservative and the assumption of 50% impervious surfaces may underestimate the amount of imperviousness on many sites, these estimates are likely to be on the low side of the spectrum. For a number of communities, the estimated revenues amounts are about the same as the estimates for residential properties. In reality, most communities nationally that have adopted stormwater fees find that the non-residential sector contributes 60-70% of total revenues, at least when they have a significant amount of non-residential property.

Total Revenue Estimates

Table 3 below provides total revenue estimates both all sectors. Again, because of the "softness" of the non-residential revenue estimates the information should be used with caution, but it provide an idea of the type of revenue potential for these fees.

Table 3: Potential Revenue From All Properties

	Annual Revenues Generated Under Different Rates			
	$3 per month per ERU	**$3.50 per month per ERU**	**$4 per month per ERU**	**Average Percentage Share of Non-Res. Property**
Portland	$1,948,162	$2,272,855	$2,597,549	45%
South Portland	$1,114,229	$1,299,934	$1,485,638	68%
Westbrook	$685,865	$800,176	$914,486	64%
Freeport	$361,858	$422,167	$482,477	69%
Gorham	$300,701	$350,818	$400,934	42%
Windham	$575,906	$671,891	$767,875	65%
Scarborough	$546,588	$637,686	$728,784	57%
Cape Elizabeth	$151,127	$176,314	$201,502	17%
Yarmouth	$186,494	$217,577	$248,659	34%
Falmouth	$252,187	$294,218	$336,250	44%
Cumberland	$117,251	$136,792	$156,334	21%
Saco	$494,734	$577,189	$659,645	51%
Biddeford	$561,082	$654,595	$748,109	45%
Auburn	$791,669	$923,614	$1,055,558	55%
Total	$8,087,851	$9,435,826	$10,783,801	53%

Even at fairly low rates, the revenue potential for stormwater fees is considerable. Revenue potential is greatest for more urbanized communities with a considerable amount non-residential development. For some of the smaller bedroom communities, potential revenues are more modest, at least at low monthly rates. Whether these amounts justify the process of implementing a fee system is a decision to be made by policy makers. But the fees have potential to both raise significant amounts and to broaden the base from which these revenues are drawn (see analysis of cost reallocation below).

In order to determine the adequacy of these fees to cover stormwater-related costs, analysis of expenses is needed, which is done below.

Expenses

Phase II Cost Considerations

A driving force behind the adoption of stormwater user fees nationally has been the National Pollutant Discharge Elimination System Program (NPDES), authorized by the Clean Water Act, which regulates point source discharges. In response to the Phase I portion of this program, many larger U.S. cities have already implemented enhanced stormwater programs and have adopted stormwater fees to help them do so. Smaller communities, including 28 in Maine (termed MS4 communities because they have Municipal Separate Storm Sewer Systems) must now comply with Phase 2 of this program, prompting consideration of possible funding sources, including stormwater fees.

Several different cost estimates exist for what it will cost communities to comply with NPDES Phase II requirements. When the program was adopted, EPA provided two different estimates, one a median value, both based on number of households in each community. The American Public Works Association (APWA) has provided two estimates as well, one for communities that plan to implement a "barebones" program; the other who wish to do a comprehensive program, both based on community population. The results of these estimates, summarized below in table, show a significant disparity in values when applied to the communities within the ISWG.

Table 3: Estimated Costs for Implementing NPDES Phase II Program

Community	Population (2000 Census)	Households (2000 Census)	EPA Estimate #1 Median Value ($4.19/household)	EPA Estimate #2 Mean Value ($9.16/household)	APWA Estimate for barebones program ($1.33/capita)	APWA Estimate for comprehensive program ($10.96 per capita)
Portland	64,249	29,722	$124,535	$272,254	**$85,451**	$704,169
South Portland	23,324	10,042	$42,076	$91,985	**$31,021**	$255,631
Westbrook	16,142	6,855	$28,722	$62,792	**$21,469**	$176,916
Freeport	7800	3082	$12,914	$28,231	**$10,374**	$85,488
Gorham	14,141	4,868	$20,397	$44,591	**$18,808**	$154,985
Windham	14,904	5,543	$23,225	$50,774	**$19,822**	$163,348
Scarborough	16,970	6,471	$27,113	$59,274	**$22,570**	$185,991
Cape Elizabeth	9,068	3,501	$14,669	$32,069	**$12,060**	$99,385
Yarmouth	8,360	3,438	$14,405	$31,492	**$11,119**	$91,626
Falmouth	10,310	3,956	$16,576	$36,237	**$13,712**	$112,998
Cumberland	7,159	2,560	$10,726	$23,450	**$9,521**	$78,463
Saco	16,822	6,773	$28,379	$62,041	**$22,373**	$184,369
Biddeford	20,942	8,616	$36,101	$78,923	**$27,853**	$229,524
Auburn	23,203	9,794	$41,037	$89,713	**$30,860**	$254,305
Totals	253,394	105,221	$440,876	$963,824	**$337,014**	$2,777,198

In general, these numbers seem more helpful in providing general context for what type of cost ranges are possible than realistic estimates for what ISWG communities might spend for individual implementation programs. If the ISWG communities proceed with collaborative implementation, there may tend to be a focus on no-frills components on which all towns agree are the highest priority, rather joint funding of more ambitious projects. Therefore, the APWA "barebones" estimate may provide a realistic ballpark figure, with successful collaborations on particular program components allowing additional cost savings. On the other hand, such estimates would not reflect costs that individual communities might incur who which to go beyond the no-frills approach.

Rather than relying upon generalized estimates, the ISWG may want to develop more precise estimates of what compliance with NPDES requirements will cost. The Casco Bay Watershed NPDES Phase II Workplan, a 5-year management plan developed to help ISWG communities comply with NPDES requirements, provides an excellent template for estimating implementation costs. Using that workplan, at least one local engineering provided the ISWG with an estimate of what implementing the plan might cost. The group could ask other consultant to make estimates as well. Or it could make its own estimates.

Other Expenses

Beyond covering costs associated with NPDES II requirements, communities with stormwater utilities fees typically use the revenues raised to fund other programs/projects as well. Some use the funds to cover operating and maintenance costs. Some use the funds to cover needed capital projects, both replacement of aging infrastructure and new facilities. Others use revenues to address combined sewer overflows (CSOs) and flooding problems.

A selling point of stormwater fees is that they allow financing of projects and programs that are now funded mostly by the property tax. It may be misleading, however, to claim that a landowner's property taxes will be reduced by the corresponding amount of what is charged annually for stormwater fees. Because stormwater systems often suffer from deferred maintenance (and an inability to compete with other perceived community needs in the budget setting process), spending on stormwater typically increases after the enactment of stormwater fees.

Analysis of Funding Adequacy for NPDES Communities

Even though some of the analysis above is based on rough estimates, it supports several preliminary conclusions:

1. For ISWG communities, the amount of revenue likely to be raised by enactment of stormwater utility fees appears more than adequate to cover minimum compliance with NPDES II requirements.
2. Even at fairly low rates, the amount of revenue raised would probably be adequate to cover a number of other stormwater-related expenses, including O&M costs and selected capital improvements.
3. At higher rates, revenues may be sufficient to fund most aspects of a community's stormwater program.

These findings are generally consistent with other communities across the country. While NPDES requirements are often the impetus for enacting stormwater fees, communities find that they are adequate to allow them to go beyond minimum compliance and help fund other needed projects.

Reallocation of Stormwater Costs

One of the more attractive aspects of stormwater utility fees, at least to municipal officials, is the prospect of creating a revenue source in which all property owners contribute relative to their impact on the stormwater system. Unlike property taxes, stormwater fees are typically levied on properties owned by non-organizations, public entities and other normally tax-exempt organizations – thus capturing additional revenue and potentially reducing the burden on other property owners. Depending on how fees are structured, they generally have the effect of reallocating the costs of financing stormwater management efforts from residential properties to other sectors.

Without collecting large amounts of local data, it is not possible to accurately predict the extent to which adoption of stormwater fees would serve to reallocate stormwater costs within ISWG communities. A study conducted as part of development of a stormwater field in Marshfield, Wisconsin (population 20,000) compared how much respective sectors pay for stormwater management under the current tax system and under a proposed stormwater fee system. These results are summarized in the following table.

Table 5: Projected Reallocation of Costs in Marshfield, Wisconsin

Sector	Under Current Tax System	Under Proposed Stormwater Fee System
Residential	61%	28%
Commercial	33%	39%
Industrial	6%	12%
Tax Exempt	0%	19%
Other lands	0%	2%

It is worth noting that these projections are based on a city with a considerable amount of non-residential property, including many tax-exempt organizations.

The extent to which stormwater fees have potential to reallocate costs is largely dependent on how the fee is structured and how much developed property is owned by different sectors. In the Greater Portland area, for instance, there is considerable variation in how much developed is owned by tax-exempt organizations. In most instances, larger communities such as Portland, South Portland and Westbrook have the greatest proportion of tax exempt property, as well as other non-residential development. In some instances, however, small communities are home to large tax-exempt institutions – such as the University of Southern Maine in Gorham – that would serve to considerably shift burdens under a stormwater fee system.

Table 6: Rough Estimate of Additional Revenue Raised for Different Amounts of Tax-Exempt Properties*

Acres of developed property	Est. of Impervious Acreage (50% coverage)	Est. Area Impervious Surface (in sf)	Number of ERUs@ 2,500 s.f. per ERU	Est. Amount of Revenue Raised Annually
1000	500	21,780,000	8,712	$313,632
500	250	10,890,000	4,356	$156,816
400	200	8,712,000	3,485	$125,453
300	150	6,534,000	2,614	$94,090
200	100	4,356,000	1,742	$62,726
100	50	2,178,000	871	$31,363
50	25	1,089,000	436	$15,682
25	12.5	544,500	218	$7,841

*Assumes at $3/monthor $36 per year per ERU.

5. NEEFC OBSERVATIONS

In evaluating stormwater fee options, the staff of the New England Environmental Finance Center (NEEFC) has focused on providing an objective analysis of pros and cons. In researching this topic, however, it is difficult not to form impressions and opinions regarding the merits of different options and how the approach might be best adapted in Maine. While NEEFC staff views its primary role as one of providing neutral analysis to the ISWG, it sees merit in offering the group some observations regarding the development of user fees, some which are value-laden. Below are eight such observations.

1. No public approval – no stormwater fee.

In trying to fashion the best stormwater fee approach, it is always helpful to keep political acceptability in mind. The idea of *any* new fee will be looked at suspiciously by a significant segment of Maine's citizenry, and new fees to deal with *stormwater*— an issue that is just emerging on the public's radar screen – will be a particularly hard sell. Even as different options are considered on their technical merits, discussion should be tempered by how the approach might "play in Peoria" – or in this case, in places such as West Freeport, North Gorham, Stoudwater or Pride's Corner.

2. A "transparent" process and product may be particularly important in Maine

Compared to some of the larger U.S. cities that have developed fairly sophisticated stormwater fee systems, local government in Maine – even in some of its more populated communities – has a folksy, small-town feel to it. What might pass muster in a city of 1 million may not get very far in Maine. Citizens generally know that, individually or in groups, they can wield a considerable amount of influence on town affairs, and they demand a high degree of transparency in their communities' decision-making processes and policies they can clearly understand. If a proposed fee structure contains a methodology for estimating impervious surface area, you can be assured that a certain percentage of citizens will go out on their lot with a tape measure to see if the estimate is accurate. Knowing this, many public officials – even those who generally support the concept of a stormwater fee – are likely to lead cautiously, trying to get sense of the public's sentiment. In this type of environment, a premium will be placed on a creating a clear, open process for deliberation of user fees, and the development of a proposal that is easy to explain and defend.

3. Identifying clear public benefits is helpful

Among the insights of those who have successfully implemented fees is the observation that citizens are much more willing to pay for something when they can see a tangible benefit. Stormwater management, unfortunately, can sometimes seem like an invisible service, especially to a public that has not been made better aware of its aspects. The "Think Blue" PR campaign is excellent because it begins to form in the public's mind the cause and effect relationship between human activities and polluted runoff. Interestingly, the ads all focus on flows into *stormdrains* – an infrastructure element that most people are aware of. The down side of this approach is that sends the message that stormwater management is not really an issue for the resident whose road is not served by the storm drain system. The challenge of showing rural residents (not regulated by NPDES) clear benefits is further discussed in Observation #5 below.

4. "Unfunded government mandate" sales pitch only goes so far

The federal NPDES program is a primary impetus behind our discussion of stormwater fees, and the temptation is strong to use the "unfunded mandate" argument in trying to gain public acceptance. A number of experienced stormwater utility advocates caution against this approach. For one thing, fees typically bring in revenues that exceed the funds needed to implement NPDES II (unless very minimal fees are adopted). These additional revenues can be used to shift stormwater- related expenses from the General Fund to the dedicated stormwater fund. Although the latter benefit can be used in building public support, it should be used with caution as well. General fund support of stormwater program has often resulted in the later being chronically unfunded with significant deferred capital and maintenance needs. Once a dedicated funded source is created with establishment of a stormwater utility, a tendency exists for stormwater-related expenditures to go up. Consistent with observation #3, most experts believe user fees should be should primarily sold on their benefits to the community.

5. The issue of geographic coverage is a challenging one

One can make a strong argument that if user fees are to be implemented, all properties owners in a community should pay into the system, since all lands (with a few exceptions) have stormwater impacts. But as far as actually getting a user fee system adopted, applying it to rural areas may be a tough sell.

- Whereas property owners in urbanized areas can actually see stormwater infrastructure and be informed about costs involved in maintaining and improving it, rural owners are less likely to understand how the fee benefits them.
- For areas already served by sewer and water, owners are generally in the habit of periodically paying water and sewer fees – and they may not strongly object to paying several additional dollars a month (if they are clearly informed of why it is needed). It is harder to picture rural residents readily accepting a new billing from the town for stormwater.

While the approach of, at least initially, getting a fee system in place for urbanized areas regulated under NPDES has tactical merit, it may be viewed as a penalty levied against people who choose to live in-town as opposed to the country – and therefore "anti-smart" growth. For these and other reasons, this consideration will be an especially challenging for ISWG to grapple with.

6. The flat fee approach for residential classes has some distinct advantage

Many communities with stormwater fees use a flat residential rate because:

- There is relatively small variation in impervious surfaces between residential properties, at least compared to non-residential properties;
- Since residential properties typically comprise more than 80% of total properties, treating this as a flat rate class greatly simplified data collection requirements and overall administration;
- The approach has been upheld in legal challenges – when the community uses accurate sampling to determine an average amount of impervious surface for a residential property (and establishing it as *the equivalent residential unit or ERU*) and uses this unit as the basis for assessing fees on non-residential properties.
- For communities that do have tiered residential rates (e.g. small, medium and large), the variation in monthly rates is relatively small – i.e $3 versus $4.50 versus $6 – which again begs the question of whether the additional revenue is worth the trouble of creating tiers.

Although the main argument for a tiered residential rate is that it is more equitable, the real question is whether this additional degree of equitability is necessary given the relatively small variations in likely fees for different classes, the relatively narrow range of impervious area typical for residential uses, and the resulting need to collect a substantial amount of new data and administer a more complex system. If equity were the only goal, there are plenty of additional refinements that one might consider regarding different non-residential uses or factoring in water quality issues – but the goal of simplicity and transparency are counterbalancing considerations.

Ultimately, consideration of a tired residential approach may be mostly a political one. In some communities, the few dollars difference in monthly fees between a "small" and "large" residential property may be needed to gain public support. If this is the reality (as opposed to the perception), the focus should be on keeping the tiered system as simple as possible, rather than creating lots of classifications that tend to split hairs.

7. Lot-size-based fees are alluring, but…

Some communities use lot sizes as the basis or in creating their fee structures. The primary benefit of using parcel size is that it is information that is often readily available to the community. The argument can also be made that, in general, the larger a parcel's land area, the more water runs off the property during storm events, increasing overall impacts. The weakness of this approach is that it gives no consideration to the whether the site is undeveloped, and to its ability to absorb or attenuate storm flows based on extent of imperviousness or other factors.

To partially address this weakness, some fee structures use lot area in conjunction with coefficients aimed at accounting for the typical amount of development for different land use classifications. This approach may provide good correlation with actual impervious surface for small parcels, but the use of a constant factor of all residential properties (typically .25), overestimates impervious surfaces for larger parcels. Actual studies show actual percentages of impervious areas drops at a fairly constant rate as lot area increase.[1] For these and other reasons, actual measurement of impervious surfaces is the method of choice by many "experts" in this field and by the majority stormwater utilities – despite the extra work involved in mapping impervious areas.

8. Trying to cover all stormwater-related may make fees too high

The textbook approach to setting user fee rates is to identify what stormwater-related expenses are to be covered, and then determine how much the customer base needs to be charged to meet this level. While this ultimately may be the "official" methodology in establishing fees, at the front end of the process there may be some benefits in doing this approach in reverse – figuring out how much revenue will be raised under several different fee scenarios. Otherwise, communities could find themselves backed into a corner of proposing fees that are much higher than the public is willing to pay – at least initially. For a community with 8,000 households and a typical amount of non-residential properties, a $3 per month fee may bring in between $450-550K annually. Knowing this, the community can make decisions about the extent to which existing and future stormwater expenses will be funded by the fees.

[1] As an example, consider two residential properties: one a 10,000 square foot lot with 2000 feet of impervious surface and the other a 5-acre lot with 4,000 square feet of impervious surface. Applying a .25 "intensity of development" factor, the impervious surface estimate for the first lot would 2,000 square feet – right on the money; but for the second, the estimated impervious surface would be 1 acre – way off the mark. Even accounting for the longer driveways typical of rural residential lots, this approach can grossly overstate imperviousness.

6. CASE STUDIES

The table below provides some basic information on 10 (of the more than 400) communities in the country with stormwater utilities. Detailed case studies are provided for communities whose name is underlined and can be quickly accessed by clicking on the community name. These cases studies have been excerpted from *An Internet Guide to Stormwater Financing*, a website developed by the Center for Urban Policy and the Environment at Indiana University-Purdue University Indianapolis. Unabridged version and other case studies may be found at the website: http://stormwaterfinance.urbancenter.iupui.edu/.

A SAMPLE OF COMMUNITIES WITH STORMWATER FEES

Municipality	Pop.	Land Area (sq. miles)	Fee Enacted	Organization	Fee Structure Type	Avg. res. monthly charge	Annual revenues
Union, OH	6,400		1997	Part of Public Works Dept.	Flat residential and non-residential	$3.00	$72,000
Valparaiso, IN	25,000	10	1998	Dept. of Stormwater Management	Res: Flat Non-res: Tiered	$3.00	$520,000
Washington, NC	9,583	6.5	2002	Part of Public Works Dept.	Res: Tiered Non-res. Tiered	$3.00	$360,000
Takoma Park, MD	17,299	2.1	1996	Part of Public Works Dept.	Res: Flat Non-res: Variable	$2.00	$200,000
Marshfield, WI	18,800	12.7	Proposed	Part of Public Works Dept.	Res: Flat Non-res: Variable	$5.50 proposed	$1.4 million estimated
Griffin, GE	25,500	15.5	1999	Stormwater Dept.	Res: Tiered Non-res: Variable	$2..95	$1.2 million
Arvada, CO*	102,153	57	2001	Part of Public Works and Utilities Dept.	Variable – All classes	$4.00	$2.1 million
Greeley, CO	76,930	29.9	2002	Separate Stormwater Division	Res: Variable Non-res: Variable	$3.75	$2.4 million
Olympia, WA	42,514	16.7	1986	Part of Public Works Dept.	Res: Tiered Non-res: Variable	$6.00	$2.5 million
Fort Collins CO	118,652	46.5	1980	Within Utilities Dept.	Variable all (complex)	$7.44	$5.6 million

UNION, OHIO

Union is a small city in Southwest Ohio that is 15 miles north of Dayton. The city is a predominantly residential community with approximately 6,400 residents. The community's proximity to Dayton and its low cost of living have made it a fast-growing community where 40-60 new homes are being built each year. Union has no income taxes, lower than average property taxes, and low utility rates that are made possible by the city's small, efficient government system. Union has the smallest number of city employees of any city of its size in Ohio.

Stormwater Management History

In 1987, a storm washed out an important road in the community and the idea of starting a stormwater utility fee to fund the maintenance and repair of the storm drain system was presented to the City Council and to the public. No one objected to the new charge because everyone in the small community had suffered the effects of the failing stormwater system and seen the damage stormwater had done to their community. The City Council passed Ordinance 794 quickly and the City of Union became one of the only cities in Ohio with a stormwater utility fee.

Stormwater Program Organization and Responsibilities

The stormwater program is organized under the city Department of Public Works and the department's seven hourly employees perform most of the stormwater program's responsibilities. The public works employees are mainly responsible for the operation and maintenance of the city's storm drain system but they also work on capital improvement projects and new storm drain construction. The employees clean out the catch basins twice a year and have completed several large projects since 1987 to correct problems in the old storm drain system and increase its capacity to handle new development.

Rate Structure

Union considered two types of fee systems: a system based on the number of square feet of impervious area on each property and a three-tiered system of flat rates based on property type. The impervious area- based rate system was judged to be too labor intensive for the small city's staff to implement so the city chose to use flat rates for residential, commercial, and industrial properties. Union city officials observed that the city was 95 percent residential and most lots had similar amounts of impervious area so the flat fee system was determined to be the most appropriate rate structure for their situation. The three-tiered rate structure of Union's stormwater utility fee currently charges its residential customers $3 a month, its commercial customers $6 a month, and its industrial customers $9 a month. The bills are sent out with the city water and sewer bills monthly. The stormwater utility fee rate structure has no credits or exemptions.

Table 1: City of Union Stormwater Utility Rate Structure

Property Classification	Stormwater Charge
Residential	$3.00 per month
Commercial	$6.00 per month
Industrial	$9.00 per month

Basis for Charges

The stormwater charges are based on a cost assessment that was done during the research phase of the utility project that took into account current and future operation and maintenance costs, capital improvements, staffing, and other budget considerations. The cost assessment results indicated that the community would require $4 or $5 a month from its residential customers but the charge was reduced to $3 by the city council in order to make the charge more acceptable to the public. The council planned to leave the rate low until residents saw the benefits of the improved stormwater system and then raise the rates at a later date to fund additional improvements. The rate has not increased since the fee's inception in 1987, but the rates may increase soon in order to fund water quality programs required by Phase II of the EPA's NPDES permit requirements.

Utility Budget

Stormwater fees produce around $72,000 each year in revenue. The city's estimated budget for stormwater service for the year 2000 is $75,300 (See Table 2). The revenue generated by the stormwater utility fees does not cover the costs of large capital improvement projects but it is used to back bonds and supplement grant funding received from the state. The stormwater utility budget currently allocates approximately $12,600 from its budget to match grant funds and $10,600 as debt service. The City of Union's stormwater program is currently receiving assistance from two Ohio Issue II grants that total approximately $98,000 for major infrastructure construction projects. The grant money will fund the replacement of two culverts that frequently back up and cause street flooding. Union does not have any impact fees levied on new development but requires developers to make any necessary improvements to the storm drain systems that the development will use in order to receive approval for the plans.

Table 2: City of Union Stormwater Utility Budget

Expenses	**Amount Budgeted**
Personnel	$35,047
Maintenance and Materials	$8,950
Debt Service	$8,695
Rentals (Including a portion of the lease payments on drain cleaning, equipment used by water, sewer and stormwater	$8,048
Land and Improvements	$7,160
Professional and Contract Services	$5,000
Miscellaneous	$2,400
Total	**$75,300**

Public Education

The City of Union does not have an active public education program. The city's population is small and the city's boundaries only encompass an area of about four square miles so the improvements that the stormwater utility fee has made possible are readily apparent to the small community. The City of Union initially had a public education program to educate its residents and prepare them for the new charges that would appear on their water and sewer bills but the program ended shortly after the stormwater utility began charging residents for stormwater services.

VALPARAISO, INDIANA

Valparaiso is located approximately 50 miles east of Chicago and about 15 miles south of Lake Michigan. The city has about 25,500 residents. The city receives an average of 39 inches of precipitation and 47 inches of snow each year.

Stormwater Management History

Prior to the establishment of a stormwater utility, there were no funds available for drainage problems. When drainage problems arose, the funds to address them were borrowed from the street department or the sewage utility. New drainage projects were rare unless they were part of a street or highway project.

Utility Creation

The City Engineer received several drainage complaints in 1996 after mild rainstorms and he prompted the Mayor to investigate the possibility of a stormwater utility. The mayor presented the issue to the Common Council for discussion and the council passed an ordinance in October of 1996 that established a Department of Stormwater Management. The department was charged with the task of investigating the city's drainage problems and developing criteria to rank the proposed projects. The Board of Directors of the new department also researched the stormwater utilities of other communities in order to decide on what type of rate structure and billing system should be used. The Engineering Department prepared a list of drainage complaints and cost estimates for each proposed project and began using aerial photography to determine the average amount of impervious area contained on a single-family lot.

The Board of Directors of the Department of Stormwater Management recommended a user charge system with six classes, recommended appropriate fees for each class, and presented their recommendations to the public in hearings and other meetings within the community. There was little opposition from community members so the proposed user charge system was presented to the Common Council and passed in the spring of 1998.

Utility Responsibilities

The Department of Stormwater Management is responsible for the collection, disposal, and drainage of storm and surface water in Valparaiso. Those duties are prioritized by the Board of Directors and carried out primarily by staff in the City Engineer's office. As part of the Gary/Hammond metropolitan area, the City of Valparaiso is currently on a "maybe" list for the EPA's Phase II NPDES stormwater regulations and the stormwater department will perform duties related to Phase II if the city is informed that it has been included in those requirements.

Utility Organization

The Valparaiso Department of Stormwater Management consists of a Board of Directors appointed by the Mayor. The Board has three members, of whom only two can be members of the same political party. The Department of Stormwater Management has no paid positions. The Department of Stormwater Management funds two-thirds of an engineer's position within the

City Engineer's office and reimburses other city departments for labor on stormwater management projects. Stormwater utility bills are sent using the water department's billing service.

Rate Structure

The City of Valparaiso established a six-class rate structure. Single-family homes are Class 1 and apartment units and mobile homes are Class 2. Non-residential sites are classified into four categories based on the number of square feet of impervious area on the parcel. A flat rate of $3.00 per month was established for single-family homes. The other five classes are charged a multiple of the single-family home rate based on the number of square feet of impervious area on the property (See Table 1).

Class	Class Description	Multiplier	Rate Per Month
1	Single-Family $3.00	1	$3.00
2	Apartment Units and Mobile Homes	.75	$2.75
3	Non-Residential < 10,000 Square Feet Impervious Area	1	$3.00
4	Non-Residential 10,000 – 40,000 Square Feet Impervious Area	4	$12
5	Non-Residential 40,000 – 160,000 Square Feet Impervious Area	16	$48
6	Non-Residential > 160,000 Square Feet Impervious Area	32	$96

Credits and Exemptions

Credits can be requested by any stormwater utility customer by obtaining a credit application and submitting it to the Board of Directors with the appropriate application fee. Single-family, apartment, and mobile home customers must submit a $25.00 application fee and non-residential customers must submit a $100.00 application fee. Credit applications are reviewed by the Board within three months and customers receive a written response to each request.

Stormwater Utility Budget

Valparaiso received nearly $520,000 in user charge revenue in 2000. Almost 70% of that revenue came from the single-family, apartment unit, and mobile home customers who make up over 90% of the utility's customer base. The stormwater utility's revenue pays for a portion of an engineer's position in the City Engineer's office and the remaining funds are deposited into the utility's expense accounts to cover costs approved by the Stormwater Management Department's Board of Directors.

Public Information

Valparaiso does not have an ongoing public education program at this time. The Stormwater Management Department holds public meetings to discuss proposed projects and takes those opportunities to educate the public about the activities of the department and receive feedback from residents on the utility. The community is small and most stormwater management projects are readily apparent to the community so there is little need for an ongoing public education program to call attention to the stormwater utility's accomplishments.

GRIFFIN, GEORGIA

The City of Griffin is located in west-central Georgia about forty miles south of Atlanta. The city's population is approximately 25,000 people. The city encompasses a 15.5 square mile area and it is the county seat of Spalding County. The city is part of the Atlanta Metropolitan Statistical Area but its population has remained fairly stable over the past decade.

Stormwater Management History

Griffin began the process of establishing a stormwater utility in the mid-1990's. The city had several reasons for establishing a utility including a deteriorating stormwater system, flooding problems, a lack of drainage in some areas of the city, unplanned channels created by stormwater, and the onset of Phase II of the EPA's NPDES stormwater permit system. The city's administration, led by the mayor, the director of public works, and the city commissioners, decided to be proactive with regards to the NPDES Phase II permit requirements and began to investigate the idea of a stormwater utility. The City of Griffin hired two consulting firms with considerable experience in setting up stormwater utilities and obtained assistance from the members of the Florida Association of Stormwater Utilities.

The combined experiences of the consulting firms and the Florida stormwater professionals resulted in a well-designed program. The City of Griffin spent $180,000 on the planning of its stormwater utility and did background research for four years until they had designed a system that would withstand legal challenges and be acceptable to the public. During the research phase, the City of Griffin mounted a large-scale public education program to reduce opposition to the stormwater utility project and demonstrate the need for additional stormwater management funding. In 1997, Griffin's Board of Commissioners enacted the ordinances that established the stormwater utility and its rate structure and the City of Griffin became the first community in Georgia to have a stormwater utility.

Stormwater Program Organization

The City of Griffin's stormwater program, which is funded by the utility fee, is a separate department from the Department of Public Works but both share the same director. The program has a staff of around fifteen people with the majority of them working in the field full-time to correct stormwater problems and maintain the stormwater system. The department has two fulltime environmental technicians and a GIS technician to assist with the mapping and master planning efforts. The stormwater program also has its own administrative assistant.

Stormwater Program Responsibilities

The city's stormwater management program began with several environmental and organizational goals in mind. The city wanted to reduce flooding, improve water quality, decrease the pollutant loads entering the city's bodies of water, improve wildlife habitats, and reduce erosion and sedimentation problems. The city also wanted to be prepared for Phase II of the NPDES stormwater permit system and increasingly stringent state water quality standards. The program made significant progress toward its goals in its first several years of operation. Griffin implemented a GIS/GPS system and mapped out the city using aerial photography. The city's staff created a hydrologic modeling system, assessed the needs of each of the city's six

major drainage basins, wrote a master plan for capital improvements, and enacted a comprehensive land use plan.

Rate Structure

Griffin has two residential property classes and one non-residential property class in its rate structure. Single-family parcels are classified based on the number of square feet included on the parcel. Single-family residential properties that have a total area of more than 1600 square feet are classified as large and charged $2.95 per month for stormwater service. Single-family parcels with a total area of less than 1600 square feet are classified as small and charged 60% of the large residential parcel rate, or $1.77 per month. Non-residential properties are charged $2.95 per month for each equivalent residential unit (ERU) on their parcel (See Table 1). The ERU was calculated using aerial photographs and digital maps to determine the average amount of impervious area on a single-family residential parcel. One ERU is equal to 2200 square feet.

Table 1: Utility Rate Structure

Property Classification	Fee Methodology	Fee
Undeveloped property and railroad rights-of-way	Exempt	0
Small Single-Family Residential Parcels (<1600 square feet)	60% of rate for one ERU	$.1.77/month
Large Single-Family Residential Parcels (>1600 square feet)	100% of the rate for one ERU	$2.95/month
Non-residential parcels Area of parcel/one ERU x rate for one ERU	Impervious area of parcel/2,200 (size of one ERU) x rate	$2.95 per ERU/ month

Credits and Exemptions

The City of Griffin does not have any exemptions for developed parcels within the stormwater service area. Undeveloped land and railroad rights-of-way are the only properties that are not liable for stormwater service fees. The city even charges itself for city-owned developed property and city streets, making the city its own largest stormwater service customer.

Peak Flow Reduction Credits

The stormwater utility fee has two types of credits available. Non-residential customers and groups of homeowners such as neighborhood associations can apply for a peak flow reduction credit of up to 50% for onsite stormwater control facilities. All peak flow reduction credit applications must be completed by a certified public engineer that is registered to practice in the State of Georgia and inspected by the stormwater department before the credit is approved to ensure that all of the control equipment is installed properly and the system is being adequately maintained.

Education Credit

The Griffin stormwater utility fee also has an education credit that is available to public and private schools in the stormwater service area that have 1,000 or more students in their system. The credit offers up to a 50% reduction in the schools' stormwater charges for teaching the Water Wise program to students. The Water Wise program teaches children about the

importance of water resources and how they can help to improve water quality in their communities.

Stormwater Program/Utility Budget

Griffin's stormwater user fees amount to approximately $1.2 million dollars each year. Approximately 80% of the utility's user fee revenue is from non-residential customers. The remaining 20% comes largely from the large residential customers with small residential parcel revenue amounting for less than 1% of the utility's total revenue. The user fees are spent on mainly on stormwater administration and operations. The program's largest expenses are for capital outlays, personal services and benefits, and purchased and contract services.

Table 3: Griffin, Georgia Stormwater Utility Audited Expenses, Fiscal Year 1999 and Projected Expenses, Fiscal Year 2000

Expenditure	Audited Expenses, 1999	Project Expenses, 2000
Personal Services and Benefits	$265,184	$417,300
Purchased and Contracted Services	$236,901	$465,341
Supplies	$133,429	$139,010
Capital Outlays	$343,001	$2,393,330
Other Financing Uses	$80,400 -	$80,400
Debt Service	$18,659	$38,579
Other Costs	$944	$944
Total	**$1,077,574**	**$3,519,135**

Public Information

Initial Program

Griffin's stormwater management public information campaign has been very successful in educating the public about stormwater problems. Stormwater program officials spent a year and a half holding public hearings, doing presentations, sending out pamphlets, writing newspaper articles, and advertising throughout the city to educate the public and get support for the utility project before it became a reality. The public works director of Griffin involved the city's most prominent leaders and gained their valuable support early in the program's development to make sure that the city's leadership understood the scope of the problem and the reasons that a stormwater utility fee would be a valuable addition to the community. The city's leaders then used every form of media available to them and conducted meetings wherever they were accepted to speak. There was little vocal opposition to the stormwater utility fee and the City Commission passed the ordinances that established it in the summer of 1997.

Ongoing Program

The City of Griffin's stormwater program has kept its intensive public education program going strong since the establishment of the utility fee. Several newspaper and journal articles have been published about the utility fee, giving the small city national attention. The program has also kept the residents of Griffin involved by posting current construction projects and other information about the stormwater department on their website (http://www.griffinstorm.com), sending out brochures and newspaper inserts on the projects the utility fee has paid for.

FORT COLLINS, COLORADO

Fort Collins is located at the base of the Rocky Mountains between Denver, Colorado and Cheyenne, Wyoming. The city's population is currently approximately 109,000 residents and the area is one of the fastest-growing metropolitan areas in the country. Fort Collins is a historically flood-prone city that experiences intense storms during the summer months. The city averages about 14 inches of rain each year and 51 inches of snow.

Stormwater Management History

The Fort Collins stormwater utility fee was adopted by the Fort Collins City Council in 1980. The new utility fee allowed Fort Collins to consolidate its stormwater management efforts into one department. The department was charged with the operation and maintenance of the city's storm drain system and the development and implementation of a capital improvements program.

The stormwater utility fee was vigorously promoted by the Fort Collins City Council. Council members realized that the city's stormwater system was in critical condition. Before the establishment of the stormwater utility fee, there was no staff or funding available to respond to drainage system problems reported by residents and the city was undergoing rapid development without a capital improvements budget that was able to keep up with the city's stormwater management needs.

Stormwater Program Responsibilities

The City of Fort Collins Stormwater Department is responsible for the maintenance and repair of the city's storm drain system, improving water quality in the city's twelve basins, and reviewing development plans to ensure that all new construction within the city adheres to the design standards for stormwater and flood control. The department is also responsible for master planning for each of the city's basins, floodplain management, and the design and construction of stormwater capital improvement projects.

Stormwater Program/Utility Organization

The stormwater program is part of the Fort Collins Utilities department that is responsible for the city's light and power, water, wastewater, and stormwater utilities. The stormwater program shares some of its staff with the water and wastewater utilities but each program has its own primary staff and budget. The stormwater program employs approximately 25 full-time equivalent employees.

Rate Structure

The Fort Collins stormwater utility fees are based on the runoff coefficient of the property, the area of the parcel, the drainage basin the parcel is located in, and an onsite detention reduction factor (when applicable). The fee for each parcel is calculated by multiplying the runoff coefficient, the on-site detention reduction factor (when applicable), the basin fee base rate, and the gross area of the parcel.

Basin Fee = (runoff coefficient) **x** (on-site detention reduction factor) **x** (basin fee base rate) **x** (area)

Runoff Coefficients

The runoff coefficient of each parcel is calculated using the percentages of pervious, semipervious, and impervious areas of the parcel in the following formula, known as the rational method:

C = (% impervious area) **x** (0.95% pervious area **x** 0.20) + (% semi-pervious area **x** 0.50)

Impervious areas are those surfaces that do not absorb stormwater including paved surfaces and buildings. Semi-pervious areas are surfaces like gravel that can absorb some stormwater but absorb it slowly. Pervious surfaces are surfaces that absorb stormwater under normal conditions. Pervious surfaces include lawns and undeveloped properties. The runoff coefficients for each property are categorized by intensity of development into five categories. Each category is assigned a rate factor to use in the calculation of the stormwater utility fee (See Table 1).

Table 1: Fort Collins Development Categories and Rate Factors

Development Category	Runoff Coefficient	Range Rate Factor
Very light	0- 0.30	0.25
Light 0.40	0.31- 0.50	0.40
Moderate 0.60	0.51- 0.70	0.60
Heavy 0.80	0.71- 0.90	0.80
Very heavy 0.95	0.91- 1.00	0.95

On-Site Detention Reduction Factor

The on-site detention reduction factor allows stormwater utility customers to get a reduction in their monthly stormwater bills by installing on-site stormwater controls. The factor is calculated using a nomograph that uses the volume of stormwater detention provided by the on-site control system and the property's runoff coefficient (See Figure 1). The nomograph was developed using the unique characteristics of the Fort Collins area's drainage basins and the city's design standards for stormwater management. Nomographs for other cities would vary with different topography and design criteria.

Basin Fee Base Rates

Customers in each drainage basin are charged differently based on the needs of their basin as identified by the basin master plans. The basin fees range from a low of $2,175 per gross acre to $10,000 per gross acre (See Table 2). Two of the basins, Boxelder Creek and Cooper Slough, do not have base rates at this time.

Table 2: Fort Collins Drainage Basin Base Fees per Gross Acre

Drainage Basin	Fee per Gross Acres
Foothills	$6,525
Fox Meadows	$6,468
McClelland/Mail Creek	$3,717
Spring Creek	$2,175
Canal Importation	$6,181
Dry Creek	$5,000
West Vine	$7,004
Evergreen/Greenbriar	$10,000
Fossil Creek	$2,274
Old Town	$4,150
Average	**$5359.40**

Base Utility Rates

The stormwater utility fee base rates are currently $0.0006831 per square foot per month for operations and maintenance and $0.0012820 per square foot per month for capital improvements. The monthly operations and maintenance fee for each parcel is calculated by multiplying the parcel's area by the runoff coefficient rate factor and the operations and maintenance base rate.

The monthly capital improvement fee is calculated by multiplying the parcel's area by the runoff coefficient rate factor and the capital improvements base rate. Single-family parcels with an area of greater than 12,000 square feet have their base rates calculated differently than the other types of parcels. Single-family parcels larger than 12,000 square feet are charged using the above formulas for the first 12,000 square feet and then are charged one-fourth of the regular rate for all. Any parcel in the Fort Collins stormwater utility service area is sixty-two cents per month.

Example:
A single-family residential parcel with an area of 14,000 square feet and a runoff coefficient rate factor of 0.40 (light) would pay $3.42 as the monthly base rate for operations and maintenance and $6.41 as the monthly base rate for capital improvements.

1) Calculate the base rates for the first 12,000 square feet.
O&M base rate = 12,000 ft2 x 0.40 x $0.0006831 = $3.28
CIP base rate = 12,000 ft2 x 0.40 x $0.0012820 = $6.15
2) Calculate the base rates for the remaining 2,000 square feet.
O&M remaining base rate = 2,000 ft2 x 0.40 x $0.0006831 x 0.25 = $ 0.14
CIP base rate = 2,000 ft2 x 0.40 x $0.0012820 x 0.25 = $0.26
3) Add the base rate components together
O&M rate = $3.28 + $0.14 = $3.42
CIP rate = $6.15 + $0.26 = $6.41
Credits and Exemptions

Fort Collins stormwater utility customers are able to obtain on-site detention reduction credits as described above in the rate structure discussion. City streets and railroad rights-of-way are exempt from stormwater charges. Properties that have a total impervious area of less than 350 square feet of the total parcel's area are also exempt from stormwater charges.

Stormwater Program/Utility Budget

The Fort Collins stormwater management program budget for the year 2000 shows revenue of $5,625,140 from utility fees, $800,000 from development fees, $725,000 from earnings on investments, and $7,250 in miscellaneous revenue (See Table 4). The stormwater utility also issues revenue bonds to pay for larger projects. The utility issued $19.98 million in revenue bonds in 1999.

Table 4: Fort Collins Stormwater Utility Revenue, 2000 Budget

Revenue Source	**Amount**
Monthly User Fees $5,625,140	$5,625,140
Development Fees $800,000	$800,000
Earnings on Investments $725,000	$725,000
Miscellaneous Revenue $7,250	$7,250
Total $7,157,390	**$7,157,390**

Public Information

The City of Fort Collins stormwater management program maintains a website, sends information concerning the stormwater program to residents, offers presentations to the community, and funds a watershed education program in the area school systems to educate the public about the need for stormwater and flood management.

7. APPENDICES

APPENDIX A: ON-LINE RESOURCES

GENERAL

An Internet Guide to Stormwater Financing, Center for Urban Policy and the Environment at Indiana University-Purdue University Indianapolis. http://stormwaterfinance.urbancenter.iupui.edu/

Establishing A Stormwater Utility, Florida Stormwater Association. http://www.florida-stormwater.org/manual/sitemap.html

How to Create A Stormwater Utility, Pioneer Valley Planning Commission. http://www.pvpc.org/docs/landuse/storm_util.pdf

SELECTED READING

From Stormwater Magazine

Woolson, Eric. "Stormwater Utilities: Where Do They Stand Now?" http://www.stormh20.com/sw_0409_stormwater.html

Kasperson, Janice. "The Stormwater Utility: Will it Work in Your Community," http://www.forester.net/sw_0011_utility.html

Busco, Dan and Linsey, Greg. "Designing Stormwater User Fees: Issues and Options," http://www.forester.net/sw_0111_designing.html

Keller, Brant. "The Critical Elements to Success of Stormwater Utilities," http://www.forester.net/sw_0205_public.html

Shuuford, Elizabeth K., Whalen, Andrew J., and Cyre, Hector, J. **"**Stormwater Utility Passes Legal Test in Georgia." http://www.forester.net/sw_0405_stormwater.html

Reese, Andy. "Stormwater Paradigms," http://www.forester.net/sw_0107_stormwater.html

Other articles/reports

Cyre, Hector J. "The Stormwater Concept in the Next Decade." EPA National Conference on Tools for Urban Watershed Management and Protection, Conference Draft, 2000. http://www.epa.gov/ORD/WebPubs/nctuw/Cyre.pdf

Stormwater Rate Study, City of Marshfield (Wisc) March 2004. http://ci.marshfield.wi.us/pw/SW/Rate_Study.pdf

SELECTED MUNICIPAL WEBSITES

Griffin, Georgia	http://www.griffinstorm.com/
Arvada, Colorado	http://www.ci.arvada.co.us/2.cfm?div_ID=264
Sanford, Florida	http://www.ci.sanford.fl.us/storm.pdf
Rochester, Minnesota	http://www.ci.sanford.fl.us/storm.pdf
Washington, North Carolina	http://www.ci.washington.nc.us/stormwater_faq.aspx
Yakima,Washington	http://www.ci.yakima.wa.us/services/stormwtr/F4Fee_cities.pdf
Takoma Park, Maryland	http://207.176.67.2/finance/documents/swques.html
Bellingham, Washington	http://www.cob.org/cobweb/pw/drainage/

Wilson, North Carolina
http://www.wilsonnc.org/Departments/PublicServices/StormWater/fee.asp

Thurston County, Washington
http://www.co.thurston.wa.us/wwm/stormwater%20pages/stormwaterrates.htm

APPENDIX B: EXAMPLE OF POSSIBLE RECOMMENDATION FROM ISWG

Below is an example of how a recommendation from the Interlocal Stormwater Working Group might look. While it does reflect some of the discussion the group has had to date on several considerations, it is offered primarily as a framework for how ISWG's discussions and decision-making could be given shape prior to meeting with political leaders.

User Fee Structure/Start-up Approach

Option A: Enact a simplified fee structure, within the next 6 months after short outreach campaign. After successful adoption, begin to develop a strategy for implementing more refined comprehensive system in the future, coupled with a significant public education/participation campaign. The simplified fee approach would likely a fixed rate for all residential properties and tiered rate for 2 or 3 non-residential classes based on approximate size of impervious surfaces (i.e. Valparaiso, Indiana).

Option B: Take the time necessary to start with a more refined approach with a full-blown public outreach program on the front end. Aim for fee adoption sometime in 2006. Recommended fee structure would be either flat rate residential with variable rate for non-residential (establishing a base unit such as an ERU), or a similar approach that incorporates several residential "tiers."

Approach to Multi-family Units

Option A: Treat multi-family buildings similar to non-residential properties, in which the fee is based on total impervious area or the number of ERUs on the entire property. For rental units, the bill would be sent to the property owners; for condominium units the bill could either be sent to the homeowners association or to individual owners.

Option B: Charge multi-family units a fraction of the typical rate of the single-family rate, e.g. if a single-family property (considered 1 ERU) is charged $3 a month, charge each multi-family units, the equivalent of .6 ERUs, or $1.80 per month.

Data Collection/Methodology

If Start-up Approach Option A is chosen, initial data collection would involve rough classification of non-residential properties within two or three groupings based on amount of impervious surfaces on site (e.g. < 10,0000 sf; 10,000-40,0000 sf and >40,000sf). Properties could be classified by reviewing assessment records, building permits, aerial photos, etc.

If Start-up Approach Option B is chosen, more precise data collection would be needed, establishing impervious surfaces for all non-residential properties, and, if several residential tiers are used, for residential uses as well. Under this approach, a fairly standardized data collection approach using GIS in combination with recently shot aerial photos would be needed. Another option to look into use of remote sensing data, which some enhancements is now able to yield parcel level impervious surface data.

Fee Collection

Option A: Contract with Portland Water District to charge existing customers the stormwater fee, probably on a quarterly or yearly basis to reduce costs. The remaining customers (in communities or areas of communities not served by PWD) could be billed under contract with a private firm.

Option B: Each town collects fees on its own, either through local utility billings or adding charge on tax bill.

Utility Organization

Create the utility primarily as a financial and legal entity rather than as a separate entity that stands alone or is incorporated into a department. The municipalities would use the funds to stormwater-related expenses (as previously identified) and to support ISWG and others in regional/cooperative measures.

Implementation

Continue use of the Adhoc Regional model currently being employed by the Interlocal Stormwater Working Group (ISWG), with local implementation where appropriate.

Expenses Covered

In general, the fees would fund all stormwater-related expenses except CSOs and major capital improvements. Communities may wish to cover more on own discretion.

Geographic Coverage

Option A: Fees would apply to properties within the individual boundaries of MS4 towns.

Option B: At least to start, fees would apply just to NPDES-regulated areas within MS4 towns

Exemptions

Public roads, selected other public uses, undeveloped land and agricultural lands (without impervious areas) would be exempt from fees.

Credits

Initially no credits. Using actual impervious surface as basis for fees provides built in incentive to reduce paved area. If credits are to be considered, two most likely candidates are: (1) a credit for properties that demonstrate annual maintenance of stormwater system by a certified engineer (2) credits for improving quality of stormwater running off site through use of designated BMPs.

MONTGOMERY COUNTY EXECUTIVE REGULATION

Offices of the County Executive • 101 Monroe Street • Rockville, Maryland 20850

Subject Water Quality Protection Charge	Number 6-02
Originating Department Department of Environmental Protection	Effective Date

Montgomery County Regulation on:

WATER QUALITY PROTECTION CHARGE

DEPARTMENT OF ENVIRONMENTAL PROTECTION AND
DEPARTMENT OF FINANCE

Issued by: County Executive
Regulation No. 6-02

Authority: Code Section 19-35
Council Review: Method (1) under Code Section 2A-15
Register Vol. __, No. __

Comment Deadline: _____
Effective Date: _____
Sunset Date: None

Summary: This regulation establishes the procedure to set rates for and implement a water quality protection charge to be applied to certain properties based on those properties' contribution of runoff to the County's stormwater management system.

Address: Written comments on these regulations should be sent to:

Ellen Scavia, Chief
Division of Environmental Policy and Compliance
Department of Environmental Protection
255 Rockville Pike
Rockville, Maryland 20850

Glenn Wyman, Chief
Treasury Division
Department of Finance
101 Monroe Street
Rockville, Maryland 20850

Staff Contact: For further information or to obtain a copy of this regulation, contact Ellen Scavia at (240) 777-7770 or Glenn Wyman at (240) 777-8929.

MONTGOMERY COUNTY EXECUTIVE REGULATION

Offices of the County Executive • 101 Monroe Street • Rockville, Maryland 20850

Subject Water Quality Protection Charge	Number 6-02
Originating Department Department of Environmental Protection	Effective Date

Sec. 1. Regulation

Section I. General Provisions

A. Authority. In accordance with the authority conferred under Chapter 19, Section 19-35, of the Montgomery County Code, 1994, as amended (hereinafter referred to as the "Code"), the County Executive hereby promulgates this regulation for the purpose of implementing the County's Water Quality Protection Charge as set forth in Chapter 19 of the Code.

B. Applicability. This regulation applies to all owners of residential property and associated nonresidential property in Montgomery County, Maryland.

Section II. Definitions

The definitions of the terms used in this regulation are provided in Chapter 19, Section 19-21, of the Code. For purposes of this regulation, the following additional words and phrases will have the meaning respectively ascribed to them in this regulation unless the context indicates otherwise:

Base Rate – The annually designated dollar amount set by the County Council to be assessed for each equivalent residential unit of property that is subject to the Water Quality Protection Charge.

Condominium – A residential property that is subject to the condominium regime established under the Maryland Condominium Act.

Director – The Director of the Montgomery County Department of Environmental Protection or the Director's designee.

Equivalent Residential Unit or ERU – The statistical median of the total horizontal impervious area of developed single-family detached residences in the County that serves as the base unit of assessment for the Water Quality Protection Charge. The designated ERU for Montgomery County equals 2,406 square feet of impervious surface.

Multifamily Residential Property - A mobile home park or a residential building where one or more dwelling units share a common entrance from the outside with other dwelling units that are arranged above, below or next to one another in the same building.

Water Quality Protection Charge or Charge – An assessment levied by the Director of Finance to cover the cost of constructing, operating, and maintaining facilities within the County's stormwater management system and fund related expenses allowed under applicable state law based on the impact of stormwater runoff from the impervious areas of developed land in the County.

MONTGOMERY COUNTY EXECUTIVE REGULATION

Offices of the County Executive • 101 Monroe Street • Rockville, Maryland 20850

Subject Water Quality Protection Charge	Number 6-02
Originating Department Department of Environmental Protection	Effective Date

Section III. Classification of Properties

For purposes of determining the appropriate assessment rate, all properties that are subject to the Water Quality Protection Charge are assigned to one of the following classifications:

A. Detached single-family residential property: For detached single-family residential properties, the impervious area includes the house, driveways, sidewalks, sheds, and any other fixtures on the property that are impenetrable by water.

B. Attached single-family residential property: Attached single-family residential properties, which include townhouses and duplexes, contain the same kind of, but typically less, impervious area than detached single-family residential properties.

C. Multifamily residential property: For multifamily residential properties the impervious area includes the residential structures that contain the dwelling units, the sidewalks, parking lots and any other permanent installations on the developed parcel, whether under single or common ownership, that is impenetrable by water.

D. Associated nonresidential property: Associated nonresidential properties may include commercial properties such as office buildings, hotels, retail establishments or industrial properties such as factories and warehouses. Associated nonresidential properties also include not-for-profit entities such as religious institutions, healthcare facilities, and other developed properties devoted to non-governmental charitable and institutional uses. The impervious area for these properties includes all buildings, parking lots, sidewalks, and any other impermeable installations permanently attached to the land parcel containing those installations.

Section IV. Rates

A. Detached single-family residential properties: The Charge for each detached single-family residential property is the full applicable base rate for one ERU.

B. Attached single-family residential properties: The Charge for each attached single-family residential property is 33 percent of the applicable base rate for one ERU.

C. Multifamily residential properties: The Charge for each multifamily residential property is based on the number of ERUs assigned to the property in accordance with the following procedure:

1) The Director determines the number of ERUs for a multifamily residential property by dividing the property's actual impervious area by the designated ERU for Montgomery County.

2) The Director computes the billable Charge by multiplying the base rate by the total number of ERUs assigned to the property.

3) 3) If the multifamily residential property is a condominium development, the Director calculates the Charge to be billed in equal shares to the owners of the development by dividing the total ERUs calculated for the property by the number of individual condominium units and then multiplying the sum by the base rate to determine the amount billable to each unit owner.

D. Associated nonresidential properties: The Charge for the owner of each associated nonresidential property is based on the number of ERUs assigned to the property in accordance with the following procedure:

1) The Director determines the number of ERUs for an associated nonresidential property by dividing the property's actual impervious area by the designated ERU for Montgomery County.

2) The Director computes the billable Charge by multiplying the base rate by the total number of ERUs assigned to the property.

Section V. Billing and Payment

A. The Director must prepare and forward to the Director of Finance the necessary data for collecting the Water Quality Protection Charge from owners of property subject to the Charge. The data must include the identification of every parcel to be charged and the amount of the Charge.

B. The Director of Finance must include the Charge as a separate line item on the real estate tax bill for each property subject to the Charge.

C. The Director of Finance must deposit all payments collected under this Section into a County stormwater management fund.

D. Unless the Charge billed to a property owner is under active appeal, interest on an overdue payment accrues according to the same schedule and at the same rate charged for delinquent real property taxes until the owner has remitted the outstanding payment and interest. An unpaid Charge is subject to all penalties and remedies that apply to unpaid real property taxes. If the unpaid Charge becomes a lien against the property, the lien has the same priority as a lien imposed for nonpayment of real property taxes.

MONTGOMERY COUNTY EXECUTIVE REGULATION

Offices of the County Executive • 101 Monroe Street • Rockville, Maryland 20850

Subject Water Quality Protection Charge	Number 6-02
Originating Department Department of Environmental Protection	Effective Date

Section VI. Requests for Adjustment; Appeals

A. A property owner may request a review and adjustment of the Charge by petitioning the Director in writing within 21 days after the property owner receives a bill for the Charge if the property owner believes that the Charge has been assigned or calculated incorrectly.

B. When submitting a petition for review of the Charge, the property owner must include a detailed statement of the basis for the petition and documents supporting the property owner's assertion that the property should be assigned to a different classification, the impervious area measurements used to calculate the ERUs for the property are incorrect, or the property is not subject to the Charge under applicable law.

C. After receiving the petition, the Director will review the Charge assigned to the property and make a written determination of whether the property owner's request for an adjustment of the Charge should be granted or denied. The Director may request additional information from the property owner that the Director reasonably believes will help the Director decide whether the property owner is entitled to an adjustment.

D. If the Director concludes that the Charge was levied by mistake or resulted from an inaccurate computation, the Director will submit the corrected data to the Department of Finance with a request for an adjustment to the property owner's bill. After receiving the Director's request, the Director of Finance will make an appropriate adjustment based on the new data submitted by the Director.

E. If the Director concludes that some or all of the requested adjustment should be denied, the property owner may seek reconsideration of the Director's conclusion by submitting a written request for reconsideration with supporting reasons to the Director within 10 days after the date of the Director's written decision.

F. If the Director does not approve the request for reconsideration, the property owner may appeal the Director's final decision within 10 days after the Director issues that decision as provided in Article I of Chapter 2A.

G. The County Board of Appeals is the designated authority charged with hearing and deciding all appeals taken from the Director's final decision to deny any relief requested under this Section.

MONTGOMERY COUNTY EXECUTIVE REGULATION

Offices of the County Executive • 101 Monroe Street • Rockville, Maryland 20850

Subject Water Quality Protection Charge	Number 6-02
Originating Department Department of Environmental Protection	Effective Date

Sec. 2. Severability

If a court holds that a portion of this regulation is invalid, the other portions remain in effect.

Sec. 3. Effective Date

This regulation takes effect 30 days after approval by the County Council.

Douglas M. Duncan,
County Executive

Approved as to Form and Legality
Office of County Attorney
By
Date 2/13/02

Revised 4/96

Stormwater Facility Maintenance Program
MONTGOMERY COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Montgomery County Water Quality Protection Charge

Frequently Asked Questions

Rain and stormwater runoff is an issue few people spend much time worrying about unless they have forgotten an umbrella during a downpour or come home to a flooded basement. However, taking appropriate steps to control stormwater runoff is becoming an extremely important issue for Montgomery County.

Impervious surfaces such as roofs, driveways, parking lots, and streets prevent precipitation from entering the ground and the groundwater where it completes the hydrologic cycle. Instead stormwater is collected and either sent to a stormwater facility or discharged directly to the streams without control. Older, urbanized areas of the county without stormwater controls bear witness to the devastation visited upon nearby stream valleys, which were blasted by incredible volumes of water, sediment, and pollution, changing from gurgling, bucolic streams to 50 foot wide lifeless channels with toppled trees, exposed sewer lines, and deeply cut and eroded banks.

What is the Water Quality Protection Charge (WQPC)?

The WQPC will appear as a line item on property tax bills and will pay for the structural maintenance of stormwater management facilities. The Water Quality Protection Charge is the result of years of study, recommendations and hard work by citizens serving on work groups and task forces, County Council Staff and the Department of Environmental Protection.

Who will pay?

The charge will be paid by all residential property owners and any associated nonresidential property owners.

What are associated nonresidential properties?

An associated nonresidential property is any nonresidential property from which stormwater drains into a stormwater management facility that primarily serves one or more residential properties. Some examples of associated nonresidential properties could be: a restaurant that has a parking lot draining into a neighborhood stormwater pond, a church parking lot draining into a neighborhood pond, or a private school that has sidewalks, parking lots and outbuildings draining to a residential pond or other type of stormwater management structure.

How has the charge been determined?

The charge is based on the average amount of square feet of roof, sidewalk and driveway for a single-family dwelling. Wet weather cannot penetrate these "impervious" surfaces, thereby washing pollutants such as oil and grease from driveways, as well as fertilizers, pesticides, and pet waste from yards and turf areas either into nearby streams or into a stormwater management structure. Accumulating stormwater also can erode stream banks if not properly managed by well-maintained ponds, sand filters, infiltration trenches or other stormwater management structures. The average impervious surface has been calculated to be 2,406 square feet and is the Equivalent Residential Unit (ERU) or the base unit for calculating the Water Quality Protection Charge.

Associated nonresidential structures are billed as multiples of the ERU. If a restaurant has 24,060 square feet of imperviousness, then the property owner will pay ten times the ERU.

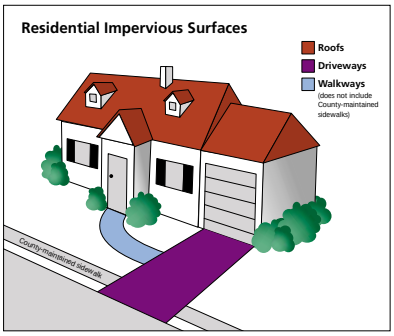
Condominium and apartment charges will be calculated based on the amount of imperviousness and will be billed as multiples of the ERU. Townhomes will be billed at one-third of an ERU.

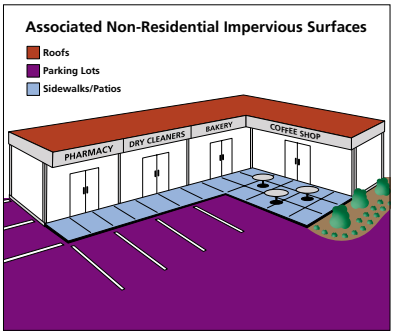
How much is the WQPC?

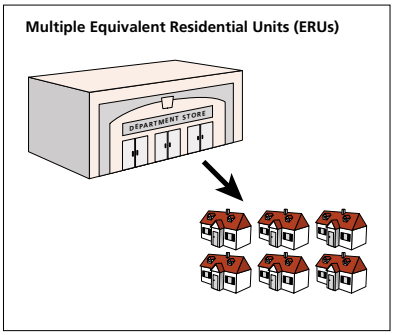
The WQPC rate is determined by the costs of structural maintenance for residential and associated nonresidential stormwater facilities divided by the number of ERU's. Currently the intent of the law is to perform structural maintenance, although other program aspects, such as inspecting and repairing stormdrains, performing structural maintenance on nonresidential facilities not previously part of the program, and offering incentives through credits and exemptions, could be added to the program.

Additions to the program will require additional increases to the rate. As of January 2002, no rate has been set. Executive Regulations need to be written that will

[continued, over]







define the program. The County Council will set the rate of the Water Quality Protection Charge on an annual basis.

What maintenance will be done by the County?

The County will perform structural maintenance on the stormwater facilities. Structural maintenance is defined by the law as: the inspection, construction, reconstruction, modification, or repair of any part of a storm water management facility undertaken to assure that the facility remains in the proper working condition to serve its intended purpose and prevent structural failure. Structural maintenance does not include landscaping, grass cutting, or trash removal.

What maintenance will remain the responsibility of the property owner?

The property owner will be responsible for the aesthetic maintenance around the facility, including trash removal and grass cutting. This routine maintenance is critical and if neglected can lead to expensive maintenance problems that will be the responsibility of the property owner.

Will the County own the property around the facility?

No, the property owner will be responsible for recording easements and covenants in the Montgomery County land records that allow the County to perform the maintenance on the facility.

When will the County accept stormwater facilities into the program?

The effective date of the legislation is March 1, 2002. The Department of Environmental Protection (DEP) will be accepting applications beginning on that date. The legislation specifies that any stormwater facilities granted final approval by the Department of Permitting Services up to that date are "existing" stormwater management structures and any facilities granted approval after that date are classified as "new" stormwater management structures.

Existing facilities will have to prepare new easement documents and new facilities will automatically become part of the program

How will structures enter the County program?

The owner must make any structural repairs needed to place the facility in proper working condition, as determined by the Department of Environmental Protection usually to asbuilt standards if available, before the County enters into an agreement with the owner that obligates the County to assume responsibility for structural maintenance of the facility.

After the owner and the County have agreed that the County will assume responsibility for structural maintenance, the owner must record the easement and any other agreements executed in conjunction with the easement that are binding on subsequent owners of land served by the facility in the County land records. The owner must deliver a certified copy of each recorded document to the Department of Environmental Protection. Structural maintenance becomes the responsibility of DEP after the documents are delivered to that Department.

Underground structures (oil/grit separators, underground storage structures, underground sand filters and water quality inlets) must have been cleaned and inspected within three months of final recordation date of easement documents. Above ground structures (dry ponds, wet ponds, and surface sand filters) must have been cleaned and inspected within twelve months of final recordation date of easement documents.

Is the Water Quality Protection Charge deductible from my Federal Income Tax?

No. The Water Quality Protection Charge is not deductible from Federal or State Income Taxes.

For more information:

Department of Environmental Protection / Montgomery County, Maryland
255 Rockville Pike, Suite 120, Rockville, MD 20850
240.777.7770 fax: 240.777.7765
e-mail: help@askDEP.com

askDEP.com
We've got answers!

Key Facts and Information About the Proposed Stormwater Management Utility Fee

Frequently Asked Questions | Timeline | Get Involved | Send Us Your Comments | More Information

In November 2006, the Mayor and Council voted to develop a funding plan based on a new annual fee to support stormwater management (SWM) programs through a SWM Utility. Fee enabling legislation was introduced in December 2007, followed by a public hearing on February 4, 2008. The Mayor and Council are accepting public comments on the proposed SWM Utility legislation and the 2008 SWM Utility fee rate through February 25, 2008.

- Mayor and Council worksession presentation on proposed Stormwater Management Utility—December 3, 2007
- Draft ordinance
- Draft regulations
- SWM Utility Proposed Rates
- Proposed SWM Budget Projections

Background

Rockville's Stormwater Management (SWM) responsibilities include:

- 32 miles of streams
- 99 miles of storm drain pipes
- 5,767 inlets
- 103 public SWM facilities, including 51 ponds
- Inspection of 393 privately-owned SWM facilities

Rapid development funded much of Rockville's stormwater management (SWM) over the past two decades with fees imposed on builders. Now that development is slowing, Rockville has to find a way to pay for stormwater management, environmental projects and unfunded mandates.

The Stormwater Advisory Group (SAG), consisting of members from Rockville's business and residential community, recommended that in order to be fair and equitable, the fee should be charged to all developed properties in Rockville.

If Rockville continues to fund stormwater management needs with property taxes, residential properties will eventually be responsible for about 2/3 of the bill, even though they only account for about 1/3 of the stormwater runoff.

If the fee is charged to all developed property owners, residential property owners would fund about 1/3 of the city's stormwater management needs, which is more proportional to the amount of stormwater runoff they produce.

As proposed, all property owners would have to pay the fee including:

- Businesses
- Homeowners
- Churches
- Government (county, state and federal)
- Schools

Revenue from a utility fee would fund:

- Unfunded state and federal mandates for stormwater management
- Rockville's environmental initiatives
- Rockville's move toward sustainability
- Existing infrastructure maintenance, ensuring it remains in good working order
- Future infrastructure needs

- Projects and programs designed to do our part to save the Chesapeake Bay

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How can residents get involved or comment on this proposal?

- Send in your comments using the online Stormwater Utility Comment Form
- Speak at a citizens' forum during a Mayor and Council meeting - sign up by calling the City Clerk's office at 240-314-8280
- Come to City Hall for a "drop in" appointment with the Mayor or a member of City Council by calling the City Clerk's office at 240-314-8280
- Send an email to the Mayor and Council at mailto:mayorcouncil@rockvillemd.gov?subject=
- Write a letter to the Mayor and Council at 111 Maryland Ave., Rockville, MD 20850
- Write, call, or email City staff members working on this project:

  Lise Soukup, Project Manager
  111 Maryland Ave.
  Rockville, MD 20850
  240-314-8515
  mailto:lsoukup@rockvillemd.gov?subject=

  Marylou Berg, Assistant to the City Manager
  111 Maryland Ave.
  Rockville, MD 20850
  240-314-8105
  mailto:mberg@rockvillemd.gov?subject=

  Jennifer Kimball, Neighborhood Resources
  111 Maryland Ave.
  Rockville, MD 20850
  240-314-8104
  mailto:jkimball@rockvillemd.gov?subject=

For more information

- Check out Stormwater Utility - Frequently Asked Questions
- View a presentation about Stormwater Management Utility Implementation
- View maps: Rockville Aerial View | Rockville Stormwater Management Infrastructure
- Read Rockville Reports' three-parts series about the Proposed Stormwater Management Utility
  - Rockville to Improve Stormwater Management (April 2007)
  - Stormwater Management Utility Funding Options Considered (May 2007)
  - Stormwater Management Utility Fee Rates and Billing Options (June 2007)
- Download the brochure, "Water, Water, Everywhere..."
- Read the information prepared for the Mayor and Council meeting on November 27, 2006
- Ask to have a presentation on SWM at your neighborhood association meeting by calling Jennifer Kimball at 240-314-8104
- Ask to have a presentation on SWM for your business group by calling Lise Soukup at 240-314-8515
- Check Rockville Reports and the City Web site for project updates and public meeting dates
- Watch Rockville Channel 11 for updates or to watch Mayor and Council meetings

Rockville City Government
Rockville City Hall • 111 Maryland Avenue • Rockville, MD 20850
240-314-5000

Please e-mail questions or comments to the Web Administrator.

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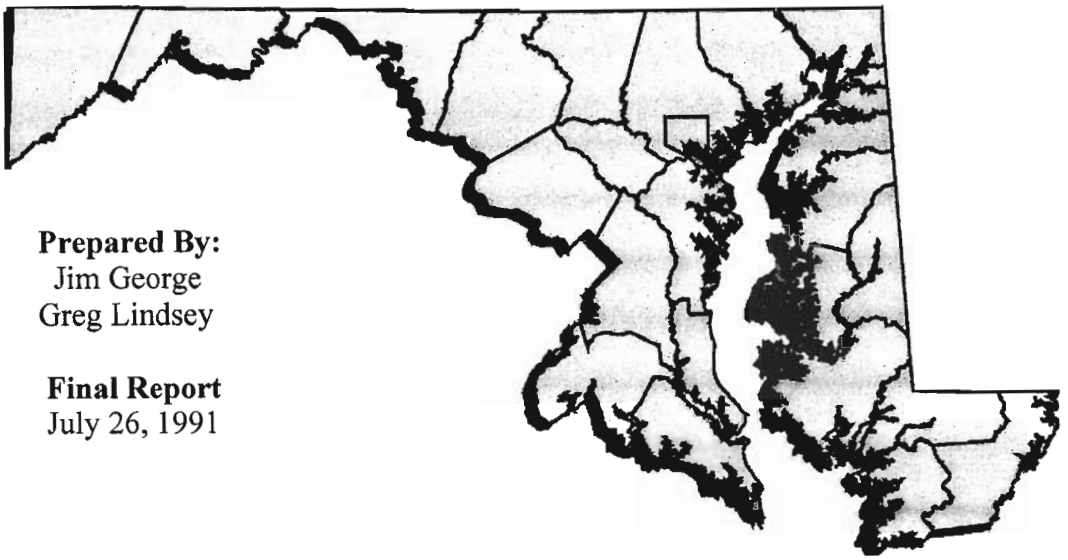
Potential Revenues From Stormwater Utilities In Maryland



Prepared By:
Jim George
Greg Lindsey

Final Report
July 26, 1991

Maryland Department of the Environment
Water Management Administration

1800 Washington Boulevard
Baltimore, MD 21230

The Sediment and Stormwater Management Administration (SSA) was incorporated into the Water Management Administration (WMA) in October 1992. For additional information concerning this publication, please contact WMA (410) 537-3543.

LIST OF APPENDICES

Appendix A County Level Land Use Data Used to Estimate Stormwater Utility Revenues

Appendix B Work Sheets for Montgomery and Cecil Counties Illustrating The Two Formats of Land Use Data

Appendix C Detailed Description of the Six Approaches Used to Estimate Potential Revenues from Stormwater Utilities

Appendix D County Level Stormwater Utility Revenue Estimation Worksheets for Six Alternative Charge Structures (Bound Separately)

EXECUTIVE SUMMARY

STUDY BACKGROUND AND OBJECTIVES

In the Water Quality Act of 1987, Congress amended the statute to address management of nonpoint source pollution. Section 319 of the Act requires that States submit assessment and management reports to the U.S. Environmental Protection Agency (USEPA) that outline strategies to control nonpoint source pollution. In response, Maryland's primary goal has been to implement the Chesapeake Bay Nutrient Reduction Plan for which quantitative goals already were in place (i.e., a 40% reduction in nutrient loadings to the Chesapeake Bay by the year 2000). This study addresses one aspect of implementing new Federal and State regulations, that is, the issue of funding Maryland programs to control nonpoint source pollution.

Stormwater management historically has been financed with general revenues from property taxes. Reliance on property taxes, however, is often inadequate. Since 1973, jurisdictions across the Country have begun implementing stormwater management utilities as an alternative source of revenue. Today over 100 stormwater management utilities are in operation nationwide.

The primary objective of this study is to estimate the potential revenue generating capacity of county-level stormwater management utilities in the State of Maryland. This study also investigates the sensitivity of these estimates to a variety of simplifying assumptions and several alternative options regarding who would be charged by a utility, that is, which standard land use categories would be included in the rate base. Finally, the distribution of charges among various types of land uses are explored for a representative set of counties.

STUDY APPROACH

The Maryland Department of Environment, Sediment and Stormwater Administration (MDE, SSA) has outlined a general approach to estimate potential revenues from stormwater utilities (Lindsey, 1988). With some modifications, the study follows this approach to estimate potential revenues from stormwater utilities for each County and Baltimore City. These estimates are summed to make a statewide revenue estimate. Land use data collected by the Maryland Office of Planning (MOP) in 1987 is used for this procedure.

The general approach involves estimating revenues as a function of parcel size and land

use. It is assumed that parcels within a land use category, such as industrial land use, share very similar runoff characteristics (in particular a similar proportion of impervious area). This assumption allows all of the parcels of a certain land use category to be grouped and treated using the average parcel size for each category. SSA has assigned a stormwater run-off coefficient or rate factor to each category, which reflects the typical amount of impervious material associated with that type of land use.

Six variations on this general approach are used to investigate the effects of alternate assumptions. The primary differences include varying the level of detail of information and using different methods to determine what amount to charge single family residential parcels relative to other land use categories. These variations among the six approaches provide one type of sensitivity analysis of the revenue estimate.

In addition, other sensitivity analyses are conducted on one of the six approaches. One analysis introduces additional land use categories into the rate base that had been excluded from the original six approaches. Agricultural parcels, tax exempt parcels, and undeveloped parcels were originally excluded for two reasons. The first reason was that, in practice, utilities often do not charge owners of these land use categories. The second motivation was to ensure that the method would not produce an overly optimistic revenue estimate.

An assumption used in all six approaches is that single family residential parcels of less than one acre would be charged $20 per year. To test the sensitivity of this assumption to changes, one of the six approaches is reevaluated assuming two alternate annual charges of $15 and $25. The primary findings of the study, and a summary of the results of these sensitivity analyses are presented in the next section.

OBSERVATIONS AND CONCLUSIONS

The estimates of total annual State revenue for all six approaches range from $60,565,500 to $72,301,400 (a 16% difference) with a median value of $67,853,200. This outcome indicates that modifications to the utility charge algorithm described within the body of this report do not greatly affect the total revenue estimate. While estimates of revenue for the entire State are relatively stable, several counties exhibit a deviation of more than 40 percent between their lowest and highest estimates depending on which of the six approaches is used.

The two sensitivity analyses described above produce significant changes in the estimate of the total annual State revenues. In particular when agricultural parcels, exempt parcels, and undeveloped parcels are introduced into the rate base for one of the six approaches, the annual revenue estimate increases from $72,301,400 to about $214,900,000.

When the annual charge of $20 for single family residential parcels is increased to $25 for a particular approach, the revenue estimate increases from $72,301,400 to $90,376,750. When the annual charge is decreased to $15 the revenue estimate decreases to $54,226,050.

Finally, several results provide insights about how charges are distributed among different land use categories for a given county. In general, the different approaches do not significantly alter the distribution of charges among the land use categories. The changes that occur do not appear to follow a pattern and must be assessed on a case by case basis for each county.

On the other hand, when making comparisons across counties, significant differences are observed in the distribution of charges among the land use categories. For example, when considering average results from all six approaches, the industrial sector of Baltimore County is estimated to bear an average of 21% of the cost, while in Montgomery County the industrial sector is estimated to bear only an average of 5% of the cost. This is attributed to differences in land development patterns.

Numerous analyses regarding cost distributions are possible. The process involves the consideration of the numbers of parcels, the parcel sizes and the relative proportions of these characteristics among the land use categories. It is possible to alter the distribution of the cost among different land use categories to some degree by altering the utility charge structure; however, the results of this study indicate that the development pattern of a county is the primary determinate.

Addendum:

Revised Estimate of the Potential Annual Revenue from Stormwater Utilities in Maryland Based on Median Parcel Sizes

Since the completion of the original report, SSA has revised the estimate of the annual revenue generating potential for Maryland counties based on median parcel sizes. The original revenue estimate, based on average parcel sizes, was about $68 Million; the revised estimate is about $42 Million (a 38% decrease).

This revised computation is based on one of the six rate structure approaches used in this report, that is, the Quantile Approach. SSA selected the Quantile Approach to make this revised estimate because it yields an estimate that falls in the middle of the range of the six approaches. The range of the original six estimates is from $54 Million to $83 Million. If we assume that using median values would result in a 38 percent decrease for each of the six estimation methods used in this report, the revised range would be from $33.5 Million to $51.5 Million.

The estimates developed in the body of this report are based on average parcel sizes for all land uses except residential land use, which was varied for each approach. The revised revenue estimate uses approximations of the median parcel sizes for commercial and industrial land uses, and mean parcel sizes for the other land uses[1].

This revised estimate is probably more reliable than the original estimate. The reason that median values tend to be more stable is because they are not skewed by a small number of anomalous large parcels.

The following tables list the data used in the revised estimation procedure. This data is presented as a comparison of average and median parcel sizes for commercial and industrial land uses, and is listed by county. Finally, note that agricultural, tax exempt, and undeveloped land uses are omitted from the original and revised estimates.

---

[1] Median parcel sizes were estimated for only the Commercial and Industrial land uses as a matter expediency. This simplification is justified on the basis that these two land uses, in addition to residential land use, make up that vast majority of all land uses (accounting for the exclusion of agricultural, tax exempt, and undeveloped land from the rate base).

Potential Stormwater Utility Revenues in Maryland: A Comparison Between Estimates Based on Median and Average Parcel Sizes

Potential Revenues Using the "Quantile" Approach

Counties/City	Average Parcel Sizes	Median* Parcel Sizes
Allegany	$1,731,000	$663,400
Anne Arundel	$6,114,300	$3,751,700
Baltimore	$9,236,800	$5,931,300
Calvert	$794,900	$558,300
Caroline	$424,300	$315,200
Carroll	$1,545,900	$1,164,700
Cecil	$2,036,900	$803,900
Charles	$1,864,800	$1,378,400
Dorchester	$855,800	$435,000
Frederick	$2,605,200	$1,272,800
Garrett	$2,316,400	$416,100
Harford	$3,165,100	$1,594,000
Howard	$2,347,000	$1,571,000
Kent	$369,400	$213,600
Montgomery	$5,082,300	$3,908,600
Prince George's	$9,034,600	$5,995,600
Queen Anne's	$595,500	$410,600
Somerset	$420,500	$258,100
St. Mary's	$1,073,800	$691,100
Talbot	$814,700	$552,200
Washington	$2,058,400	$1,151,800
Wicomico	$1,129,900	$705,300
Worcester	$2,567,000	$924,400
Baltimore City	$9,959,200	$7,144,300
TOTAL	$68,143,700	$41,811,400

* Median values were computed for Commercial and Industrial parcels, which strongly influence the revenue estimate; all other land use parcel sizes are based on averages (except residential). The average values are based on 1987 data and the median values are based on 1990 data.

A Comparison of Average and Median Parcel Sizes (Acres)
For Commercial and Industrial Land Uses
in Maryland Counties

	Commercial Parcel Sizes		Industrial Parcel Sizes	
Counties/City	**Average**	**Median**	**Average**	**Median**
Allegany	1.6	0.25	38.7	1.80
Anne Arundel	2.7	0.80	11.9	4.50
Baltimore	2.0	0.40	12.6	2.20
Calvert	4.0	0.75	49.0	4.00
Caroline	2.2	0.35	8.8	3.25
Carroll	2.8	0.50	11.2	2.00
Cecil	5.2	0.75	39.4	7.50
Charles	3.7	0.75	9.4	1.25
Dorchester	2.7	0.30	14.2	4.00
Frederick	3.2	0.30	55.9	2.50
Garrett	20.0	0.75	51.1	25.00
Harford	2.7	0.50	87.1	4.00
Howard	3.2	1.00	9.8	4.00
Kent	2.4	0.30	0.0	0.00
Montgomery	1.0	0.25	8.9	0.75
Prince George's	1.9	0.30	8.8	0.75
Queen Anne's	3.6	0.60	6.2	5.25
Somerset	2.1	0.30	0.0	0.00
St. Mary's	4.3	0.75	21.3	0.30
Talbot	2.0	0.35	12.4	0.75
Washington	2.9	0.30	10.0	3.50
Wicomico	1.7	0.30	5.5	1.25
Worcester	2.2	0.25	5.2	1.20
Baltimore City	0.5	0.25	3.2	1.25

Notes: The median values are based on 1990 data. The average values are based on 1987 data.

1.0 INTRODUCTION

This report is an analysis of potential stormwater utility revenues in the State of Maryland. It includes estimates of potential revenues for each major jurisdiction in Maryland (23 counties and Baltimore City) under a variety of assumptions.

The report begins with several definitions and an explanation of the utility approach to financing stormwater management (Section 2). A brief overview of previous research conducted by the Maryland Department of Environment, Sediment and Stormwater Administration (MDE, SSA) is provided. General procedures for estimating utility revenues are summarized and illustrated with an example.

In Section 3, estimates of total revenues are presented. Six different approaches are used to explore the sensitivity of estimates to underlying assumptions about the amount of impervious area on typical parcels and to other factors. In addition, the sensitivity of the estimates to different definitions of the utility rate base (i.e., the land use categories that will be charged) is explored, and general limitations of the analyses are noted.

The U.S. Environmental Protection Agency provided funding for this study as part of a grant to MDE under Section 319 of the 1987 Water Quality Act. Section 319 requires that states complete assessment and management reports that document nonpoint sources of pollution and outline management programs necessary to achieve water quality objectives. In Maryland's management report, MDE identified the lack of funding for stormwater programs and projects, including water quality retrofits, as a significant barrier to control of nonpoint source pollution and achievement of nonpoint source-related water quality objectives. Hence, when funds became available under Section 319, MDE proposed that EPA fund implementation of a technical assistance program to assist local officials in establishing stable, sufficient sources of funds for stormwater management.

This report comprises the first deliverable for the utilities technical assistance project funded with Maryland's Section 319 grant. The revenue estimates included herein will be used to support feasibility studies that will be prepared for individual counties.

2.0 STORMWATER UTILITIES

Stormwater management historically has been financed with general revenues from property taxes. Since local officials often view stormwater management as a lower priority than other, more visible government programs, stormwater management typically receives limited financial resources. As a result, reliance on property taxes to finance stormwater management has proven inadequate.

Alternative sources of financing are available. The Chesapeake Bay Nutrient Reduction Plan, which outlines programs and activities necessary to achieve Bay cleanup objectives, identifies stormwater utilities as a primary alternative source of funding (Shanks and Tassone, 1988). The Sediment and Stormwater Administration has supported research of stormwater utilities (Lindsey 1988a, 1988b, 1989).

2.1 Definition and Rationale for the Utility Approach

Stormwater utilities are public utilities, much like conventional water and waste water utilities, that are established to provide the service of stormwater management. They are financed by dedicated[1] user charges, not by property taxes. User charges for an individual property are based on the contribution of the property to the total volume of stormwater runoff that must be managed.[2]

The utility approach involves a redefinition of the way in which people have thought about runoff and stormwater management (if they have thought about it at all). The revised perspective is that runoff is a man-made problem, and that owners of property are responsible for it. This is a reasonable view point if one compares the higher water retention characteristics of undeveloped land compared to land having impervious structures, driveways, and patios, which significantly increase runoff.

The rationale for the utility approach is the "user pays" or "polluter pays" principle. Individual property owners are viewed as generators, and the role of government is to control the discharges. To finance the government's activities, property owners pay user charges in amounts proportionate to their discharges. Neither property values and ability to pay, nor perceived benefits (e.g., protection from floodwaters) and willingness to pay generally are considered. Thus, with the utility approach, the benefits of stormwater management are deemphasized, and emphasis is placed on the cause of the problem.

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[1] Dedicated simply means the charges can be used only for stormwater management.

[2] In theory, factors in addition to the volume of runoff (proximity to sensitive environments, pollutant/nutrient contributions) can be incorporated into charge systems; however, the difficulty of accounting for the costs of such factors has prevented most utilities from doing so.

Three definitions follow from this discussion. First, users are people or institutions whose properties generate runoff to the surrounding area (including streams, lakes and stormwater sewer systems). Second, beneficiaries are people or properties that gain from stormwater management. Benefits include improved water quality and flood control. Finally, user charges are dedicated fees paid by users (generators of stormwater) based on the amount of runoff that leaves their property. The utility approach consists of practical application of these definitions.

Care must be taken in the formation of utilities, particularly their rate structures, because utilities are subject to controversy. Four of 19 utilities surveyed in 1987 reported legal challenges in which the rate structure was questioned (Lindsey, 1988a). Courts, however, have upheld the creation of stormwater utilities. Crye (1986) has summarized an important legal standard that has evolved:

> Charges must be fair and reasonable and bear a substantial relationship to the cost of service and facilities.

This says that local jurisdictions must have a rational basis for making estimates of runoff and determining charges, but that runoff from parcels need not be measured precisely. Equally important, the standard does not mention benefits or beneficiaries. Utility rate systems may be based on costs, not benefits.

There is a consensus among public works officials that the utility approach is the best way to finance stormwater management. The main reason for their preference is that utilities are a stable source of funds. A second important factor is that many people think that user charges based on one's contribution to the problem are more fair than property taxes. These two rationales are summarized in a statement by the American Public Works Association (APWA, 1981):

> The user charge and utility concept are the most dependable and equitable approaches available to local governments for financing stormwater management.

2.2 The Experiences of Other Stormwater Utilities

Stormwater utilities exist in more than 100 communities in the United States (Cyre, 1990). Utilities use a variety of methods to estimate runoff and determine charges. Before reviewing the specific approaches investigated for this report, several findings of surveys of existing stormwater utilities are worth noting.

In 1987, The Maryland Department of the Environment, Sediment and Stormwater Administration (SSA) sent questionnaires to 25 existing utilities; 19 responded. Survey

findings show that utilities have been established in both smaller communities and older, central cities (utility service area populations range from 20,000 to more than a million). Some are organized to serve multiple jurisdictions (e.g., a county and a city). The oldest utility responding to the survey was established in 1973. All of the utilities base the user charges on some type of estimate of the amount of runoff from parcels. Most based their estimates on the amount or percentage of impervious area of an individual's property.

Several summary measures developed from the survey data provide a sense of the revenue generating potential of stormwater utilities.

- Annual user charges for single family residential (SFR) users range from $15 to $52.80 ($1.25 to $4.40 monthly) in 1987.

- Charges to single family residential users account for between 24% to 62% of all revenues from user charges.

- Revenues per developed acre within the utility service area range from $50.45 to $122.06 annually.

- Revenues per acre (both developed and undeveloped) range from $22.75 to $79.93 annually.

- Total annual revenues range from about $263,000 to a projected $8.2 Million.

In 1990, SSA resurveyed the utilities. Annual SFR charges presently range from about $13 to almost $90, while annual utility revenues range from $75,000 to almost $10.5 million.

2.3 General Approach to Estimating Potential Revenues

Estimating potential revenues in a jurisdiction is a straightforward process of summing up the individual user charges of all of the rate payers in the utility rate base. For planning purposes this is simplified by grouping users according to similar land uses and estimating typical charges for average-sized parcels within each land use category. In this context the rate base is defined as the set of land use categories for which owners will be charged.

We begin with an overview of the general procedures for estimating revenues. Following the overview is a detailed illustration of the procedures used in this study to generate several revenue projections based on alternative underlying assumptions.

It should be stressed that the following estimates of potential revenues bear no direct

relationship to the revenues from the actual implementation of a stormwater program. These estimates are made solely to provide an indication of the amount of revenues that could be generated if the utilities are established under a certain set of assumptions and are to charge amounts comparable to amounts charged by utilities elsewhere.

2.3.1 Overview

Preliminary estimates of the revenue-generating capacity of Maryland counties (and thus the State) can be made using land use data that are delineated at the county level[3]. The following land use data are necessary:

- Land use category definitions[4]
- The number of parcels of land in each category
- The total acreage in each category
- Parcel area data (average parcel area is sufficient for initial planning studies).

In addition stormwater runoff rate factors are needed. These are coefficients from 0 to 1 that reflect the typical percentage of impervious area for a given parcel and thereby reflect the parcel's tendency to generate stormwater runoff.

The concept behind most stormwater utility charge schemes is straight forward. In general, utility charges are directly proportional to parcel size and the rate factor, i.e., they can be thought of an acreage charge weighted by the percentage of area that is impervious. This relationship is shown in the following simplified user charge equation.

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[3] Data are available from the Maryland Office of Planning. Appendix A is a sample of the land use data used in this study.

[4] Land use categories are standard descriptive classifications (e.g., industrial, commercial, residential, undeveloped, and others). As an approximation, it is assumed that stormwater runoff characteristics are the same for all parcels in a given land use category.

$$PC = PA \times F \times C/U$$

where, PC = the charge for a parcel

PA = the area of the parcel

F = the rate factor (runoff coefficient) for the parcel (typically associated with the type of land use category, $0 \leq F \leq 1$)

C/U = the charge per unit area (or other units to be described later in this report)

The rate factor (F) relates the charge to the amount of runoff, which is central to the utility concept. That is, parcels that are more intensely developed have a greater value of F, and a greater charge for a given parcel size (e.g., F = 0.80 for commercial parcels, which typically have paved parking areas and sidewalks, and generate a lot of runoff).

Using data from the Department of Assessments and Taxation, the Maryland Office of Planning has categorized every parcel of land in each county,according to land use (e.g., commercial, industrial, and residential). For the purposes of this revenue estimation procedure every parcel within each land use category is assumed to have the same characteristic potential for runoff and is assigned a common rate factor. This amounts to assuming that, within a land use category, each parcel has the same proportion of impervious area (i.e., the intensity of development is assumed to be the same). While this assumption is obviously not true, it is sufficient at this level of planning, and it allows typical charges for each category to be estimated.

Within a land use category, the average parcel size is calculated and multiplied by the rate factor. This yields an estimate of the average impervious area per parcel, which can be expressed as the number of equivalent runoff units that can be attributed to the parcel. Typical charges for each parcel can be based on the number of equivalent runoff units. Lindsey (1988 b) has outlined this procedure.

By convention, most utilities have followed the practice of expressing the amount of impervious area or the number of equivalent runoff units as single family equivalent units (SFEs) (sometimes called equivalent residential units - ERUs). This approach will be followed here. The average impervious area is converted to SFEs by simply dividing through by the average impervious area of a typical single family residential parcel. An SFE is a measure of the impervious ground cover per typical single family residential parcel. It allows the amount of impervious area of a parcel in any land use category to be expressed in terms of the amount typically found on a single family residential parcel. For example, a typical commercial parcel may equate to 4.5 SFEs. Among other reasons, this approach has been adopted by utilities to emphasize the fact that charges

are fair and so that homeowners can easily understand their charges relative to charges paid by others.

A more detailed account of the general approach follows. It is based on a slight modification of the equation presented above, and reflects the use of SFEs for an average parcel in a given land use category:

$$PC = (PA \times F)/(I) \times C/U$$

where,

PC = the charge for an average parcel

PA = the area of an average parcel

F = the rate factor (runoff coefficient) for the parcel (typically associated with the type of land use category, $0 \leq F \leq 1$)

I = is the average impervious area of a typical residential parcel

C/U = charge per SFE, i.e., $20/SFE (In general this is "charge per unit", where the unit in this case is the SFE)

These modifications simply have a scaling effect by dividing through by the impervious area of a typical residential parcel. As an additional enhancement of the equation another term may be added or subtracted to reflect a credit or a surcharge. This is not shown explicitly in the equation above.

The average charge per parcel for a given land use category is determined by multiplying the number of SFEs times a dollar-amount per SFE, which is assumed to be $20/SFE for all six approaches in this study. This average charge per parcel is then multiplied by the number of parcels in the land use category. The result is an estimated total charge (i.e., revenue) for the given land use category. This process is repeated for each land use category. The subtotals for each land use category are then summed to arrive at a total county revenue estimate. This process is performed for each county and summed to arrive at an estimated state revenue figure.

2.3.2 An Illustrative County Stormwater Utility Revenue Estimation

We illustrate the method used to estimate revenues for each county. Before discussing the illustration below, it is worth placing it in context by drawing a distinction between the approach used here to estimate revenues, and the approach typically used by local officials. Local officials typically determine the amount of revenues needed and then estimate charges. For example, assume that an engineering-based estimation of the total annual revenue requirement for stormwater management is known to be $1.5 Million. The ensuing procedure would be to determine the user charges necessary to meet this revenue requirement. Since all user charges are keyed off the charge for a single family equivalent (SFE) unit, the procedure amounts to adjusting the charge per SFE until the revenue requirement is met. A typical charge for a residential parcel less than one acre in size (i.e., per SFE) might be $18.25 per year.

The second approach, which is used in this report, is the reverse of the first approach. We assume a fixed $20 annual charge per SFE. The procedure is to calculate the revenues that would be generated based on this fixed assumption.

Since the user charges in each land use category can be expressed in SFE units, the process is well suited to the use of a computer spread sheet. The SFE unit is flexible and can be altered to reflect different underlying assumptions for a particular revenue estimation. Since user charges for parcels in all of the other categories are keyed off of the SFE, the SFE can be viewed as the control mechanism of the procedure.

Two examples of how the specific definition of the SFE unit can be altered follow. First, the range of residential parcel sizes used to represent a single family equivalent may be changed. In this study, for instance, SFEs are defined with respect to either residential parcels of less than one acre, or parcels of less than one-quarter acre. Second, since the amount of impervious area associated with the SFE is only an estimate, its value can be altered to investigate the implication of different assumptions (for example, we can assume a typical residential parcel is 60% or 65% impervious).

In the case illustrated below, the single family equivalent is set somewhat arbitrarily at 3,000 square feet of impervious area for residential parcels less than or equal to 1 acre in size. In this case the impervious area has been fixed at 3,000 square feet rather than using the product of a rate factor and the average parcel size to determine the average impervious area within the interval less than one acre. The rationale for this is discussed in the description of the six alternative approaches; however, it is sufficient to say at this point that the ability simply insert a number (3,000 sq.ft.) further reflects the flexibility of the SFE unit.

Table 1 is a worksheet that illustrates the process used to estimate potential revenues from a county stormwater utility. Data used in the worksheet are from the Maryland Office of Planning (See Appendix A for a sample of this data). The components of the worksheet are described immediately below.

Table 1

Illustrative Worksheet for Estimating Revenues From Utility User Charges

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Land Use	Number of Parcels	Average Acre/ Parcel	Rate Factor (Imp)	Average Sq. Ft. Impervious per Parcel	Typical Number of SFEs	SFEs per Land Use Category	Revenue Requirement ($)	Dollars/ SFE	Typical Annual Charge	Total $ by Category	% Paid by Category
Agriculture	957	107.7	0.00	0	0.00	0			0.00	0	0.00
Commercial	1,085	6.6	0.82	235,747	78.58	85,262			1,571.64	1,705,225	0.68
Comm Res	1	9.0	0.68	266,587	88.86	89			1,777.24	1,777	0.00
Exempt	468	42.5	0.00	0	0.00	0			0.00	0	0.00
Park			0.11	0	0.00	0			0.00	0	0.00
Playground			0.17	0	0.00	0			0.00	0	0.00
School			0.50	0	0.00	0			0.00	0	0.00
Industrial	43	39.4	0.70	1,201,385	400.46	17,220			8,009.19	344,395	0.14
Apartments	17	2.0	0.64	55,757	18.59	316			371.71	6,319	0.00
Not Perc	28	1.7	0.00	0	0.00	0			0.00	0	0.00
Residential											
< 1 Acre	14,133	0.38	na	3,000	1.00	14,133			20.00	282,658	0.11
> 1 Acre	4,859	4.36	na	4,500	1.50	7,289			30.00	145,769	0.06
Res Ag	189	11.7	na	4,500	1.50	284			30.00	5,670	0.00
Res Comm	1	1.0	0.64	27,878	9.29	9			185.85	186	0.00
Condominium	5	0.00	0.64	0	0.00	0			0.00	0	0.00
Condo Comm	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Marshland	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Non-standard											
Cooperative	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Mobil/Traile	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Group Quar	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Motel	0	0.0	0.82	0	0.00	0			0.00	0	0.00
Forest Cons	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Detached S-F											
0 - .5 Ac	0	0.0	0.40	0	0.00	0			0.00	0	0.00
> .5 - 1 Ac	0	0.0	0.23	0	0.00	0			0.00	0	0.00
> 1 Acre	0	0.0	0.16	0	0.00	0			0.00	0	0.00
Garden Apt.	0	0.0	0.40	0	0.00	0			0.00	0	0.00
High Rise	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Other	0	0.0	0.50	0	0.00	0			0.00	0	0.00
Total (Dev.)	21,786					124,601				$2,492,000	1.00
Unimproved	10,878	5.8	0.00	0	0.00	0			0.00	0	0.00
Grand Total	32,664					124,601	$2,492,000	$20.00		$2,492,000	1.00

na = not applicable

Column C1 is the name of the land use category. In the cases of Exempt and Residential land uses, subcategories are defined to allow finer distinctions in stormwater runoff characteristics.

Column C2 is the number of parcels in each land use category.

Column C3 is the average parcel size for each land use category expressed in acres. For the Residential land use category, weighted average parcel sizes were calculated for parcels greater than and less than one acre using the data displayed in Appendix A.

Column C4 contains the utility rate factors, which represent the typical percentage of impervious cover on a property. For example, the rate factor for industrial parcels is 0.70 implying that, on average, about 70% of each industrial parcel is covered by impervious material. These factors reflect standard hydrologic runoff coefficients[5] such as those used in the Rational Method of runoff estimation.

This column can also be used to control whether or not a land use category is included in the rate base. Table 1 illustrates a case in which zero values are inserted for agriculture, exempt, and unimproved land use categories thereby excluding them from the rate base.

Column C5 is the average impervious area per parcel for each land use category. This average impervious area is expressed in square feet. The values are calculated as the (average acres per parcel) x (proportion of impervious area) x (43,560 ft/acre). That is, (C3) x (C4 which is the rate factor) x (43,560 ft/acre).

Column C6 is the number of Single Family Equivalent (SFE) units. An SFE is defined as the ratio: (impervious area of an average parcel for a given land use) / (average impervious area of a residential parcel less than 1 acre). In the worksheet it is calculated as C5/C5* where C5* is the particular value of C5 for Residential < 1 Acre[6].

This dimensionless unit equals one for a typical single family living on a residential parcel of less than 1 acre. Since most people are familiar with residential land use, SFEs allow a comparison among land use categories based on a familiar measure. Once

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[5] In general this is a precise statement. However, in several approaches presented in this report these values are altered. Where this is the case, the alterations are noted.

[6] Most of the approaches presented in this report define the SFE with respect to the average parcel size among residential parcels less than one acre. In one approach, however, the delineation of the residential land use is much finer. In that case, the SFE is defined with respect to the average parcel size among residential parcels less than 1/4 acre. As a consistent rule, all of the approaches presented in this report define SFEs with respect to the smallest subclassification of residential land use. Furthermore, when referring to the smallest subclass the term "typical residential parcel" is used.

allow a comparison among land use categories based on a familiar measure. Once defined, SFEs also facilitate the utility charge calculations, although they are not necessary to meet these ends.

Recall that the estimations in this report all assume that the smallest residential parcels pay $20 per year. Thus, once SFEs are determined for each land use category, calculations are reduced to multiplying $20 times the number of SFEs. In the case of the average small residential parcel, the calculation is trivial: (1 SFE) x ($20 per SFE) = $20. If a land use category has five and one half times the impervious area as the typical residential parcel the calculation is: (5.5 SFEs) x ($20 per SFE) = $110.

Column C7 is the number of SFEs per land use category. This is equal to the average number SFEs per parcel multiplied by the number of parcels in the given land use category. That is, (C2) x (C6). The column is summed to a total at the bottom.

Column C8 is the Total County Revenue Generated based on the assumption that the typical residential parcel will be charged $20 per year. It is the product of $20 times the sum of column C7 (the grand total number of SFEs for the county). In terms of computations, it is plugged into the spread sheet after a hand calculation.

Column C9 is the charge per unit as depicted by (C/U) in the equation presented above. That is, it is the dollars per SFE, which in the present case is $20/SFE. It is calculated as the fraction (C8*) / (C7*) where the star indicates the values that are used are from the bottom of the column.

Column C10 is the typical annual charge for each land use category. It is the amount that would be paid by the owner of an average sized parcel in the given land use category. It is calculated as the typical number of SFEs times the charge per SFE ($20), or (C6) x (C9*) where the star indicates the value that is used is from the bottom of the column.

Column C11 is the total amount of revenue generated by a given land use category. It is the product of the average annual charge and the number of parcels for the given land use category. It is calculated as (C10) x (C2).

Column C12 is the percentage of the total revenue paid by the given land use category. It is the total revenue per category divided by the grand total revenue for the entire county. It is calculated as (C11) / (C8*) where the star indicates the value that is used is from the bottom of the column.

Table 1 also illustrates the flexibility of the worksheet-based estimation procedure. Notice that the column C4 entries for residential land use are "na" (not applicable). Rather than multiplying a rate factor (C4) times the average parcel size (C3) to arrive at the average impervious area (C5), the impervious area for residential parcels less than 1

acre has been set equal to 3,000 sq.ft.[7] An impervious area of 1.5 times this area (4,500 sq. ft.) is used for residential parcels greater than 1 acre. Note that this leads to the larger residential category paying a user charge that is 1.5 times that of the smaller category (i.e., $30).

This particular assumption was investigated as one of six approaches reviewed in this report (Approach 1). The motivation for this particular arrangement is discussed in the descriptions of the alternate approaches presented in the later in this report.

[7] This rough estimate, based on typical values found in the technical literature, is the assumption made in Approach 1 of this report. Approach 2 fixes this value at 4,000 sq. ft.

3.0 POTENTIAL REVENUES FROM STORMWATER UTILITIES IN MARYLAND

This section includes estimates of the revenue-generating capacity of the State of Maryland under a variety of utility user charge approaches. Six alternative approaches are presented; all are variations of the general approach described in the previous section. The sensitivity of these estimates to different assumptions is explored.

3.1 Alternative Utility Charge Structures

3.1.1 Common Assumptions Among the Six Approaches

It is useful to review the assumptions that are common to the six revenue estimation approaches prior to describing the approaches in detail. The limitations imposed by these assumptions will be revisited as part of the discussion of results.

It is also important to recognize that, even though the procedures are similar in form to actual user charge schemes, the revenue projections generated by this study constitute only rough planning estimates. The simplifying assumptions associated with this exercise introduce errors that are tolerable for this level of estimation, but may not be appropriate for the actual implementation of a utility (in particular the use of average parcel size for each land use category).

As the overview of the general approach in Section 2 indicates, average parcel sizes are used in each of the six revenue estimation methods. Average values of this type are susceptible to being skewed by a small number of extreme values. Where corrections have been made to account for this, they are noted.

As mentioned above, a base annual charge of $20 per SFE is used in each approach. Use of annual charge was motivated by several considerations. First, it reflects a conservative figure that falls in the range of SSA 1987 Stormwater Utility Survey findings (it is less than the median annual charge). Second, it reflects preliminary findings of current research into people's willingness-to-pay for stormwater management services in one Maryland county (Baltimore County) (Lindsey, 1991). While changes in this value drive the total revenue figure, it has no effect on the distribution of charges among different land use categories. The issue of the distribution of charges among land use categories is discussed below in the subsection on results.

As noted, the rate base is defined as the categories of users to be charged. For the six baseline estimates, several land use categories are not included in the rate base. These

are agriculture, marshlands, unimproved[8] parcels, and tax exempt parcels (e.g., churches, schools, parks, government facilities, and others). Resistance to utilities often originates from these land use categories. For instance, farmers may argue that they are already regulated by soil conservation measures. Owners of marshlands or unimproved lands may argue that as long as their land is left natural they should not be penalized simply for owning it. Finally, tax exempt establishments may perceive utility charges as a form of taxation and may contest the charges.

The decision to exclude these land use categories from the six approaches stems from uncertainty about their eventual inclusion. Excluding them also errs on the side of underestimating the potential revenues, which is conservative.

Many existing utilities, however, include some combination of these land use categories in their rate base. For example, the SSA survey of nineteen utilities reveals that thirteen utilities charge churches and hospitals that are typically exempt from property taxes. Eleven charge parks, and ten charge agricultural land use categories. Whereas streets and right-of-ways are excluded from the rate base of the six approaches presented in this report, six of the utilities surveyed include them. Three utilities also reported charging users of undeveloped land. As part of the sensitivity analysis presented in Section 3.2, these land uses are included in the rate base resulting in a three-fold increase in the potential revenues.

The land use data used in this study are aggregated at the county (i.e., they include data for incorporated municipalities). Consequently, the estimates in this report rely on the simplifying assumption that cooperative agreements among jurisdictions could be made (e.g., between cities and the surrounding county). This avoids the effort required to determine which cities would not participate with the counties in developing utilities. This assumption also avoids the need to edit the available data to remove such cities from the rate base.

Since all of the approaches are essentially based on the same data, issues of data quality affect all six of the approaches examined in this report. The data is presumed to be accurate, though the potential for misclassification of parcels and other inaccuracies may exist. Furthermore, the data printouts (See Appendix A) were generated in 1987. Since land developers are supposed to have adhered to best management practices since that time (e.g., on-site stormwater control for new developments), it is likely that such parcels would be eligible for credits under the implementation of a utility. The credits would have the effect of offsetting the error due to omitting newly developed lands.

The assumptions outlined above highlight the similarities among the six revenue estimation approaches. In contrast, the primary differences and reasons for developing

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[8] In the tax files, any property with an improvement worth more than $10 is classified as "improved."

the different approaches are summarized in the following section.

3.1.2 Rationales for and Differences Among the Six Approaches

The six revenue generation approaches are variations of the general approach described Section 2. As an introduction to the six user charge approaches reviewed in this study, three broad comparisons are presented. Table 2 summarizes the three basic similarities and differences among the approaches. These are: 1) the method of determining residential SFEs, 2) the specificity of residential land use categories, and 3) the specificity of rate factors.

Determination of Residential SFEs. The six approaches can be characterized according to how the SFEs were determined for subcategories of the residential land use category. The traditional method, described in the general approach, is to calculate the impervious area based on the average parcel size for each residential subcategory (e.g., < 1 Acre, and > 1 Acre). This is the product of the rate factor (percent impervious) and average parcel size within the given subcategory. Note that the average impervious area for the smallest residential subcategory defines the SFE. A second method of determining the SFE is to select a fixed average impervious area based on professional judgement.

There are two reasons for arbitrarily fixing the SFE. The first is an equity consideration. Direct application of rate factors produces a pronounced difference in user charges between parcels just below and just above the one acre cut-off in the user charge approaches that utilize only two residential subcategories. This is because the average acreage for the larger residential category dominates the computation of the SFE. Fixing the SFE by selecting a fixed amount of impervious area can mitigate the disparities among categories.

The second reason is that rate factors are poorly documented for residential parcels larger than two acres. For larger parcels in general, it is reasonable to assume that a significant portion of the land is undeveloped. Since undeveloped lands are excluded from the rate base of all six approaches[9], discounting the runoff contribution from the undeveloped portions of large residential parcels is a consistent extension. In the absence of accurate data, judgement must be used in fixing SFEs for larger parcels.

It happens that, for parcels less than one acre in size, values ranging from 2,500 to 3,000 square feet of impervious area commonly are found in the engineering literature. Thus, an estimate of 3,000 square feet serves as a reasonable choice for fixed value of the SFE; this value is used in two of the six cases. For reasons of equity, larger parcels have been assigned the value of 1.5 SFEs. This corresponds to a value of 4,500 square feet of impervious area. This ratio of 1 to 1.5 is used in the two of the six approaches. These

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[9] As a sensitivity analysis of one of the six approaches (Approach 1), undeveloped lands are included in the rate base and the results are provided.

two approaches are cases having two residential subcategories, i.e., less than and greater than one acre.

In the user charge approaches which use detailed residential subcategories, the transition from small to large rates is distributed gradually over more categories. As a consequence, the stark inequity does not arise as it does when only two subcategories are used. Thus for the approaches tabulated above having detailed residential categories, the traditional rate factor approach produces a reasonably equitable outcome.

One of the six approaches is a hybrid. It uses both the traditional application of rate factors and the method of fixing the SFE based on professional judgement. This particular case has only two residential subcategories (residential parcels less than and those greater than one acre). The impervious area for the small subcategory is computed using rate factors, and the larger subcategory is fixed at 1.5 SFEs, i.e., 1.5 times the impervious area of the small subcategory.

This discussion shows that the six approaches can be grouped according to how the residential SFEs were determined. That is, by traditional use of the rate factors (i.e., calculated), use of professional judgement to choose reasonable SFE values (i.e., fixed), or by a combination of the two (a hybrid). Table 2 indicates how SFEs are determined for each approach.

Specificity of Residential Acreage Categories. In practice, utility charge systems must be adequately detailed without being overly cumbersome. In the general approach described Section 2, a simple procedure is applied repeatedly for each land use category under the assumption that the physical characteristics of parcels within a category are similar enough to be aggregated. The aggregation arises explicitly in the form of using the same runoff coefficient (rate factor) for all of the parcels within a category. Alternatively, parcels within any land use category can be grouped into subcategories according to different acreage intervals, and assigned slightly different rate factors. This increased detail is intended to better represent the variations within the overall land use category. When considering actual implementation of a charge system, such increases in detail are usually gained at the expense of increased administrative burden.

For the residential land use category, two variations were considered in this study. In the first case, two subcategories were defined. Residential parcels were classified as being either less than or equal to one acre (Res. < 1), or being greater than one acre (Res. > 1). In the second case, detailed parcel size intervals were used beginning with quarter acre increments for the range of 0 to 0.5 acres, then half acre increments up until 2 acres, then one acre increments up until 5 acres, then five acre increments through 20 acres and so on (see Appendix A). The approaches which used these two variations are summarized in Table 2.

Table 2

Similarities and Differences Among the Six Revenue Estimation Approaches

Three Differentiating Characteristics	Six Approaches					
	Fixed SFE (3,000)	Fixed SFE (4,000)	Quantile	Detailed	Simplified	Grouped RF
Residential SFEs (Method of Determining the SFEs)	Fixed	Fixed	Calculated	Calculated	Hybrid	Calculated
Residential Categories (Number of Residential Subcategories)	Two	Two	Two	Detailed	Two	Detailed
Rate Factors (The Number of Different Rate Factors Used)	Six	Six	Nine	Many	Three	Four

Specificity of the Runoff Rate Factors. A third way to differentiate the six approaches is according to the level of specificity of the rate factors. Again, a trade off between precision and the associated administrative burden motivates the discussion. Recall a similar trade off motivated the consideration of approaches which utilized detailed residential subcategories versus categories that were collapsed down to two (less than or greater than 1 acre).

In the case of rate factors, several existing utilities assign rate factors on the basis of making measurements of impervious area via surveys or by digitizing aerial photos. In this case, the different values of rate factors constitute a continuum. In other cases, a discrete number of rate factors are associated with land use categories. In the latter case, the number of different rate factors used in the charge scheme may be reduced further through aggregation.

Two approaches are used herein. One involves aggregation or grouping of rate factors; the other involves use of different rate factor for each land use category (i.e., desegregated rate factors). This study considers two approaches that group rate factors into 2 or 4 different categories, while the remaining four approaches desegregate rate factors into either roughly 8 categories or a continuum of values. The specific approaches are summarized above in Table 2.

As mentioned previously, when considering implementation of an actual user charge system, aggregating information, such as the number of rate factors, reduces administrative burden. In the context of implementation, a second motivation exists for aggregating rate factors, a reduction in contested charges. If from the beginning the utility concedes that the approach is not precise, disputes over details, such as the accuracy of survey work, and statistical representations of land use categories become moot.

3.1.3 Descriptions of Six Alternative User Charge Approaches

The six different approaches are identified by simple names in addition to being numbered. The six approaches summarized below are: Fixed SFE (3,000), Fixed SFE (4,000), Quantile, Detailed, Simplified, Grouped RF (rate factors). A more detailed description of the six approaches is provided in Appendix C.

Approach 1 "Fixed SFE (3,000)": The name of this approach is drawn from the fact that the residential SFEs were fixed by professional judgment to 3,000 square feet for residential parcels less than one acre in area.

The residential category is divided into two groups: parcels < 1 acre, and parcels > 1 acre. The following average estimated impervious areas are assumed for each residential category:

3,000 sq. ft. impervious for parcels < 1 acre (This defines the unit SFE)
4,500 sq. ft. impervious for parcels > 1 acre (1.5 SFE)

The degree of specificity of rate factors is mid-ranged with approximately six different rate factors being used for different land use categories.

Approach 2 "Fixed SFE (4,000)": Like Approach 1, the residential category is divided into two groups: parcels < 1 acre, and parcels > 1 acre. The following average estimated impervious areas are assumed for each residential category:

4,000 sq. ft. impervious for parcels < 1 acre (This defines the unit SFE)
6,000 sq. ft. impervious for parcels > 1 acre (1.5 SFE)

The degree of specificity of rate factors is mid-ranged with approximately six different rate factors being used for different land use categories.

At first glance, it may seem counter intuitive that using a higher impervious area for residential parcels would produce a lower revenue estimate. To see how this works, consider the following example in which a comparison is made between SFEs defined to be 4,000 sq.ft./SFE versus 3,000 sq.ft./SFE.

A commercial parcel of 12,000 sq.ft. of impervious area under the Fixed SFE (4,000) approach pays $20/SFE or (12,000/4,000) x $20 /sq.ft. = $60. Under the Fixed SFE (3,000) approach, the same commercial parcel is assessed (12,000/3,000) x $20 /sq.ft. = $80. In both approaches, the same amount of revenue is generated by the residential parcels because their rates are fixed by definition at $20 and $30 per parcel for the two residential subcategories. Consequently, the residential land use category does not contribute to differences in the projected revenue.

Approach 3 "Quantile": Again, the residential category is divided into two groups: Res. $\leq$ 1 acre, and Res. > 1 acre. Rate factors are used to determine SFEs for the residential land use category.

This approach corrects for sharp differences in user charges between smaller and larger parcels that arise when the residential land use category is broken into two categories and mean acreage values are used to represent typical parcel size. An alternative to use of mean acreage values, which are often skewed by infrequent extreme values, is to use the median (50th percentile) parcel size (for parcels less than one acre) and the 90th percentile size as the typical value for parcels greater than one acre[10].

The level of specificity of rate factors is slightly increased above that of Approaches 1 and 2 with approximately eight different rate factors being used for different land use categories.

Approach 4 "Detailed": For this approach, the residential category is divided into about 20 acreage intervals according to the data available (See Appendix A, page A-2). In addition to the high level of specificity of the residential category, the rate factors are highly detailed since a different rate factor is assigned to each of the 20 residential acreage categories. The SFEs for residential parcels are all computed using rate factors as opposed to being fixed.

This approach represents the most detailed revenue estimation approach of the study, although it is quite simplified in comparison to actual implementation methods.

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[10] It is the parcel size below which 90 percent of the parcels are smaller, or stated another way, is the parcel size for which only 10 percent of the parcels are larger.

Approach 5 "Simplified": This approach was motivated by a key aspect of the approach used in Austin, Texas, which classifies each land use category into one of three rate factor groups 0.10, 0.40, or 0.80.

This approach uses rate factors to determine the SFE for the residential parcels < 1 acre, but fixes the SFE for parcels > 1 acre at 1.5 SFEs. Consequently, the value of the unit SFE can rise and fall for different estimates between counties, while the SFE for parcels > 1 acre follows that rise and fall. This combined use of rate factors to compute the unit SFE and fixed SFEs for the parcels > 1 acre is referred to above in Table 2 as a hybrid treatment of residential SFEs.

This approach derives its name from the fact that it is characterized by having two simplified features; the collapsed rate factors and only two residential categories.

Approach 6 "Grouped RF": This approach is based loosely on the Ft. Collins, Texas approach, which attempts to minimize administrative burdens and contested charges by aggregating users into relatively broad rate factor categories.

Like the Detailed Approach, the level of specificity of the residential category is highly detailed, and the SFEs for residential parcels are all computed using rate factors. Unlike the Detailed Approach, however, the level of specificity of the rate factors is simplified by grouping (hence the name Grouped RF).

The SFE was calculated as (0.60) x (mean acreage) using the smallest residential acreage interval (0 - 0.25 acres), where 0.60 is the rate factor.

3.2 Revenue Estimation Results

The presentation of results begins with an overview of the State total revenue-generating figures and some broad observations. An in depth look at results for five counties representing varying degrees of development is then presented. This is intended to illustrate some of the relationships between the different approaches and how they perform for counties with different development patterns. In addition, several variations on the Fixed SFE (3,000) approach were investigated to explore the sensitivity of the base approach. Finally, the limitations of the study are discussed.

3.2.1 Summary Results

Table 3 includes estimates of total utility revenues for each county and Baltimore City for each of the six approaches. These are summed to provide an estimate of total state wide revenues. A glance at the total revenue figures in Table 3 reveals little difference among the six approaches. The median revenue estimate is $67,853,200 with a difference in minimum and maximum estimates of about $11 Million. Fixed SFE (3,000), and Grouped RF tend to produce the largest estimates, while Fixed SFE (4,000) and the

Simplified Approach usually produce the smallest estimates.

The revenue estimates for each county respond differently to the different approaches; some increase when going from one approach to another while others decrease or remain essentially unchanged. The most common reason for this observation results from differences in development patterns among counties. Less developed counties tend to have larger residential parcels, fewer industrial and commercial parcels and more land in agricultural use which was not included in the rate base for the six approaches. Several particular examples of these occurrences are discussed in the subsection on sensitivity analyses.

Table 4 presents the minimum and maximum estimates for each county and indicates the approach that produced the extreme. From Table 4, the difference between maximum and minimum revenue estimates for a given county are found to range from $250,100 (Kent County, Simplified Approach) to $10,129,400 (Baltimore Co., Fixed SFE (3,000) Approach). This excludes the maximum estimate for Baltimore City of $15,160,000 (Simplified Approach).

Table 5 summarizes the approaches that most often produced the high and low estimates. These findings are presented as a percentage of the counties for which an approach resulted in a particular outcome of the revenue estimate. For example, the Simplified Approach yielded the lowest estimate for 83% of the counties, and in 54% of the counties, the Fixed SFE (4,000) Approach yielded the second lowest estimate.

Several observations are noteworthy. The Simplified Approach most often generates the lowest county-level estimates, and the Fixed SFE (4,000) Approach consistently yields the second lowest estimate. The picture is less clear for approaches that generate high estimates. The Fixed SFE (3,000) and Grouped RF approaches nearly share equally in generating high revenue estimates.

It is also interesting to note that the projection for the Detailed Approach falls in the middle of the other projections. Recall that the Detailed Approach is an attempt to build a revenue estimation scheme that more accurately reflects physical runoff conditions for residential users. The Detailed Approach is also intended to mimic the greater amount of detail (and administrative burden) that is associated with the actual implementation of a utility charge system.

The estimates for Baltimore City also display a large variance ($7.9 - $15.2 Million). Furthermore, the approach that produced the maximum revenue estimate for Baltimore City is the Simplified Approach, which is more typically associated with producing minimum estimates for the other counties. The reason for this deviation is discussed below.

The reason most of the estimates for most counties are small for the Simplified Approach is related to both the method of determining the SFEs and the specificity of the residential land use category. The SFEs for Res. < 1 acre are determined using rate factors and average acreage. In most cases, this produces a large estimated impervious area (typical SFE > 6,000 sq. ft. as compared with 3,000 and 4,000 for Approaches 1 and 2) which in turn lowers the number of SFEs for nonresidential categories. In Baltimore City, however, the average acreage is very small (0.07 versus a typical 0.38). This sharply decreased the estimated impervious area for Res. < 1 acre (i.e., the SFE) and consequently increased the number of SFEs in the nonresidential sectors. Specific observations, like the Baltimore City case are difficult to discern from the summary-level results. To address the micro-level observations, it is helpful to consider several case studies. This has been done below for five counties that represent a variety of development patterns.

Table 3

Potential Stormwater Utility Revenues for Maryland Counties and Baltimore City for Five Alternative Charge Approaches

Counties/City	Fixed SFE 3,000 (Approach 1)	Fixed SFE 4,000 (Approach 2)	Quantile (Approach 3)	Detailed (Approach 4)	Simplified* (Approach 5)	Grouped RF** (Approach 6)
Allegany	$1,979,700	$1,616,600	$1,731,000	$1,878,800	$1,591,200	$2,222,100
Anne Arundel	$5,585,900	$4,744,800	$6,114,300	$4,574,000	$4,478,500	$4,686,900
Baltimore	$10,129,400	$8,592,800	$9,236,800	$9,803,000	$10,068,300	$9,904,200
Calvert	$969,100	$812,300	$794,900	$1,017,400	$690,200	$1,234,200
Caroline	$515,800	$427,300	$424,300	$463,300	$365,000	$575,400
Carroll	$1,705,900	$1,456,200	$1,545,900	$1,871,300	$1,247,700	$2,138,600
Cecil	$2,492,000	$1,977,500	$2,036,900	$2,393,200	$1,434,900	$2,582,500
Charles	$1,383,700	$1,169,600	$1,864,800	$1,447,200	$1,088,800	$1,902,800
Dorchester	$914,000	$741,700	$855,800	$878,000	$604,600	$954,100
Frederick	$2,850,800	$2,339,400	$2,605,200	$3,136,800	$1,931,900	$3,315,400
Garrett	$4,646,500	$3,540,200	$2,316,400	$2,901,000	$1,788,200	$3,214,600
Harford	$3,374,300	$2,741,000	$3,165,100	$3,231,100	$2,294,900	$3,432,800
Howard	$2,769,000	$2,286,700	$2,347,000	$3,183,800	$2,075,600	$3,269,800
Kent	$384,200	$320,500	$369,400	$345,100	$250,100	$369,000
Montgomery	$6,582,200	$5,768,900	$5,082,300	$4,975,600	$5,463,800	$5,038,700
Prince George's	$8,324,000	$6,936,400	$9,034,600	$6,518,800	$7,592,300	$6,520,500
Queen Anne's	$714,700	$592,000	$595,500	$631,300	$450,700	$643,800
Somerset	$578,400	$472,900	$420,500	$492,100	$349,500	$506,300
St. Mary's	$1,459,700	$1,194,600	$1,073,800	$1,254,400	$835,600	$1,458,100
Talbot	$667,700	$554,700	$814,700	$610,100	$482,000	$611,100
Washington	$2,138,600	$1,765,300	$2,058,400	$1,930,600	$1,538,700	$2,150,600
Wicomico	$1,239,000	$1,042,000	$1,129,900	$1,149,100	$914,400	$1,324,500
Worcester	$2,061,300	$1,501,200	$2,567,000	$1,671,000	$1,394,800	$1,885,900
Baltimore City	$8,671,900	$7,961,900	$9,959,200	$11,205,700	$15,160,000	$11,320,500
TOTAL	$72,301,400	$60,556,500	$68,143,700	$67,562,700	$64,152,800	$71,262,400

* Estimates cited here are based on a variation of the Austin, TX approach
** Estimates cited here are based on a variation of the Ft. Collins, TX approach

Notes: All estimations assume that $20 is assessed for typical residential parcels (i.e., parcels less than one acre or less than one quarter acre depending on the approach).

Estimates are based on 1987 land use data.

Table 4

Minimum and Maximum Revenue Projections Selected from the Six Alternative Approaches

Counties/City	Minimum	Maximum
Allegany	$1,590,700[5]	$2,222,100[6]
Anne Arundel	$4,478,500[5]	$6,114,300[3]
Baltimore	$8,592,800[3]	$10,129,400[1]
Calvert	$690,200[5]	$1,234,200[6]
Caroline	$365,000[5]	$575,400[6]
Carroll	$1,247,700[5]	$2,138,600[6]
Cecil	$1,434,900[5]	$2,582,500[6]
Charles	$1,088,800[5]	$1,902,800[6]
Dorchester	$604,800[5]	$954,100[6]
Frederick	$1,931,900[5]	$3,315,400[6]
Garrett	$1,788,200[5]	$4,646,500[1]
Harford	$2,294,900[5]	$3,432,800[6]
Howard	$2,075,600[5]	$3,269,800[6]
Kent	$250,100[5]	$384,200[1]
Montgomery	$4,975,600[4]	$6,582,200[1]
Prince George's	$6,518,800[4]	$9,034,600[3]
Queen Anne's	$450,700[5]	$714,700[1]
Somerset	$349,500[5]	$506,300[6]
St. Mary's	$835,700[5]	$1,459,700[1]
Talbot	$482,000[5]	$814,700[3]
Washington	$1,538,700[5]	$2,150,600[6]
Wicomico	$914,400[5]	$1,324,500[6]
Worcester	$1,394,800[5]	$2,567,000[3]
Baltimore City	$7,961,900[2]	$15,160,000[5]
TOTAL	$53,856,200	$83,216,400

Note: Superscripts correspond to the revenue estimation approach that produced the given maximum or minimum:

1 FIXED SFE (3,000)
2 FIXED SFE (4,000)
3 QUANTILE
4 DETAILED
5 SIMPLIFIED
6 GROUPED RF

Table 5

Approaches Most often Responsible for Large and Small Revenue Estimates

Size of Revenue Estimate	Approach Most Often Responsible	Percentage of Counties
Highest	Grouped RF Approach	50 %
2nd Highest	Fixed SFE (3,000) Approach	46 %
Mid Range	Quantile or Detailed Approaches	60 %
2nd Lowest	Fixed SFE (4,000) Approach	54 %
Lowest	Simplified Approach	83 %

3.2.2 A Closer Look at Results From Five Counties

The counties considered in this subsection are Baltimore, Carroll, Cecil, Harford, and Montgomery. The counties represent a variety of land development patterns. Baltimore and Montgomery counties are urban, while Carroll and Harford are developing. Cecil is mostly rural. They also represent cases in which development of estimates required special treatment of land use categories including the residential category. This was the case with both Baltimore County and Montgomery County (as well as Baltimore City). Appendix B presents worksheets for Montgomery County and Cecil County that illustrate this difference. Cecil County is representative of the way land use categories were typically reported by the Office of Planning.

Table 6 shows the projected revenue figures generated by the six approaches for the five selected counties. It also shows the distribution of the total charge among the following five land use categories as a percentage: Residential (below and above 1 acre), Commercial, Industrial, and the grouping of All Other land use categories.

For these five counties Montgomery County displays the smallest difference between its highest and lowest projection, while Cecil County show the largest difference. For Montgomery County, the highest projection is just 25% greater than the lowest projection, while the corresponding ratio is 44% for Cecil County. In most cases, the two highest and two lowest projections are practically the same.

Table 6

Percentage of Payment By Land Use Categories

Counties	Revenues	Residential < 1 acre	Residential > 1 acre	Commercial	Industrial	All Others
Baltimore						
1) Fixed SFE (3,000)	$10,129,400	31%	5%	25%	24%	15%
2) Fixed SFE (4,000)	$8,592,800	37%	6%	22%	21%	14%
3) Quantile	$9,236,800	34%	6%	22%	22%	16%
4) Detailed	$9,803,000	33%	9%	21%	20%	17%
5) Simplified	$10,069,300	31%	6%	20%	23%	20%
6) Grouped RF	$9,904,200	32%	10%	22%	19%	17%
Carroll						
1) Fixed SFE (3,000)	$1,705,900	24%	16%	44%	13%	3%
2) Fixed SFE (4,000)	$1,456,200	28%	19%	39%	11%	3%
3) Quantile	$1,545,900	26%	36%	22%	7%	9%
4) Detailed	$1,871,300	27%	25%	28%	8%	12%
5) Simplified	$1,247,700	33%	29%	21%	7%	10%
6) Grouped RF	$2,138,600	18%	21%	26%	7%	28%
Cecil						
1) Fixed SFE (3,000)	$2,492,000	11%	6%	68%	14%	1%
2) Fixed SFE (4,000)	$1,977,500	14%	7%	65%	13%	1%
3) Quantile	$2,036,900	14%	14%	58%	12%	2%
4) Detailed	$2,393,200	15%	12%	58%	12%	3%
5) Simplified	$1,434,900	20%	14%	52%	12%	2%
6) Grouped RF	$2,582,500	12%	16%	57%	10%	5%
Harford						
1) Fixed SFE (3,000)	$3,734,300	18%	8%	32%	38%	4%
2) Fixed SFE (4,000)	$2,741,000	22%	10%	30%	35%	3%
3) Quantile	$3,165,100	19%	18%	26%	30%	7%
4) Detailed	$3,231,100	21%	15%	25%	30%	9%
5) Simplified	$2,294,900	26%	16%	22%	30%	6%
6) Grouped RF	$3,432,800	18%	16%	25%	26%	15%
Montgomery						
1) Fixed SFE (3,000)	$6,582,200	48%	5%	34%	6%	7%
2) Fixed SFE (4,000)	$5,768,900	54%	5%	29%	5%	7%
3) Quantile	$5,082,300	57%	5%	26%	4%	8%
4) Detailed	$4,975,600	50%	8%	26%	4%	12%
5) Simplified	$5,463,800	51%	8%	25%	5%	11%
6) Grouped RF	$5,038,700	46%	7%	27%	4%	16%

The distribution of charges among the land use categories is apparently determined primarily by the specific characteristics of each county rather than the different approaches. That is to say, within a given county, the proportion of the total revenue generated by each land use category generally remains about the same from approach to approach.

Having said this, however, Table 6 reveals several cases in which the distribution of charges do vary between approaches within a given county. For example, residential parcels greater than one acre bear an increased proportion of the cost for Approach 3 (Quantile) for all five counties. Other less pronounced variations in the residential category are also apparent. Another redistribution is evident between Approaches 1 and 5 for the Commercial sector in Carroll County. In Approach 1 (Fixed SFE (3,000)), the Commercial sector bears 44% of the cost, while in Approach 5 (Simplified), it bears only 21%. Note also the general trend in the "All Others" column for Carroll County; the cost burden ranges from 3% for Approach 1 (Fixed SFE (3,000)) to 28% for Approach 6 (Grouped RF).

As stated above, the most pronounced differences in the distribution of revenues arise due to differences among counties rather than among approaches within a county. For instance, Montgomery County has a large residential sector reflected strongly in Table 6; the residential sector bears between 53% to 62% of the charge depending on the revenue estimation approach used. This compares to Baltimore County (another developed county) in which the residential sector bears between 37% to 54%, and Cecil County (a rural county) in which the residential sector bears between 17% to 34% of the cost.

Notice that, while Cecil County is relatively small, the proportion of the cost borne by its commercial sector is large compared to other counties. This is a result of two factors. First, the average size of a commercial parcel in Cecil County is 6.6 acres while in Harford County it is 2.2 acres and in Baltimore County it is 2.0 acres. Second, the proportion of commercial parcels to other parcels for Cecil County is larger than for other counties. For example, the ratio of commercial parcels to residential parcels in Cecil County is about 6%. This compares with Harford County at 4% and to Baltimore County at 3%.

Another dynamic of the utility charge systems becomes apparent when analyzing what underlies the similar proportions of revenue generated by the commercial and industrial sectors of Harford County. The similar proportions could suggest that the number of industrial and commercial parcels are equal. In actuality, however, Harford County has 1,632 commercial parcels and only 72 industrial parcels.

The reason for this even share of the revenue base is that the commercial sector is composed of a large number of small parcels, and the industrial sector has a small number of large parcels. Consequently, the estimated average annual charge for the industrial sector in Harford County is roughly 27 times higher than that of the commercial sector (e.g, $13,182/year per industrial parcel and $496/year per commercial parcel using the Fixed SFE (3,000) Approach).

Clearly, comparisons of the type presented above are numerous. However, the factors to consider when assessing how the revenues will be distributed among land use categories in a particular county are the same. These considerations are parcel sizes, the numbers of parcels, and the proportional distribution of these two measures between the different land use categories. When designing a utility charge system for a particular jurisdiction, more detailed analyses of this type must be conducted in order to fully understand the efficiency and equity of the system.

3.2.3 Sensitivity Analyses

The principal result of the study, stated previously in the summary results, is that the total revenue estimates are quite similar for all six approaches. Recall that the median of the six total revenue estimates was presented earlier as $67,853,200 with a difference between minimum and maximum estimates of about $11 Million.

The sensitivity of the total revenue estimate can be explored by considering the following hypothetical situation. That is, suppose that each county were independently to select the approach that yielded the lowest revenue estimate and these county revenue estimates were summed to arrive at a total revenue projection for the State. Alternatively, suppose that each county were to select the highest estimate and these were summed in a similar fashion. Such State revenue estimates provide an indication of potential lower and upper bounds on the total State revenue estimate that range from $53,856,200 to $83,216,400.

Another simple sensitivity analysis consists of determining the new estimates when the annual charge is changed to $15 or $25 per SFE for the Detailed Approach which lies in the middle of the range of six estimates. When an annual charge of $15/SFE is assessed, the total state revenue estimate drops to $54,226,050. When an annual charge of $25/SFE is assessed, the total state revenue estimate rises to $90,376,750. These new bounds are exactly 25 percent below and above the original figure of $72,301,400 just as $15 and $25 are 25 percent below and above the original $20 annual charge.

To test the sensitivity of the approaches to changes in the underlying simplifying assumptions, the Fixed SFE (3,000) approach has been used as the test case. It is assumed that the other approaches would respond similarly to the same sensitivity analyses. The analyses included the following:

1) Assumptions about which land use categories would be included in the rate base. That is, inclusion or exclusion of Agricultural, Exempt, and Unimproved land use categories.

2) Fixed SFE (3,000) with the rate factor for the residential agriculture land use category set at 0.1 versus fixing the impervious area at 4,500 sq. ft. (Note that this analysis is unique to the Fixed SFE (3,000) Approach).

An Illustrative Sensitivity Analysis: Removal of Elkton Parcels From Rate Base

The issue of nonparticipation by local municipalities in county stormwater programs was mentioned earlier in this report. If a city has its own stormwater management program and does not participate in the county program, the county revenue base will be smaller. As an illustration of the potential impact of a nonparticipating city, we considered a specific case for Cecil County, Maryland.

The City of Elkton (Cecil County) has an independent stormwater control system, and thus Elkton is not likely to participate in a county-wide utility. We assessed the impact of removing Elkton from the rate base by reevaluating four of the six utility charge approaches. This entailed subtracting the appropriate number of parcels for each land use category based on information in property tax assessment tables, and adjusting the average parcel size. In general, the average parcel size of the remaining parcels increased slightly. This seems consistent with the general tendency for lot sizes to be smaller within city limits.

The analysis was based on the assumption that residential parcels less than one acre in size would be assessed a fixed annual charge of $20. This results in each of the alternative approaches generating different revenue totals rather than being fixed to meet a $1.5 Million revenue target. Depending on the charge approach, the percentage decrease in revenues resulting from the removal of Elkton from the rate base ranged from 3.9% to 5.4%. Since the different charge structures generated varying total revenues prior to the removal of Elkton parcels, the decrease in the dollar amounts are not directly comparable. The analysis results are presented in Table 7.

Table 7

Sensitivity Analysis: Removal of Elkton Parcels From User Charge Rate Base

Charge Approach	Revenues Generated (Elkton Included)	Revenues Generated (Elkton Excluded)	Revenue Decrease	Percent Decrease
Fixed SFE 3000	$2,268,600	$2,180,600	$88,000	3.9%
Fixed SFE 4000	$1,823,560	$1,745,340	$78,220	4.3%
Quantile	$4,009,720	$3,821,040	$188,680	4.7%
Simplified	$1,333,940	$1,262,520	$71,420	5.4%

Rate Base Considerations. Table 8, column C summarizes the results of including Agricultural, Exempt, and Unimproved land use categories in the Fixed SFE (3,000) Approach; the original estimate is given in column A. This revised estimate shows a

dramatic increase from $72,360,700 to $213,795,200.

A rate factor of 0.1 was used for the Agricultural, Undeveloped, and Exempt land use categories. The rate factor of 0.1 was selected as an arbitrary low value. This category includes both intensely developed lands such as schools, and government building, as well as undeveloped park lands. Given that relatively small rate factors were used in this revised estimate, the huge increase in the state revenue estimate reflects the large land area that has been introduced by including the new land use categories.

It is worth noting that intermediate analyses, which are constituted by introducing subsets of the three additional land use categories, would produce intermediate estimates below $213,795,200. Thus, the consideration of these three land use categories provides a fair sense of the true upper bound on the original Fixed SFE (3,000) approach.

Sensitivity of the Residential Agricultural Category. Several examples have been presented that represent alternative ways the estimated impervious area of residential parcels may be treated. The two methods used in this study were: 1) multiplying a rate factor by the average parcel size, and 2) selecting a value based on professional judgement. All else being equal, estimates using the Fixed SFE (3,000) Approach were generated in which the estimated impervious area for the Residential Agricultural Category was altered.

This analysis is intended to be indicative of the outcome of a minor change in any of the approaches. It differs from the other changes to the residential category discussed previously because those changes dictated the value of the SFE which in turn affected outcomes of the other land use categories.

Comparison of columns A and B in Table 8 summarizes the results of this analysis. The original Fixed SFE (3,000) Approach (Column A) fixes the impervious area of the Residential Agricultural category at 4,500 sq. ft. The modification (Column B) uses a small rate factor of 0.1 to calculate the impervious area. The increase in the estimated total revenue from $72,301,400 to $75,565,700 indicates that the use of the rate factor results in a smaller estimated impervious area.

Table 8

Variations on the Fixed SFE (3,000) Revenue Estimation Approach

Counties/City	(A) Fixed SFE 3,000 (Res. Ag. Imp. Acreage Fixed at 4,500 sq. ft. per Parcel)	(B) Fixed SFE 3,000 (Res. Ag. Imp. Acreage based on 0.1 Rate Factor)	(C) Fixed SFE 3,000 (Inclusion of Agri., Exempt and Unimproved in Rate Base)
Allegany	$1,979,700	$1,985,000	$9,183,900
Anne Arundel	$5,585,900	$5,708,000	$11,700,000
Baltimore	$10,129,400	$10,489,600	$19,278,900
Calvert	$969,100	$1,058,700	$3,807,700
Caroline	$515,800	$613,000	$5,957,400
Carroll	$1,705,900	$2,109,300	$8,821,700
Cecil	$2,492,000	$2,550,600	$7,879,800
Charles	$1,383,700	$1,547,500	$8,424,800
Dorchester	$914,000	$961,500	$10,728,700
Frederick	$2,850,800	$2,884,000	$13,563,600
Garrett	$4,646,500	$4,661,000	$17,689,000
Harford	$3,374,300	$3,568,700	$9,142,000
Howard	$2,769,000	$2,795,500	$5,897,000
Kent	$384,200	$395,000	$4,820,500
Montgomery	$6,582,200	$6,582,200	$12,604,500
Prince George's	$8,324,000	$8,342,000	$5,009,800
Queen Anne's	$714,700	$776,700	$7,166,000
Somerset	$578,400	$648,200	$6,133,000
St. Mary's	$1,459,700	$1,450,000	$7,264,900
Talbot	$667,700	$701,400	$5,078,300
Washington	$2,138,600	$2,210,500	$9,547,300
Wicomico	$1,239,000	$1,388,000	$4,435,000
Worcester	$2,061,300	$2,171,200	$10,442,500
Baltimore City	$8,671,900	$9,968,100	$9,218,900
TOTAL	$72,301,400	$75,565,700	$213,795,200

3.2.4 Limitations

The scope of this study is limited to providing a rough planning estimation of the revenue generating capacity of a stormwater management utility in Maryland. The effects of the simplifying assumptions used in this study and their potential effects are discussed below. In addition, another level of analysis considers the limitations of the utility concept itself.

Limitations on interpreting the Study Results. The reader may notice a close relationship between the discussion of limitations and that of sensitivity analysis. In short, where a simple sensitivity analysis of the effects of an assumption is not possible, the simplifying assumptions are discussed here as limitations.

As mentioned earlier in this report, average parcel area estimates are vulnerable to being skewed upward by a small number of large parcels. This is corrected for, to some degree, (and possibly over corrected) in the Fixed SFE (3,000) and Fixed SFE (4,000) approaches for the residential categories, but is not addressed for any of the other categories. A probable example of this, although it has not been confirmed by accessing the original data, arises in Garrett County. In this case the average acre per parcel for the commercial category is 30 acres. Other typical average parcel sizes for this category are about 3 acres and at most 6 acres.

Not accounting for the effects of credits for on-site stormwater best management practices (BMPs) contributes to overestimation of revenues. In most existing utilities, credits are awarded to property owners and groups of owners who establish and maintain stormwater management mechanisms to handel their runoff. For example, large industrial sites may construct retention ponds and, consequently, reduce their utility charge. Similarly, newly developed town houses may share stormwater management ponds making the home owners eligible for a credit.

Several simplifying assumptions are worth noting. It is unclear if accounting for these would increase or decrease the revenue estimation. These include the aggregation of all sites within a land use category, which does not properly reflect the variability among parcels. Again, because averages are used, it is possible that the aggregation of industrial parcels, for example, over estimates the revenue potential. However, it is also possible that for other reasons the aggregation yields an under estimation.

In the sensitivity analysis above that assessed the inclusion of the Exempt land use category, a value of 0.1 was used for the rate factor. It is not clear whether this value is accurate because the exempt category includes such a wide variety of land uses (e.g., parks, hospitals, churches, airports). Although accuracy is in question, the value is most likely an underestimate and thus does not exaggerate the potential revenues from this sector.

Limits of the Utility Concept The utility concept as typically applied has several inherent limitations. One is that the runoff coefficients used to represent runoff volumes are not precise. Even if the impervious area per parcel is known, other factors including surface slope, soil type, and antecedent soil moisture that are known to affect runoff volumes are not considered. Incorporating the detailed data necessary to address these additional variables usually is not considered cost effective.

A significant underlying concern with excess stormwater is that it carries nutrients into the Chesapeake Bay resulting in reduced water quality. Most utility charge structures do not attempt to assess additional charges for users who introduce higher concentrations of nutrients. The same issue applies to other types of pollutants as well, including grease, industrial chemicals, and pesticides. Credits for on-site stormwater management address this issue to some degree, but only in an indirect manner.

Several trade-offs occur with regard to equity issues when using a utility approach. For instance, an individual's ability to pay is not considered in the utility charge structure as it is in the case of property tax assessments. In the later case, the assumption[11] is that someone owning an expensive piece of property has higher financial means, and thereby, can pay proportionately more of the share.

The utility approach also does not necessarily reflect the benefits received by those who pay the most. Other user charges often have increased benefits associated with increased charges. This is the case for highway tolls, and entry charges for use of public parks, or boat launches.

In the case of the stormwater utility charge, the underlying philosophy is that the more the user pollutes or places a burden on the sewer system, the more the user pays. Thus, more runoff from a property owner's parcel results in a higher charge. If the user is in a rural area and the water from his land traverses its way to the bay via natural channels rather than through the municipal sewer system, it could be argued that the user charge is not equitable since he is not using the publicly maintained system. Issues of this type require resolution on a case by case basis and may be addressed by use of a modified charge structure.

[11] This assumption is increasingly difficult to make in view of the number of people who have seen property values increase dramatically, while their modest financial means have not kept pace.

GEOGRAPHY: CECIL COUNTY-SUMMARY REDISTRIBUTED

TAPE DATE APR 87

	IMPROVED					UNIMPROVED					TOTAL	
LAND USE	NO. OF PARCELS ACRES SPEC.	ACRES	AVERAGE ACRES	NO. OF PARCELS ACRES NOT SPEC	TOTAL ACRES	NO. OF PARCELS ACRES SPEC.	ACRES	AVERAGE ACRES	NO. OF PARCELS ACRES NOT SPEC	TOTAL ACRES	PARCELS	ACRES
AGRICULTURAL	957	103115	107.7	0	103115	402	25554	63.6	0	25554	1359	128669
COMMERCIAL	1085	7193	6.6	0	7193	620	7379	11.9	0	7379	1705	14572
COMM RES	1	9	9.0	0	9	1	15	15.0	0	15	2	24
EXEMPT	468	19911	42.5	0	19911	426	5190	12.2	0	5190	894	25101
INDUSTRIAL	43	1694	39.4	0	1694	41	448	10.9	0	448	84	2142
APARTMENTS	17	34	2.0	0	34	0	0	.0	0	0	17	34
NOT PERC	28	48	1.7	0	48	306	749	2.4	0	749	334	797
RESIDENTIAL	18992	27409	1.4	0	27409	8850	21502	2.4	0	21502	27842	48911
RES AGR	189	2214	11.7	0	2214	229	1719	7.5	0	1719	418	3933
RES COMM	1	1	1.0	0	1	1	0	.0	0	0	2	1
CONDOMINIUM	5	0	.0	0	0	1	0	.0	0	0	6	0
CONDO COMM	0	0	.0	0	0	0	0	.0	0	0	0	0
MARSHLAND	0	0	.0	0	0	1	16	16.0	0	16	1	16
DISTRICT TOTAL	21786	161628		0	161628	10878	62572		0	62572	32664	224200

TAPE DATE Aug 87

GEOGRAPHY: CECIL COUNTY-SUMMARY REDISTRIBUTED
LAND USE CODE: RESIDENTIAL

IMPROVED PARCELS(ACRES SPECIFIED)

ACREAGE INTERVALS	NUMBER OF PARCELS	PERCENT OF TOTAL PARCELS	CUMULATIVE NUMBER OF PARCELS	CUMULATIVE % OF TOTAL PARCELS	ACREAGE: NUMBER OF ACRES	PERCENT OF TOTAL ACRES	CUMULATIVE NUMBER OF ACRES	CUMULATIVE % OF TOTAL ACRES	AVERAGE ACREAGE	CUMULATIVE AVERAGE ACREAGE
0 - .25	6181	32.55	6181	32.55	823	3.00	823	3.00	.13	.13
>.25 - .5	3743	19.71	9924	52.25	1498	5.47	2322	8.47	.40	.23
>.5 - 1.0	4209	22.16	14133	74.42	3127	11.41	5449	19.88	.74	.39
>1.0 - 1.5	1538	8.10	15671	82.51	1869	6.82	7318	26.70	1.22	.47
>1.5 - 2.0	785	4.13	16456	86.65	1400	5.11	8718	31.81	1.78	.53
>2.0 - 3.0	821	4.32	17277	90.97	2059	7.51	10778	39.32	2.51	.62
>3.0 - 5.0	767	4.04	18044	95.01	3068	11.19	13845	50.51	4.00	.77
>5.0 - 10.0	590	3.11	18634	98.11	4121	15.04	17966	65.55	6.98	.96
>10.0 - 15.0	160	.84	18794	98.96	1941	7.08	19907	72.63	12.13	1.06
>15.0 - 20.0	66	.35	18860	99.30	1134	4.14	21041	76.77	17.18	1.12
>20.0 - 30.0	61	.32	18921	99.63	1521	5.55	22562	82.32	24.93	1.19
>30.0 - 40.0	26	.14	18947	99.76	889	3.24	23451	85.56	34.19	1.24
>40.0 - 50.0	8	.04	18955	99.81	368	1.34	23819	86.90	46.00	1.26
>50.0 - 75.0	21	.11	18976	99.92	1325	4.83	25144	91.74	63.10	1.33
>75.0 - 100.0	5	.03	18981	99.94	430	1.57	25574	93.31	86.00	1.35
>100.0 - 150.0	4	.02	18985	99.96	540	1.97	26114	95.28	135.00	1.38
>150.0 - 200.0	6	.03	18991	99.99	1068	3.90	27182	99.17	178.00	1.43
>200.0 - 300.0	1	.01	18992	100.00	227	.83	27409	100.00	227.00	1.44
>300.0 - 500.0	0	.00	18992	100.00	0	.00	27409	100.00	.00	1.44
>500.0 - 750.0	0	.00	18992	100.00	0	.00	27409	100.00	.00	1.44
>750.0 - 1000.0	0	.00	18992	100.00	0	.00	27409	100.00	.00	1.44
>1000.0 - 10,000	0	.00	18992	100.00	0	.00	27409	100.00	.00	1.44
>10,000	0	.00	18992	100.00	0	.00	27409	100.00	.00	1.44

UNIMPROVED PARCELS (ACRES SPECIFIED)

ACREAGE INTERVALS	NUMBER OF PARCELS	PERCENT OF TOTAL PARCELS	CUMULATIVE NUMBER OF PARCELS	CUMULATIVE % OF TOTAL PARCELS	ACREAGE: NUMBER OF ACRES	PERCENT OF TOTAL ACRES	CUMULATIVE NUMBER OF ACRES	CUMULATIVE % OF TOTAL ACRES	AVERAGE ACREAGE	CUMULATIVE AVERAGE ACREAGE
0 - .25	3393	38.34	3393	38.34	358	1.67	358	1.67	.11	.11
>.25 - .5	1515	17.12	4908	55.46	607	2.82	965	4.49	.40	.20
>.5 - 1.0	1562	17.65	6470	73.11	1142	5.31	2107	9.80	.73	.33
>1.0 - 1.5	611	6.90	7081	80.01	743	3.46	2850	13.26	1.22	.40
>1.5 - 2.0	326	3.68	7407	83.69	578	2.69	3428	15.94	1.77	.46
>2.0 - 3.0	358	4.05	7765	87.74	888	4.13	4317	20.08	2.48	.56
>3.0 - 5.0	371	4.19	8136	91.93	1491	6.93	5807	27.01	4.02	.71
>5.0 - 10.0	319	3.60	8455	95.54	2231	10.38	8038	37.39	6.99	.95
>10.0 - 15.0	129	1.46	8584	96.99	1613	7.50	9651	44.89	12.50	1.12
>15.0 - 20.0	65	.73	8649	97.73	1108	5.15	10759	50.04	17.05	1.24
>20.0 - 30.0	81	.92	8730	98.64	2003	9.32	12762	59.36	24.73	1.46
>30.0 - 40.0	37	.42	8767	99.06	1242	5.78	14004	65.13	33.57	1.60
>40.0 - 50.0	22	.25	8789	99.31	981	4.56	14985	69.70	44.59	1.71
>50.0 - 75.0	29	.33	8818	99.64	1825	8.49	16810	78.18	62.93	1.91
>75.0 - 100.0	14	.16	8832	99.80	1248	5.80	18058	83.99	89.14	2.04
>100.0 - 150.0	6	.07	8838	99.86	651	3.03	18709	87.01	108.50	2.12
>150.0 - 200.0	5	.06	8843	99.92	859	4.00	19568	91.01	171.80	2.21
>200.0 - 300.0	5	.06	8848	99.98	1190	5.53	20758	96.54	238.00	2.35
>300.0 - 500.0	2	.02	8850	100.00	743	3.46	21501	100.00	371.50	2.43
>500.0 - 750.0	0	.00	8850	100.00	0	.00	21501	100.00	.00	2.43
>750.0 - 1000.0	0	.00	8850	100.00	0	.00	21501	100.00	.00	2.43
>1000.0 - 10,000	0	.00	8850	100.00	0	.00	21501	100.00	.00	2.43
>10,000	0	.00	8850	100.00	0	.00	21501	100.00	.00	2.43

NO. OF IMP. PARCELS, ACREAGE SPECIFIED 18992 (100.0)
NO. OF IMP. PARCELS, ACREAGE NOT SPEC. 0 (.0)
TOTAL 18992

NO. OF UNIMPROVED PARCELS, ACREAGE SPECIFIED 8850 (100.0)
NO. OF UNIMPROVED PARCELS, ACREAGE NOT SPEC. 0 (.0)
TOTAL 8850

FIXED SFE (3,000)

Baseline Stormwater Utility Charge System for Cecil County, MD

Land Use	Number of Parcels	Average Acre/ Parcel	Rate Factor (Imp)	Average Sq. Ft. Impervious per Parcel	Typical Number of SFEs	SFEs per Land Use Category	Revenue Requirement ($)	Dollars/ SFE	Typical Annual Charge	Total $ by Category	% Paid by Category
Agriculture	957	107.7	0.00	0	0.00	0			0.00	0	0.00
Commercial	1,085	6.6	0.82	235,747	78.58	85,262			1,571.64	1,705,225	0.68
Comm Res	1	9.0	0.68	266,587	88.86	89			1,777.24	1,777	0.00
Exempt	468	42.5	0.00	0	0.00	0			0.00	0	0.00
Park			0.11	0	0.00	0			0.00	0	0.00
Playground			0.17	0	0.00	0			0.00	0	0.00
School			0.50	0	0.00	0			0.00	0	0.00
Industrial	43	39.4	0.70	1,201,385	400.46	17,220			8,009.19	344,395	0.14
Apartments	17	2.0	0.64	55,757	18.59	316			371.71	6,319	0.00
Not Perc	28	1.7	0.00	0	0.00	0			0.00	0	0.00
Residential											
< 1 Acre	14,133	0.38	na	3,000	1.00	14,133			20.00	282,658	0.11
> 1 Acre	4,859	4.36	na	4,500	1.50	7,289			30.00	145,769	0.06
Res Ag	189	11.7	na	4,500	1.50	284			30.00	5,670	0.00
Res Comm	1	1.0	0.64	27,878	9.29	9			185.85	186	0.00
Condominium	5	0.00	0.64	0	0.00	0			0.00	0	0.00
Condo Comm	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Marshland	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Non-standard											
Cooperative	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Mobil/Trailer	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Group Quar	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Motel	0	0.0	0.82	0	0.00	0			0.00	0	0.00
Forest Cons	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Garden Apt.	0	0.0	0.40	0	0.00	0			0.00	0	0.00
High Rise	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Other	0	0.0	0.50	0	0.00	0			0.00	0	0.00
Total (Dev.)	21,786					124,601				$2,492,000	1.00
Unimproved	10,878	5.8	0.00	0	0.00	0			0.00	0	0.00
Grand Total	32,664					124,601	$2,492,000	$20.00		$2,492,000	1.00

FIXED SFE (3,000)

Baseline Stormwater Utility Charge System for Montgomery County, MD

Land Use	Number of Parcels	Average Acre/ Parcel	Rate Factor (Imp)	Average Sq. Ft. Impervious per Parcel	Typical Number of SFEs	SFEs per Land Use Category	Revenue Requirement ($)	Dollars/ SFE	Typical Annual Charge	Total $ by Category	% Paid by Category
Agriculture	1,152	67.2	0.00	0	0.00	0			0.00	0	0.00
Commercial	9,273	1.0	0.82	35,719	11.91	110,408			238.13	2,208,146	0.33
Comm Res	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Exempt	1,577	12.3	0.00	0	0.00	0			0.00	0	0.00
Industrial	205	8.9	0.70	271,379	90.46	18,544			1,809.18	370,882	0.06
Apartments	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Not Perc	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Res Ag	0	0.0	na	0	0.00	0			0.00	0	0.00
Res Comm	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Condominium	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Condo Comm	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Marshland	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Non-standard											
Cooperative	1	5.0	0.64	139,392	46.46	46			929.27	929	0.00
Mobil/Trailer	10	3.1	0.64	86,423	28.81	288			576.15	5,761	0.00
Group Quar	116	2.3	0.64	64,120	21.37	2,479			427.47	49,586	0.01
Motel	33	3.1	0.82	110,730	36.91	1,218			738.19	24,360	0.00
Forest Cons	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Detached S-F											
< 1 Acre	132,208	0.00	na	3,000	1.00	132,208			20.00	2,644,142	0.40
> 1 Acre	10,271	4.01	na	4,500	1.50	15,407			30.00	308,128	0.05
Attached S-F											
< 1 Acre	38,171	0.00	na	2,000	0.67	25,447			13.33	508,943	0.08
> 1 Acre	40	5.52	na	3,000	1.00	40			20.00	800	0.00
Garden Apt.	14,484	0.2	0.40	3,485	1.16	16,825			23.23	336,490	0.05
High Rise	8,233	0.1	0.64	2,788	0.93	7,651			18.59	153,014	0.02
Other	261	0.8	0.50	17,424	5.81	1,516			116.16	30,318	0.00
Total (Dev.)	216,035					332,077				$6,641,500	1.00
Unimproved	35,909	3.1	0.00	0	0.00	0			0.00	0	0.00
Grand Total	251,944					332,077	$6,641,500	$20.00		$6,641,500	1.00

FIXED SFE (3,000)

Baseline Stormwater Utility Charge System for Cecil County, MD

Land Use	Number of Parcels	Average Acre/ Parcel	Rate Factor (Imp)	Average Sq. Ft. Impervious per Parcel	Typical Number of SFEs	SFEs per Land Use Category	Revenue Requirement ($)	Dollars/ SFE	Typical Annual Charge	Total $ by Category	% Paid by Category
Agriculture	957	107.7	0.00	0	0.00	0			0.00	0	0.00
Commercial	1,085	6.6	0.82	235,747	78.58	85,262			1,571.64	1,705,225	0.68
Comm Res	1	9.0	0.68	266,587	88.86	89			1,777.24	1,777	0.00
Exempt	468	42.5	0.00	0	0.00	0			0.00	0	0.00
Park			0.11	0	0.00	0			0.00	0	0.00
Playground			0.17	0	0.00	0			0.00	0	0.00
School			0.50	0	0.00	0			0.00	0	0.00
Industrial	43	39.4	0.70	1,201,385	400.46	17,220			8,009.19	344,395	0.14
Apartments	17	2.0	0.64	55,757	18.59	316			371.71	6,319	0.00
Not Perc	28	1.7	0.00	0	0.00	0			0.00	0	0.00
Residential											
< 1 Acre	14,133	0.38	na	3,000	1.00	14,133			20.00	282,658	0.11
> 1 Acre	4,859	4.36	na	4,500	1.50	7,289			30.00	145,769	0.06
Res Ag	189	11.7	na	4,500	1.50	284			30.00	5,670	0.00
Res Comm	1	1.0	0.64	27,878	9.29	9			185.85	186	0.00
Condominium	5	0.00	0.64	0	0.00	0			0.00	0	0.00
Condo Comm	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Marshland	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Non-standard											
Cooperative	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Mobil/Trailer	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Group Quar	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Motel	0	0.0	0.82	0	0.00	0			0.00	0	0.00
Forest Cons	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Garden Apt.	0	0.0	0.40	0	0.00	0			0.00	0	0.00
High Rise	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Other	0	0.0	0.50	0	0.00	0			0.00	0	0.00
Total (Dev.)	21,786					124,601				$2,492,000	1.00
Unimproved	10,878	5.8	0.00	0	0.00	0			0.00	0	0.00
Grand Total	32,664					124,601	$2,492,000	$20.00		$2,492,000	1.00

FIXED SFE (3,000)

Baseline Stormwater Utility Charge System for Montgomery County, MD

Land Use	Number of Parcels	Average Acre/ Parcel	Rate Factor (Imp)	Average Sq. Ft. Impervious per Parcel	Typical Number of SFEs	SFEs per Land Use Category	Revenue Requirement ($)	Dollars/ SFE	Typical Annual Charge	Total $ by Category	% Paid by Category
Agriculture	1,152	67.2	0.00	0	0.00	0			0.00	0	0.00
Commercial	9,273	1.0	0.82	35,719	11.91	110,408			238.13	2,208,146	0.33
Comm Res	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Exempt	1,577	12.3	0.00	0	0.00	0			0.00	0	0.00
Industrial	205	8.9	0.70	271,379	90.46	18,544			1,809.18	370,882	0.06
Apartments	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Not Perc	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Res Ag	0	0.0	na	0	0.00	0			0.00	0	0.00
Res Comm	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Condominium	0	0.0	0.64	0	0.00	0			0.00	0	0.00
Condo Comm	0	0.0	0.68	0	0.00	0			0.00	0	0.00
Marshland	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Non-standard											
Cooperative	1	5.0	0.64	139,392	46.46	46			929.27	929	0.00
Mobil/Trailer	10	3.1	0.64	86,423	28.81	288			576.15	5,761	0.00
Group Quar	116	2.3	0.64	64,120	21.37	2,479			427.47	49,586	0.01
Motel	33	3.1	0.82	110,730	36.91	1,218			738.19	24,360	0.00
Forest Cons	0	0.0	0.00	0	0.00	0			0.00	0	0.00
Detached S-F											
< 1 Acre	132,208	0.00	na	3,000	1.00	132,208			20.00	2,644,142	0.40
> 1 Acre	10,271	4.01	na	4,500	1.50	15,407			30.00	308,128	0.05
Attached S-F											
< 1 Acre	38,171	0.00	na	2,000	0.67	25,447			13.33	508,943	0.08
> 1 Acre	40	5.52	na	3,000	1.00	40			20.00	800	0.00
Garden Apt.	14,484	0.2	0.40	3,485	1.16	16,825			23.23	336,490	0.05
High Rise	8,233	0.1	0.64	2,788	0.93	7,651			18.59	153,014	0.02
Other	261	0.8	0.50	17,424	5.81	1,516			116.16	30,318	0.00
Total (Dev.)	216,035					332,077				$6,641,500	1.00
Unimproved	35,909	3.1	0.00	0	0.00	0			0.00	0	0.00
Grand Total	251,944					332,077	$6,641,500	$20.00		$6,641,500	1.00

Appendix C

Six Alternative User Charge Structures for Estimating Stormwater Utility Revenues

Approach 1 "Fixed SFE (3,000)": This approach serves as the base case against which primary comparisons are made. The name of this approach implies that the residential SFEs were fixed by professional judgment. The choice of 3,000 square feet of impervious area was based on general agreement with published figures and is somewhat arbitrary. The number "3,000" refers to the assumed average square footage of impervious area per residential parcel less than one acre.

The residential category is divided into parcels < 1 acre, and parcels > 1 acre. The following average estimated impervious areas are assumed for each residential category:

3,000 sq. ft. impervious for parcels < 1 acre (1 SFE)
4,500 sq. ft. impervious for parcels > 1 acre (1.5 SFE)

The impervious area for residential agricultural use is also fixed at 4,500 sq. ft.. As an intended consequence, Residential parcels > 1 acre are assessed a fixed annual charge of $30 (1.5 times the utility rate for parcels < 1 acre).

The degree of specificity of rate factors is moderate using approximately six different rate factors for the different land use categories.

Approach 2 "Fixed SFE (4,000)": This approach is a slight modification of the Fixed SFE (3,000) approach. It differs only in the estimated impervious area that is assumed when computing residential SFEs.

The residential category is divided into parcels < 1 acre, and parcels > 1 acre. The following average estimated impervious areas are assumed for each residential category:

4,000 sq. ft. impervious for parcels < 1 acre (1 SFE)
6,000 sq. ft. impervious for parcels > 1 acre (1.5 SFE)

The impervious area for residential agricultural use is also fixed at 6,000 sq. ft.. As an intended consequence, Residential parcels > 1 acre are assessed a fixed annual charge of $30 (1.5 times the utility rate for parcels < 1 acre).

The degree of specificity of rate factors is moderate with approximately six different rate factors being used for different land use categories.

Recall that the choice in Approach 1 of 3,000 square feet of impervious area was based on agreement with published figures. The selection of 4,000 sq.ft. is motivated by two factors. First, this estimate is consistent with results from generally accepted guidance described in the Soil Conservation Service Technical Release No. 55. Second, this value yields more conservative (lower) revenue estimates than the 3,000 sq.ft. value.

Approach 3 "Quantile": This approach is again very similar to Approach 1, Fixed SFE (3,000). Like Fixed SFE (3,000), the residential category is divided into Res. < 1 acre, and Res. > 1 acre. It differs only in the manner in which the SFEs are determined for the residential land use category. It is designed to use rate factors to determine the SFE, while at the same time correcting for the pronounced difference in user charges between smaller and larger parcels.

Recall that the traditional approach is to multiply the mean parcel size times the rate factor. The mean, however, has a tendency to be skewed by extreme values and can result in a small number of large parcels pulling up the average parcel size when most parcels are actually quite small.

As an alternative, the median parcel size may be considered. The median parcel size is the point at which 50 percent of the parcels are larger and 50 percent are smaller. It is more generally referred to as the 50th percentile measure, and is not influenced by extreme sized parcels.

Another measure is the 90th percentile. It is the parcel size below which 90 percent of the parcels are smaller, or stated another way, is the parcel size for which only 10 percent of the parcels are larger.

Rather than using the average parcel size within the category Res. < 1 acre, the median value of all residential parcels is used. Similarly, rather than using the average parcel size within the category Res. > 1 acre, the 90th percentile is used.

The median and 90th percentile were estimated rather than computed exactly. The percentiles were easily read from the cumulative percent of total parcels tabulated as part of the available data (See Appendix A). An estimated value was determined as the average parcel size associated with the interval in which the percentile fell. For example, on page A-2 of Appendix A, the 50th percentile falls within the acreage interval > 0.25 - 0.5 acres. Reading across to the right, the average acreage within this interval is 0.40 acres. Given this acreage, a rate factor value can be read from an engineering table (Soil Conservation Service, TR55).

The mean parcel size for the interval less than 1 acre and the estimated median parcel size of all residential parcels are roughly the same. This is because the 50th percentile (the median) invariably falls in the range below one acre (the majority of residential parcels are less than one acre in every county in Maryland), and the range of the interval is narrow,

thus allowing little variability in the parcel size. As an outcome of this, SFE estimates for the interval of parcels below one acre do not differ significantly from estimates in the other approaches.

This was not the case for the 90th percentile value, which is typically significantly different than the mean value of residential parcels in the interval greater than 1 acre. A typical comparison of values is a MEAN = 3.57 acres and a 90th percentile = 1.77 acres (Howard County). In more developed counties with many small parcels, the 90th percentile can fall the range below one acre. In this case, the average parcel size associated with first acreage interval which falls above one acre was used.

The level of specificity of rate factors is slightly increased above that of Approaches 1 and 2 with approximately eight different rate factors being used for different land use categories. The reason for this is that the rate factors for the two residential subcategories in the quantile approach are typically distinctive from the others.

Approach 4 "Detailed": This approach differs from Fixed SFE (3,000) in two of the three of the characteristics described in the last section, and differs slightly on the third point (See Table 2 above). That is, the level of specificity of the residential category is highly detailed, and the SFEs for residential parcels are all computed using rate factors, both of which are different to the Fixed SFE (3,000) approach. The level of specificity of the rate factors are highly detailed for the Detailed Approach, whereas, the level is of intermediate specificity for the Fixed SFE (3,000) approach.

The residential category is divided into about 20 acreage intervals according to the data available (See Appendix A, page A-2). Average parcel sizes were used for each interval, and impervious area estimates were determined using engineering tables for parcels of less than 2 acres. For parcels greater than 2 acres the percent impervious was estimated assuming a reasonable constant amount of impervious area (14,000 sq.ft.) for parcels above two acres until the value 0.1 percent impervious was reached (at the 200 - 300 acre interval) above which 0.1 percent was used for all parcels.

This approach represents the most detailed revenue estimation approach of the study, although it is quite simplified in comparison to actual implementation methods. Since this is the most detailed case, it should approximate reality better than the other cases, and in this regard, serves as a baseline by which to compare the other approaches.

Approach 5 "Simplified": This approach applied a key aspect of the Austin Texas to Approach 1, Fixed SFE (3,000), described above. The primary modification to Fixed SFE (3,000) is a reduced level of specificity of the rate factors across all land use categories.

In addition, this approach uses rate factors to determine the SFE (impervious area for Res. < 1 acre), and fixes the SFE for Res. > 1 acre at 1.5 SFEs. Consequently, the SFE is able to rise or fall between county estimates, and the SFE of the larger residential land use subcategory follows that rise or fall. The use of rate factors and fixed SFEs is referred to above in Table 2 as a hybrid treatment of residential SFEs since both are used.

The Simplified approach derives its name from the fact that it is characterized by having two streamlined, or coarse, features. These are the rate factors and the residential categories. The Simplified approach uses the values 0.80, 0.40, and 0.10 as rate factors, whereas all of the other approaches use a more refined set. Additionally, as in Fixed SFE (3,000), the residential category is divided into parcels < 1 acre, and parcels > 1 acre.

Approach 6 "Grouped RF": This approach is similar to the Detailed Approach in that it differs from Fixed SFE (3,000) in the same way for two of the three of the characteristics described in the last section. It differs to a lesser degree on the third point (specificity of rate factors), and does so in the opposite sense of the Detailed Approach (i.e., the rate factors are aggregated or grouped rather than detailed).

Like the Detailed Approach, the level of specificity of the residential category is highly detailed, and the SFEs for residential parcels are all computed using rate factors. These are both different than the Fixed SFE (3,000) approach. Unlike the Detailed Approach, however, the level of specificity of the rate factors is coarse for the Grouped RF Approach, whereas, the level is of intermediate specificity for Fixed SFE (3,000).

The Grouped RF approach is based loosely on the Ft. Collins, Texas utility charge structure, which attempts to minimize administrative burden and contested charges by aggregating users into relatively broad rate factor categories.

The Grouped RF approach assigns rate factors according to the following table:

Grouped RF Rate Factor Assignments

Degree of Development	Runoff Coefficient	Rate Factor
Very Light	0 - 0.30	0.25
Light	0.31 - 0.50	0.40
Moderate	0.51 - 0.70	0.60
Heavy	0.71 - 0.90	0.80
Very Heavy	0.91 - 1.0	0.95

The SFE was calculated as (0.60) x (mean acreage) using the smallest residential acreage interval (0 - 0.25 acres), where 0.60 is the rate factor. For residential parcels greater than 0.25 acre, the following algorithm was used to calculate the impervious area:

(0.25 acre) x (rate factor) + (remaining acreage) x (1/4) x (rate factor). In words that is the first quarter acre times the rate factor, plus the remaining acreage over 0.25 acre times 1/4 times the rate factor. A rate factor of 0.25 was used for residential parcels greater that 0.25 acres.

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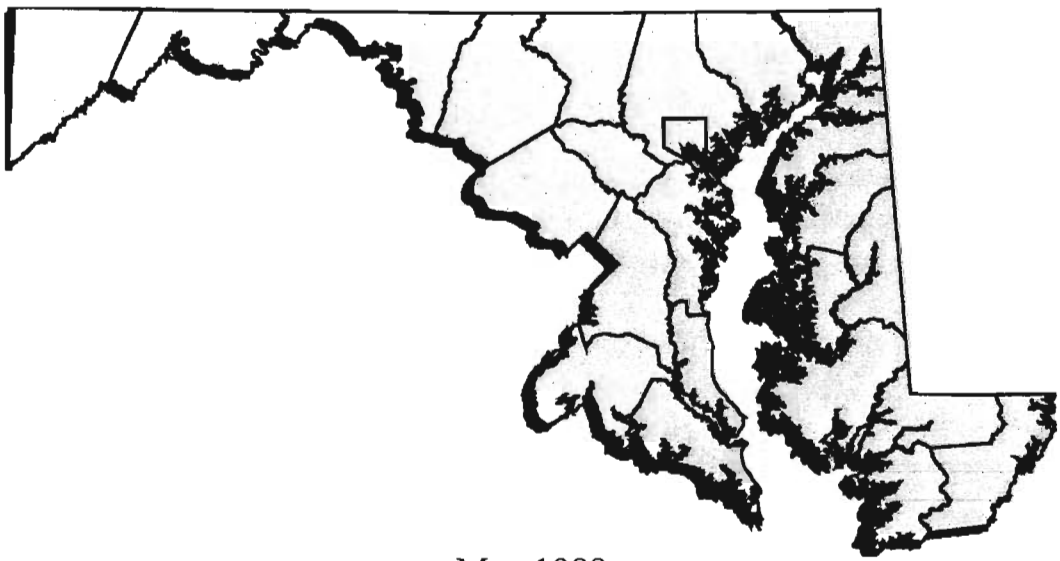
Sample
Stormwater Utility Ordinance



May 1988

Maryland Department of the Environment
Water Management Administration

1800 Washington Boulevard
Baltimore, MD 21230

.The Sediment and Stormwater Management Administration (SSA) was incorporated into the Water Management Administration (WMA) in October 1992. For additional information concerning this publication, please contact WMA (410) 537-3543.

SAMPLE STORMWATER UTILITY ORDINANCE

This sample ordinance is designed to provide guidance to local officials in establishing stormwater utilities. It is based on a review of 20 stormwater ordinances used in other communities throughout the country. While some of the sections can be incorporated into an actual ordinance essentially as written, most will have to be modified and adapted to local circumstances. Several sections (e.g., those concerning requirements for watershed planning and exemptions from stormwater charges) are optional; local officials must determine whether these ought be included. The ordinance has been written for officials who are interested in forming a utility to serve a single jurisdiction. Officials interested in forming a utility to serve multiple jurisdictions should contact the Water Management Administration for additional information.

1.0 FINDINGS, INTENT, AND AUTHORITY

1.1 Findings

The (unit board/council) finds that:

- the (unit) maintains a system of storm and surface water management facilities, including but not limited to inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basins, infiltration facilities, and other components as well as all natural waterways;

- the stormwater system has received inadequate maintenance and is in a state of disrepair;

- water quality is degrading due to channel erosion and the discharge of nutrients, metals, oil, grease, toxics, and other substances into and through the stormwater system;

- the public health, safety, and welfare is adversely affected by poor ambient water quality and flooding that results from inadequate management of both the quality and quantity of stormwater; and

- the (local unit) is exposed to the possibility of costly litigation due to the state of disrepair of the existing system and the potential for floods that can damage property, injure individuals, and impede the movement of emergency vehicles.

The (unit board/council) further finds that:

- every parcel of real property, both public and private, either uses or benefits from the maintenance of the stormwater system;

- current and anticipated growth in (unit) will contribute to and increase the need for improvement and maintenance of the stormwater system;

- the extent of use of the stormwater system by each property is dependent on factors that influence runoff, including land use and intensity of development, the amount of impervious surface on the property, and the geographic location of property in a given watershed or basin;

- owners of properties should finance stormwater management to the extent that they contribute to the need for it;

- responsibility for stormwater management has not been clearly defined, that planning for stormwater management should be improved, and that the necessary and true costs of stormwater management have not been reflected in past expenditures by the (local unit);

- management of the stormwater system to protect the public health, safety and welfare will require increased revenues; and

- it is in the interest of the public to consolidate responsibility for managing the stormwater system within a single agency, to initiate long range master planning, to undertake water quality management and stormwater system maintenance activities, and to finance stormwater management adequately with a user charge system that is reasonable and equitable so that each user of the system pays commensurate with the volume of runoff contributed to it.

1.2 Intent

Therefore, with the passage of this ordinance, it is the intent of (unit board/council) to promote the public health, safety, and welfare by:

- creating a stormwater management utility to manage the stormwater system;

- consolidating responsibility for all stormwater management activities in (unit agency);

- preparing long range master plans for stormwater management for each watershed basin in (unit);

- undertaking regular maintenance and requiring annual inspections of all stormwater management facilities, both public and private;

- financing stormwater management adequately through the imposition of user charges for each piece of real property that uses the stormwater system;

- setting charges such that the fees paid by each user reflect the extent to which the user creates need for the system and such that the charges bear a substantial relationship to the cost of service; and

- creating a rate structure based on the intensity of development, the land use, and the amount of impervious area on each property that is fair and equitable; is simple and can be administered easily; and can generate sufficient revenues.

1.3 Authority

Authority for the creation of this stormwater utility and the imposition of charges to finance stormwater management is conferred in §4-204(d) Environment Article, Annotated Code of Maryland, 1996, which states:

> "Each governing body of a county or municipality may adopt a system of charges to fund the implementation of stormwater management programs…"

The provisions of this ordinance are adopted under the authority of the (unit) code and shall apply to all real properties within the (unincorporated, incorporated) area of (unit). The application of this ordinance and the provisions expressed herein shall not be deemed a limitation or a repeal of any other powers granted by State statute.

2.0 DEFINITIONS

(1) "Board" means the Stormwater Management Board created under Sections 3.2 and 3.3 of this ordinance to provide advice to the (unit board/council) concerning all matters of utility operation.

(2) "Charges" are fees levied on owners or occupants of parcels or pieces of real property based on the runoff contribution of the property.

(3) "Credits" are reductions in the amount of charges that are levied against a property.

(4) "Equivalent runoff units" (ERU) are units used to determine stormwater charges that are calculated by multiplying the area of a parcel times a rate factor that is based on the percentage of impervious surface.

(5) "Impervious surface" means surfaces on or in a lot or parcel of real property that eliminate infiltration of stormwater into the earth.

(6) "Intensity of development" refers to the percentage of a parcel that is covered with impervious surface.

(7) "Plan" means a master stormwater plan prepared under the authority of this or any other ordinance that identifies the existing stormwater system and recommends a program and specific projects for continued development and improvement of the system for the purposes of flood control and water quality management.

(8) "Owner or occupant" is the person who pays, or is legally responsible for the payment of utility or other metered charges, made against a lot(s), parcel(s) of land, building(s), office(s) or premises within the _____.

(9) "Single family equivalents" are units based on those established for single family residential parcels used to express ERUs for other land use types.

(10) "Stormwater system" means the system or network of storm and surface water management facilities, including but not limited to inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basins, infiltration facilities, and other components as well as all natural waterways;

(11) "Undeveloped land" is a parcel of land that is without any building, structure, or improvement.

(12) "Users" are owners or occupants of a piece of real property within the boundaries of the utility that contributes runoff to the stormwater system.

(13) "Utility" means the administrative organization of the (unit) that has been established exclusively for the purposes of stormwater management and flood control and is authorized to impose and collect charges for these same purposes.

3.0 CREATION AND ADMINISTRATION OF UTILITY

3.1 Establishment of a Stormwater Management Utility

In accordance with all applicable laws of the State of Maryland, the (unit council/board) hereby establishes a stormwater management utility with the authority to determine and levy charges for stormwater management. The utility will be in the (local agency, e.g., Department of Public Works) under the control of the (agency administrator, e.g., County Administrator).

3.2 Boundaries and Jurisdiction

The boundaries of the utility shall be [boundaries of local jurisdiction(s) or (such watersheds within the boundaries of the local jurisdiction as identified by the local agency administrator] and approved by the (unit council/board).

3.3 Creation of a Stormwater Management Board (optional)

To assist with management of the utility, the (unit council/board) hereby establishes a Stormwater Management Board (Board) to provide advice to the (unit council/board) concerning all aspects of the program and the utility. The Board shall consist of five to seven members as determined from time to time by the (unit council/board). The (unit council/board) shall appoint all members', terms shall be four years, and initial appointments shall be made so that members terms overlap. The (local unit council/board) shall appoint persons to fill vacancies that may exist on the Board from time to time.

3.4 Duties of the Board (optional)

The Board shall provide advice and recommendations on all aspects of the management and operation of the utility including:

- identifying stormwater management problems;
- developing a long range master plan for stormwater management, including priorities for implementing capital improvements;
- determining utility charges; and
- providing for petitions or appeals by users of the system who contest the levels of charges or request waivers or exemptions.

3.5 Utility Administration

The (local agency administrator) shall have responsibility for implementing all aspects of the utility including long range planning, plan implementation, capital improvements, stormwater facility maintenance, stormwater charge determination, billing, ordinance enforcement, and hearings for appeals and petitions. The (local agency administrator) will also be responsible for providing staff support to the (unit council/board) and the Board. Such responsibility will be delegated to those agencies and staff within the (local unit) administration best equipped to undertake the particular task. In the event that an agency or department other than the one in which the utility is located is better equipped to undertake a particular task, the (local agency administrator) shall ensure that appropriate interagency charges are determined so that all costs are reflected in the utility budget and that utility charges finance all aspects of stormwater management.

3.6 Scope of Utility Responsibility

The (local unit council/board) hereby transfers all components of the stormwater system presently maintained by other agencies within (local unit) to the utility. The utility shall have full responsibility for planning, developing, and maintaining of the stormwater system. The utility will be responsible for all additions to the stormwater system constructed with public funds.

With respect to new stormwater management facilities constructed by private entities, the (local agency administrator) shall develop criteria to determine whether these will be maintained by the utility or by the private entity which has constructed them. Such criteria may include whether the facility has been designed primarily to serve residential users and whether it has been designed primarily for purposes of stormwater management. In general, preferences shall be given to public maintenance of new facilities, particularly for those facilities designed to provide water quality benefits. In situations in which it is determined that public maintenance is not

preferable, standards shall be developed to ensure that the inspection of facilities occurs annually and that facilities are maintained as needed.

4.0 MASTER STORMWATER PLAN (OPTIONAL)

The (unit council/board) hereby requires the (local agency administrator) to prepare a Master Stormwater Management Plan (Plan) for each watershed in (unit). The Plan shall establish goals for stormwater management and shall be the basis for determining all future activities, including capital improvements and maintenance activities, which are undertaken by the utility. The utility shall not undertake any activities that are not recommended in the Plan.

In general, the plan shall include an inventory of all existing stormwater facilities and identify alternative actions that the utility can undertake to achieve water quality goals and to determine the costs of such alternatives. The Plan shall include those maps as necessary to show the location of facilities and alternatives by basin. Projects or facilities that are proposed should clearly be linked to projected improvements in water quality or flooding situations and shall reflect State requirements and preferences for on-site controls of stormwater runoff. The Plan shall include benefit-cost analyses which can be used to compare alternatives. Where they exist, planning documents for individual basins may be consolidated as part of the master Plan.

The Plan shall be submitted to the (unit board/council) for approval not more than one year following the establishment of the utility. From time to time, as required by the (local unit board/council), the (local agency administrator) shall update the Plan.

5.0 STORMWATER USER CHARGES

5.1 Creation and Purpose of Stormwater Charges

The (unit board/council) hereby establishes stormwater user charges to finance all utility activities. Necessary activities generally are those identified in the Plan and at a minimum shall be identified as administrative, operations and maintenance, and capital improvements. Such charges shall be paid by each user of the stormwater system and will reflect the extent to which each user contributes runoff to the system. The charges will bear a substantial relationship to the cost of service provided to the property. The rate structure shall be fair and equitable, simple and easy to administer, and generate sufficient revenue to fund all necessary utility activities.

The use of charges is limited to those activities for which the utility was established, including but not limited to: planning; acquisition of interests in land and real property, including easements; design and construction of facilities, including debt service and related financing expenses; maintenance of the stormwater system; billing and administration; and water quality management, Including monitoring, surveillance, and construction and maintenance inspection. If the (local agency administrator) determines that capital charges will be different among drainage basins, it shall be required that capital expenditures from the fund relate to the particular basin from which the fees were collected. It shall not be required, however, that expenditures for administration and operations and maintenance relate to the particular basin from which the fees were collected.

If the Board determines that rate increases are needed to achieve the goals of the Plan, utility charges may be increased periodically to cover all costs. Updates of the Plan shall include estimates of the amount of rate increases that would result from implementing the Plan.

5.2 Calculation of Fees

The (local agency administrator) shall establish a method for calculating charges and a rate structure based on the intensity of development, land use, and the amount of impervious surface on each property. Prior to implementing the utility, the (local agency administrator) shall submit the proposed rate structure to the (unit board/council) for approval. Because intensity of development and the amount of impervious area per parcel generally correlate with the type of land use, user categories generally shall be identified as land use categories. To the extent practicable, the classes of users shall correspond to standardized land use categories used by the Maryland Department of Planning (MDP). If the number and size of capital improvements to be undertaken in each drainage basin differ significantly, local officials may decide to vary capital charges among them. If capital charges are calculated separately for different drainage basins, however, administrative and operations and maintenance expenses shall not differ.

In general, fees shall be calculated using the following formula:

Charge per parcel = (area * rate factor * charge per ERU) + credit or surcharge

where:

Area = the total area of the, property;

Rate factor = a coefficient used to reflect the amount of impervious area and the percentage of rainfall that leaves a property as runoff (Table 1);

ERU = equivalent runoff unit;

Charge/ERU = a charge per quantity runoff established such that each user of the system pays an equal amount for the per unit volume of runoff and the total revenue requirements of the Utility are met. Credits or surcharges are determined as in Section 7.0.

Rate factors similar to those included in Table 1 are to be used to determine charges. If the (local agency administrator) determines rate factors should be scaled for non-single family residential parcels so that they are based on single family equivalents, such a rate structure may be developed. Total revenue needed by the utility shall be at those necessary to achieve stormwater management goals and shall include but not be limited to the costs identified in the Plan.

Initially, all charges shall be based on rate factors that correspond to general land use. For individual properties other than single family residential, the (local agency administrator) shall

survey existing sources of information for data concerning the amount and percent of impervious area for the non-residential categories. Once the utility is established, the (local agency administrator) shall commence a program to verify the amount of impervious area on all properties. Information to be used may include data from on-site measurements, site development plans, tax assessors records, data from aerial photographs, or any other available sources. Eventually, all charges for non-residential properties shall be based on the amount of impervious area on the properties as verified by the (local agency administrator).

Table 1. Representative Rate Factors for Utility Charges.

Land Use Category	Average Percent Imperviousness	Rate Factor
Agriculture	–	0.10
Commercial	0.85	0.82
Commercial	0.70	0.68
Residential		
Exempt	–	0.26
Parks	0.07	0.11
Playgrounds	0.13	0.17
Schools	0.50	0.50
Industrial	0.72	0.70
Apartments	0.65	0.64
Residential	–	
Acreage (A)	0.65	0.40
< ⅛ (townhouses)		
⅛ < A < ¼	0.38	0.40
¼ < A < ⅓	0.30	0.40
⅓ < A < ½	0.25	0.40
½ < A <1	0.20	0.23
1 < A	0.12	0.16
Residential-Agricultural	–	0.16
Residential-Commercial	–	0.64
Condominium	–	0.64
Condo-Commercial	–	0.68
Marshland	–	0.00
Other Non-standard Categories		
Cooperative	–	0.64
Mobile	–	0.64
Group Quarters	–	0.64
Motel	–	0.82
Other	–	0.50

Estimates of the average percentage of impervious area are from the Natural Resource Conservation Service's (NRCS) TR-55 Model. The estimate of .65 for apartments was taken from the TR-55 estimate for townhouses. A "-" in the average impervious column means that no estimate corresponded directly with the land use category. The rate factors were determined by selecting figures for a comparable use [e.g., Resedential Agriculture was assigned the same rate

factor as Residential 1 < Acreage]. The equation used to convert average impervious area to a rate factor is:

$$C = .95\ (\%\ \text{imp.}) + .05\ (1 - \%\ \text{imp.})$$

where:
C = the runoff coefficient or rate factor for a parcel;
% imp. = the percentage of impervious surface on a parcel.

5.3 Standardized Residential Charges

The (unit board/council) finds that most parcels of real property are classified as single family residential, that the intensity of development of these parcels is similar, and that it would be excessively expensive to determine precisely the percentage of impervious area on each parcel. Therefore, the (unit board/council) directs the (local agency administrator) to standardize charges for all single family residential users. Based on a representative sample of single family residential parcels, the (local agency administrator) shall determine the average amount of impervious surface, and the number of ERUs per parcel. The standard residential charge shall be a flat fee equal to the average number of ERUs times the charge per ERU. The (local agency administrator) may establish classes of single family residential users based on total parcel area if doing so would better reflect the contribution of runoff and would result in more equitable charges.

5.4 Charges in the Event of Multiple Owners

In the case where multiple owners or occupants are metered individually on a single property (e.g., condominium, shopping center, etc.), the average number of owners or occupants and the total property impervious area will be used to determine individual charges. If there are significant differences in the total area of property owned or occupied by any owner or occupant, the (local agency administrator) shall also consider the relative contributions to runoff in determining the allocation of the total charge to the owners/occupants.

5.5 Charges for Public Properties

The (unit board/council) finds that all real property owned and maintained by various local, State, and federal governmental units contributes to runoff and the stormwater management problem. Public properties, including streets and rights-of-way and properties owned by other local units such as school districts, are to be charged as if they were private properties. In the case of properties owned by (the local unit), such charges will be paid from the general fund and deposited into the Stormwater Utility Fund. In the case of properties owned by other local governments, or State or federal governments, intergovernmental charges shall be levied.

5.6 Watershed Management Areas

If in the Plan significant differences in capital requirements are found to exist in different drainage basins, and the (local agency administrator) determines that different capital fees shall

be established, public hearings shall be held and watershed management areas shall be established to accommodate different rate charges.

6.0 STORMWATER FUND

6.1 New Stormwater Fund

The (unit board/council) hereby directs the (local agency administrator) to establish a separate enterprise fund called the Stormwater Utility Fund (SUF) to be used exclusively for purposes of the utility. All revenues received by the utility shall be deposited into the SUF. All disbursements will be for expenditures for stormwater management authorized by (local agency administrator) in accordance with all applicable laws, regulations, and policies.

6.2 Interagency Charges

As is necessary, the (local agency administrator) shall develop a procedure for implementing and accounting for interagency charges such that all expenditures for the purposes of stormwater management are paid by revenues from stormwater charges. Examples of the types of expenditures that should be accounted for by interagency charges and paid for with utility revenues include legal fees, billing, and other general administrative expenses. In addition, the procedure shall include provisions to insure that charges to the general fund for runoff from public properties are credited to the SUF.

7.0 CREDITS, EXEMPTIONS AND SURCHARGES

7.1 Credits for On-site Management

The (local agency administrator) shall develop and implement procedures where users of the stormwater system can receive credit for on-site treatment of stormwater runoff. Such credit will consist of partial exemption from user charges. Determination of the credit will depend in part on calculations made by the (local agency administrator) and be based on the extent of runoff control. The (local agency administrator) shall consider the degree of control of both the quantity and quality of stormwater when determining credits. In addition, the (local agency administrator) shall consider future maintenance responsibility when determining credits (see Section 3.6). In no case shall the user charge be reduced to an amount less than the standard single family residential charge.

Such credits shall remain in effect as long as the owner of such systems has obtained the proper permits and constructed the facilities according to plans approved by (local agency), the owner remains responsible for all costs of operation and maintenance of the system, and the (local agency administrator) has access for inspection of the system to determine if it is in compliance with design and maintenance standards.

7.2 Exemptions from Charges (OPTIONAL)

Notwithstanding any local ordinances which exempt certain parcels from responsibility for implementing stormwater controls, all properties except those listed here will be liable for

payment of stormwater charges. Properties exempted from payment of stormwater charges include:

- wetlands, ponds, and other natural watercourses that serve as components of the stormwater management system;
- public parks that have not been developed and include not impervious area and are predominantly in their natural state;
- agricultural land (Note: Table 1 includes runoff coefficients for agricultural land in the event it is charged); and
- undeveloped land.

7.3 Surcharges for Parcels in Floodplains (OPTIONAL)

Properties of land lying within the historical 100 year floodplain may be flooded despite activities undertaken by the utility. Costs to protect such properties generally will exceed costs to protect other properties. Because costs to protect these parcels will be greater, a surcharge shall be levied on them. The (local agency administrator) shall undertake studies to determine the increase in costs necessary to protect these properties and shall recommend to the (local unit board/council) a surcharge stated in terms of a percentage of the general utility charge for a similar parcel not in the 100 year floodplain.

8.0 BILLING

The (local agency administrator) shall modify existing utility billing systems to incorporate stormwater charges. For properties not served with water or sewer by (the local unit), the (local agency administrator) shall develop a new billing system that can be added to an existing system. Information included in the billing system shall include, but not be limited to, the owner of each property and land use information required to calculate the charges.

9.0 ENFORCEMENT AND PENALTIES

9.1 Enforcement

In the event that any user fails to pay the specified charges, the (local agency administrator) shall take the necessary legal steps to collect such charges. This may be accomplished by placing a lien on the property, which may be placed on the tax bill and collected as ordinary taxes by the County/Municipality.

9.2 Penalties (OPTIONAL)

Any person convicted of violating the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction thereof, shall be subject to a fine of not more than Five

Thousand Dollars ($5,000.00) or imprisonment not exceeding 1 year or both for each violation with costs imposed in the discretion of the court. Each day that a violation continues shall be a separate offense. In addition, the (governing authority) may institute injunctive, mandamus or other appropriate action or proceedings of law to correct violations of this ordinance. Any court of competent jurisdiction shall have the right to issue temporary or permanent restraining orders, injunctions, or mandamus or other appropriate forms of relief.

10.0 APPEALS

Any person aggrieved by an action of the (local agency administrator) charged with enforcing this ordinance, who believes that stormwater charges have been imposed without basis or have been determined incorrectly, shall have the right to appeal and may petition the (local hearing examiner) for a hearing to contest such charges. The appeal shall be filed in writing within (time frame) of the date of official notification or transmittal of the contested determination by the (local agency administrator). The petitioner shall state clearly the grounds on which the appeal is based. The appeal shall be processed in the manner prescribed for hearing administrative appeals under (local or State code provision).

11.0 SEVERABILITY

If any section, subsection, sentence, clause, phrase, or portion of this ordinance is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision. Such holding shall not affect the validity of the remaining portions of this ordinance, it being the intent of the (local unit board/council) that this ordinance shall stand on its own merit.

12.0 FLOODS AND LIABILITY

Floods from stormwater runoff may occur occasionally that exceed the capacity of the stormwater system maintained and financed with utility charges. This ordinance does not imply that properties subject to charges shall always be free from flooding or flood damage, or that all flood control projects to control runoff can be constructed cost-effectively. Nothing whatsoever in this ordinance shall deem the (local unit, local unit board/council, (local agency administrator, or local agency staff) liable for any damages incurred in a flood or from adverse water quality. Nothing in this ordinance purports to reduce the need or necessity for flood insurance.

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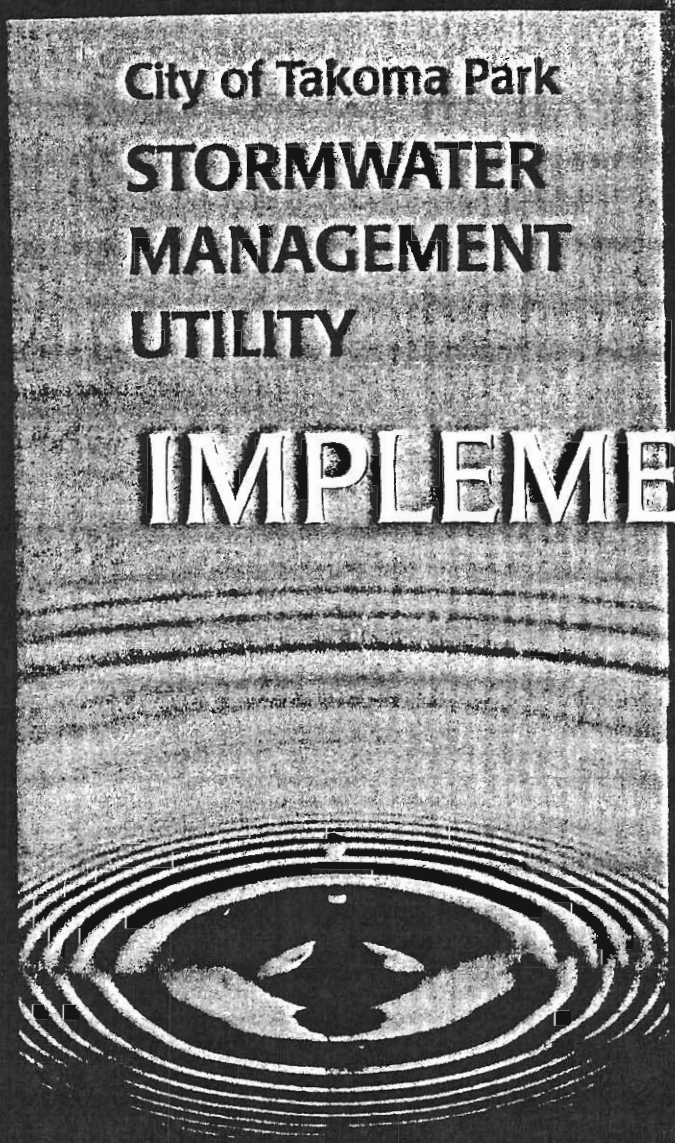
City of Takoma Park

STORMWATER MANAGEMENT UTILITY

IMPLEMENTATION REPORT



Prepared for

City of Takoma Park

Prepared by

CH2MHILL

February 1997

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Stormwater Management Utility
Implementation Report

Prepared for

City of Takoma Park

Prepared by

CH2M HILL

February 1997

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Table of Contents

Section		Page
1	**Overview**	**1-1**
	Rate Structure	1-1
	Billing Mechanism	1-1
	Penalties	1-2
2	**Fee Calculation Method**	**2-1**
	Stormwater Management Utility Billing Classification	2-1
	Residential	2-2
	Other Developed (Nonresidential and Multifamily) Property	2-4
	Undeveloped Property	2-7
	Example of Nonresidential Fee Calculation	2-7
	Special Cases	2-8
	Multiple Owner Properties	2-8
3	**Revenue Requirements**	**3-1**
4	**Rate Structure Analysis and Fee Recommendations**	**4-1**
	Numbers of Accounts and Base Units by Land Use	4-1
	Fee Recommendation	4-3
5	**Stormwater Billing Databases**	**5-1**
	Maryland National Capital Park and Planning Commission (MNCPPC) Geographic Information System (GIS) Database	5-2
	Maryland Office of Planning (MOP) State Department of Assessments and Taxation (SDAT) Database	5-7
6	**Administrative Policies**	**6-1**

SECTION 1

Overview

The City of Takoma Park, Maryland, adopted a new Stormwater Management Utility (SMU) ordinance on June 10, 1996, that created a stormwater management fee system based on the amount of runoff from each property to fund the costs of stormwater management in the City. A copy of the ordinance is included as Appendix A. Authority for creating the stormwater management fee system is conferred on the City by Section 4-204(d), Environment Article, Annotated Code of Maryland, as amended.

A separate ordinance was adopted by the City Council on February __ 1997, establishing the fee structure. The new stormwater management fee will be billed through a stand-alone billing system. The City Administrator administers the SMU.

Presentations to City Council and public hearings were held regularly throughout the SMU implementation project to provide opportunities for questions or comments from elected officials and the public to be addressed.

Rate Structure

The new rate structure is the same for all developed properties in the City, including property owned by public and tax-exempt entities. The rate is based on impervious area as a measure of each property's contribution to stormwater runoff. Impervious area is measured in Equivalent Residential Units (ERUs), or Base Units. Base Units are defined in the ordinance as "the median impervious surface area associated with a single family residential property in the City." The base unit is calculated as 1,228 square feet (ft^2). An annual rate of $__ per base unit is charged to all property owners. Tax exempt properties must pay the SMU fee because it is a fee rather than a tax.

Billing Mechanism

SMU fees will be billed once annually with a billing system developed by CH2M HILL. Bills will be printed and mailed in February 1997, for Fiscal Year 1997, which is extends from July 1, 1996, to June 30, 1997. The fee must be paid within 30 days after the date the bill is

mailed or issued to the property owner. A property owner may request correction of the fee by submitting a request in writing to the City Administrator within 30 days after the bill is mailed or issued to the property owner.

Penalties

The penalties for late or missed SMU fee payments are specified in the ordinance. An overdue fee bears interest and penalties at the rate of 1.67 percent per month or fraction of a month that a fee is overdue. When overdue, the fee, including interest and penalties, is a lien on real property and may be collected in the same manner as delinquent real property taxes or by a suit against the property owner.

SECTION 2

Fee Calculation Method

The new rate structure is the same for all developed properties in the City, including property owned by public and tax-exempt entities. The rate is based on impervious area as a measure of each property's contribution to stormwater runoff. Impervious area is measured in Equivalent Residential Units (ERUs), or Base Units.

> ***Base Unit****—means the median impervious surface area associated with a single family residential property in the City* (SMU Ordinance, see Appendix A).

The City implemented a stormwater utility user fee program that funds all of the current stormwater management program, including capital improvement projects. A stormwater management utility user fee program assessed to each property on the basis of its contribution to stormwater runoff appears to be the most equitable means of funding existing and future programs. By using impervious areas of each parcel, this system of user fee distributes the cost of the program more equitably amongst all sources of stormwater runoff above natural conditions.

Stormwater Management Utility Billing Classification

Although all properties pay the same rate, fees are calculated differently depending on the type of property. Properties were sorted into the following stormwater classes:

- Residential
- Other Developed Property (NR or RM)
- Undeveloped

For the purpose of determining impervious areas and stormwater management fees, the term residential (stormwater class RS) is applied to all single-family detached housing, as well as townhouses which have only a single owner or dwelling unit. But, the term residential does not include multi-family properties (apartment or condominium with more than two dwelling units), which generally have larger impervious areas and either a single owner or a common association that owns common areas. Other developed properties, hereinafter referred to as nonresidential properties, include multifamily properties (stormwater class RM), commercial and industrial properties (stormwater class NR), and tax-exempt properties such as hospitals, schools, recreational and cultural facilities, hotels and churches (stormwater class NR).

Undeveloped properties include all parks and open space not containing impervious area, as well as any land designated as residential, multifamily, commercial, industrial, or tax-exempt that does not currently contain impervious surfaces.

The billing classification is based primarily on the tax assessor land use designation of the property type. Zoning designations were not used as these were found to not reflect on actual land uses. Table 2-1 summarizes the stormwater class assigned to each land use the Maryland Office of Planning's State Department of Assessments and Taxation (SDAT) database.

Residential

Single Family Residential Property*—means a developed property which serves the primary purpose of providing a permanent dwelling unit and which is classified as residential in the State assessment rolls. A single family detached dwelling or a townhouse containing an accessory apartment or second dwelling unit is included in this definition* (SMU Ordinance, see Appendix A).

TABLE 2-1
Stormwater Class Assigned to Properties by Land Use Designation for Calculation of Stormwater Management Fees
City of Takoma Park

Land Use	Description	SW_Class
A	AGRICULTURAL	
C	COMMERCIAL	NR
CA	COUNTRY CLUB	NR
CC	COMMERCIAL CONDOS	NR
CR	COMMERCIAL RESIDENTIAL	NR
E	EXEMPT	NR
EC	EXEMPT COMMERCIAL	NR
I	INDUSTRIAL	NR
IC	INDUSTRIAL CONDOS	NR
M	APARTMENTS	RM
MA	MARSH LAND	
NC	NON-CONFORMING USE	
NP	NON-PERC LAND	
O	OPEN SPACE/CONSERVATION	
P	PARKING AREA	
R	RESIDENTIAL	RS
RA	RES AGRICULTURAL	RS
RC	RES COMMERCIAL	NR
S	SATELLITE CITIES	
TH	TOWNHOUSE	RS
TS	TOWN SECTOR	
U	RES. CONDOS	RM

Tax assessor land use type R is initially assumed to be residential (RS) for SMU billing. The SMU billing type is based on the use and stormwater runoff characteristics. Therefore, a property used for nonresidential purposes may be classified differently for SMU billing.

All single family residential properties in the City of Takoma Park were used to establish the base unit. Therefore, all residential properties are billed for one base unit ($__ per year). The statistical median of the impervious area was used to establish the fee for these properties.

Impervious area data for estimating base units were estimated from digital maps provided by the Maryland National Capital Park and Planning Commission (MNCPPC). Planimetric

information showing edges of buildings and pavement were obtained in digital map format (in the ArcInfo geographic information system software) from the MNCPPC in the fall of 1996. Nine maps cover the City at a 1 inch = 200 feet scale. One color copy of these maps has been provided to the City, showing property boundaries, property type, and building and other impervious surfaces.

Many of these data were recently completed for MNCPPC by contractors, and had not been thoroughly reviewed. To limit cost of mapping, MNCPPC had specified that impervious surfaces less than 200 feet in length within parcels should not be digitized. Therefore, driveways on residential parcels and small parking areas on nonresidential parcels were not included in the MNCPPC data set. Following early discussions the City decided to not include estimates of driveway impervious area in the estimate of base units on residential properties. A significant number of properties in the City do not have driveways, and the small increase in median impervious area of residential parcels did not justify the relative cost of estimating driveway impervious area for the 3,425 residential properties.

By using the ArcInfo geographic information system (GIS), parcel boundary information were superimposed on impervious area boundary data, and impervious area estimated for each parcel. Figure 2-1 shows the distribution of impervious area of residential parcels. The base unit was calculated based on all 3,425 residential parcels in the City containing any non-zero impervious area.

The calculated base unit surface area is 1,228 square feet.

Other Developed (Nonresidential and Multifamily) Property

Other Developed Property—means a developed property other than single-family residential property. Such property shall include, but not be limited to, multi-family dwellings, commercial properties, industrial properties, parking lots, hospitals, schools, recreational and cultural facilities, hotels, offices, and churches (SMU Ordinance, see Appendix A).

Frequency Distribution of Impervious Area for Residential Parcels in Takoma Park

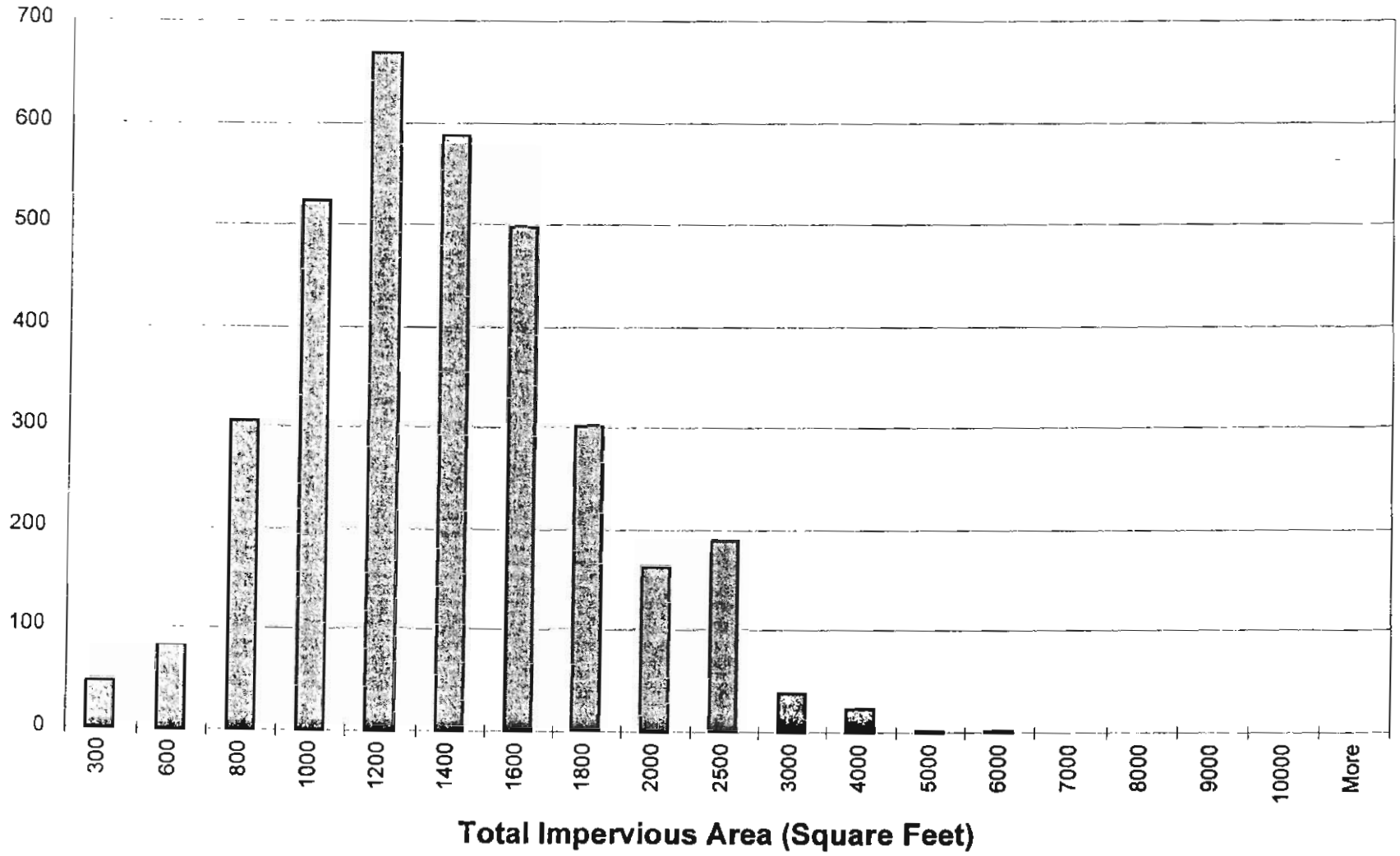


Figure 2-1

Tax assessor land use types C, CA, CC, CR, E, EC, I, IC, M RC and U, as shown on Table 2-1, are initially assumed to be other developed property, either nonresidential (NR) or multifamily (RM), for SMU billing.

Nonresidential and multifamily properties are billed based on the amount of impervious surface. Impervious areas were determined from GIS data obtained from MNCPPC, as discussed in Section 3.

Impervious Surface Area- *means the number of square feet of horizontal surface covered by buildings and other impervious surfaces.*

Impervious Surface—means a surface area which is compacted or covered with material that is resistant to infiltration by water, including, but not limited to, most conventionally surfaced streets, roofs, sidewalks, patios, driveways, parking lots, and any other oiled, graveled, graded, compacted, or other surface which impedes the natural infiltration of surface water (SMU Ordinance, see Appendix A).

The GIS data generally divided impervious area into two categories: buildings and other impervious area. The billing impervious area for a nonresidential property is calculated as:

Billing impervious area = building impervious area + other impervious area

All areas are measured in square feet. The number of base units is calculated from the billing impervious area as:

Number of Base Units = Billing impervious area/(1,228 ft^2/base unit)

The fee is then equal to the billing rate times the number of base units:

SMU fee ($/year) = Number of Base Units x ($____/year/Base Unit)

The City of Takoma Park has decided that in Fiscal Year 1998 it will adopt a policy on allowing fee reductions for parcels with stormwater management quality and quantity

ols that meet appropriate City and County codes. Therefore, no fee reductions are currently allowed for in the rate structure. An example of the fee calculation procedure for nonresidential properties is provided later in this section.

Undeveloped Property

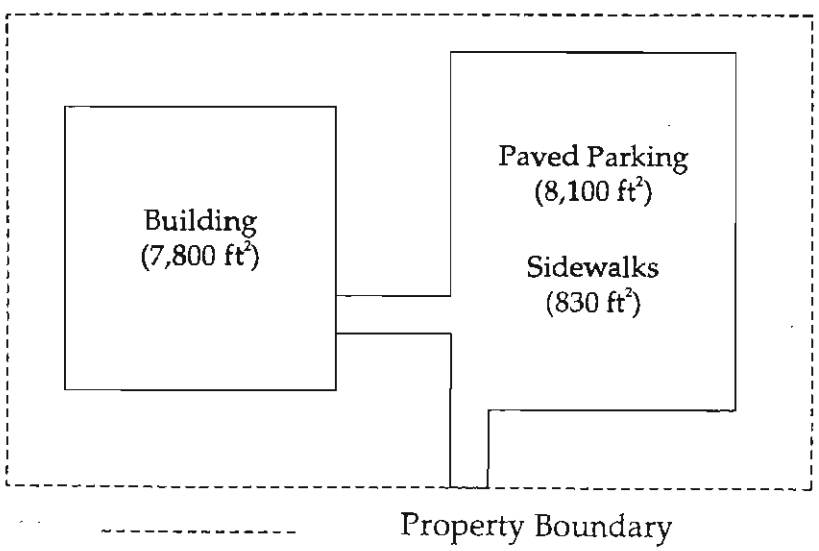
> ***Undeveloped Property****—means any non-single family residential property which has one-third or less of the base unit of impervious surface area* (SMU Ordinance, see Appendix A).

Parcels with less than 409 square feet (one third of the base unit of 1,228 ft^2) of impervious area are considered undeveloped for SMU billing purposes. For both residential and nonresidential parcels, the impervious area is determined from the MNCPPC GIS database.

Example of Nonresidential Fee Calculation

Figure 2-2 shows an example of nonresidential fee calculation.

FIGURE 2-2
Example of Nonresidential Fee Calculation



Impervious Surface	Impervious Area (ft^2)
Building	7,800
Parking	8,100
Sidewalks	830
Total	16,730

Billing Impervious Area = building impervious area + other impervious area
= 7,800 + (8,100 + 830)
= 16,730 ft^2

Number of Base Units = billing impervious area/base unit
= 16,730 ft^2/(1,228 ft^2/base unit)
= 13.6 base units

SMU Billing Fee = Number of Base Units x Rate
= 13.6 x $25/base unit/year
= $340.00 per year

Special Cases

Multiple Owner Properties

In some cases, where there are multiple owners of a single property, they cannot be shown on the single parcel boundary layer in the GIS database. Examples include multi-story condominiums.

In these cases, the impervious area is determined for the single parcel and distributed equally to all property owners.

There are seven parcels that were identified in the City as having more than one owner. Appendix C lists the owners associated with these properties. The map of parcel types in Takoma Park shows the location of these parcels (see map pocket).

SECTION 3

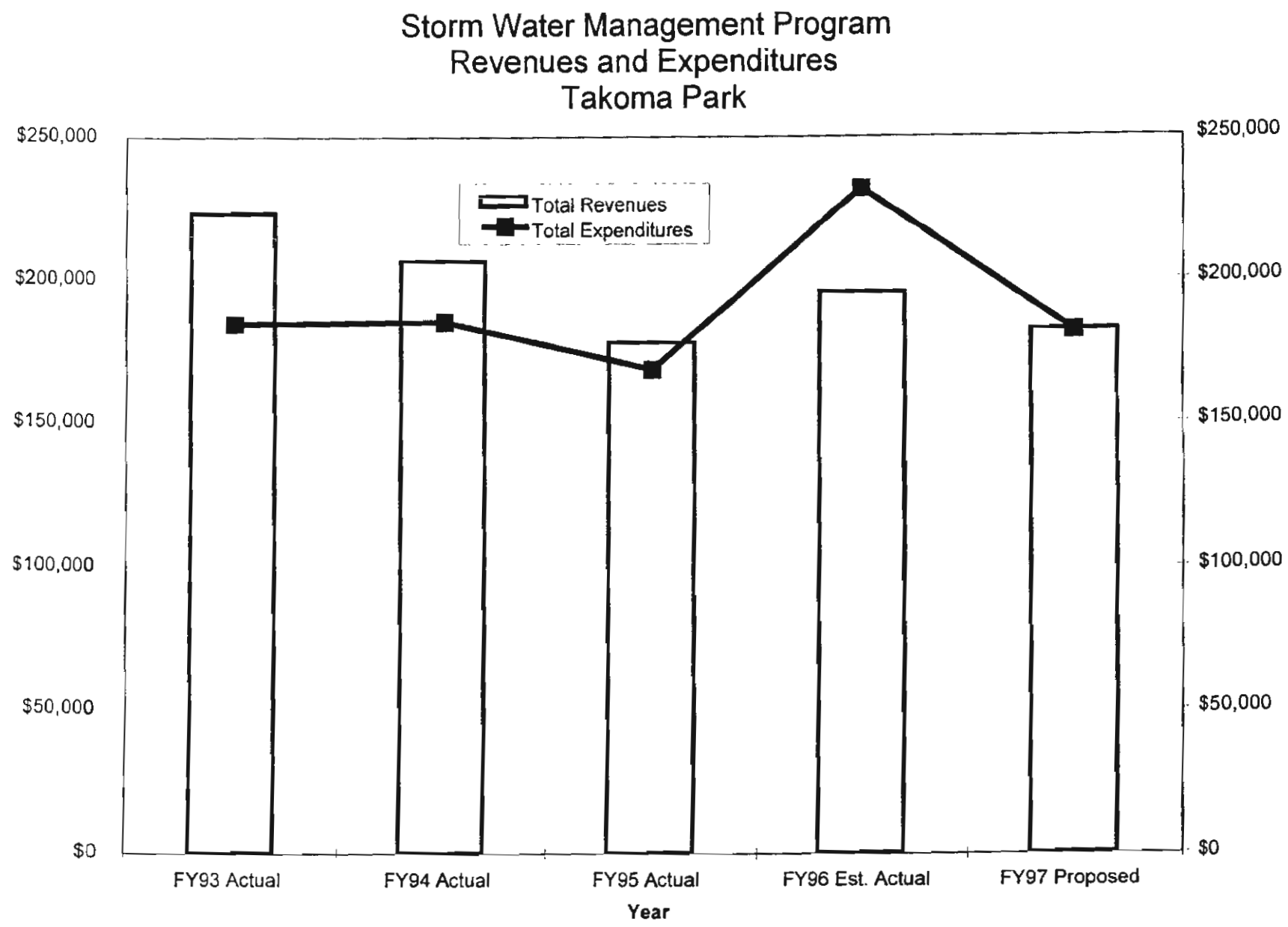
Revenue Requirements

A central tenet in the establishment of stormwater management utilities around the U.S. has been that income derived from the stormwater utility user fees should be dedicated special revenue and should not exceed the actual costs incurred by the locality operating the stormwater management program.

Since FY91, Takoma Park has established a budget expenditure history on the annual cost of stormwater maintenance. Table 3-1 summarizes the revenues and expenditures presented in the proposed FY97 budget memorandum from the City Administrator to City Council (April 19, 1996). Figure 3-1 shows revenues and expenditures over the last 4 years, and proposed for FY97. Revenues have been based in part on an ad valorem tax system. Figure 3-2 shows revenues and the percentage of the revenues that was funded from the real property tax.

TABLE 3-1
Stormwater Management Revenues and Expenditures
City of Takoma Park

Description	FY93 Actual	FY94 Actual	FY95 Actual	FY96 Est. Actual	FY97 Proposed
Stormwater Management Revenues					
Real Property	$152,117	$52,604	$110,596	$81,965	$0
Appropriated Surplus	$0	$148,628	$44,000	$68,000	$0
EPA Grant	$0	$0	$15,532	$25,000	$0
Other	$71,198	$4,840	$8,095	$20,086	$200,000
Total Revenues	***$223,315***	***$206,072***	***$178,223***	***$195,051***	***$200,000***
Tax Levy per $100 valuation	***$0.06***	***$0.02***	***$0.04***	***$0.03***	***$0.00***
% Revenues from Real Property Tax	**68%**	**26%**	**62%**	**42%**	**0%**
Stormwater Management Expenditures					
Capital Improvements	$50,099	$133,518	$75,705	$108,000	$100,000
Other	$134,696	$52,024	$93,608	$124,000	$100,000
Total Expenditures	***$184,795***	***$185,542***	***$169,313***	***$232,000***	***$200,000***



CH2MHILL

Figure 3-1

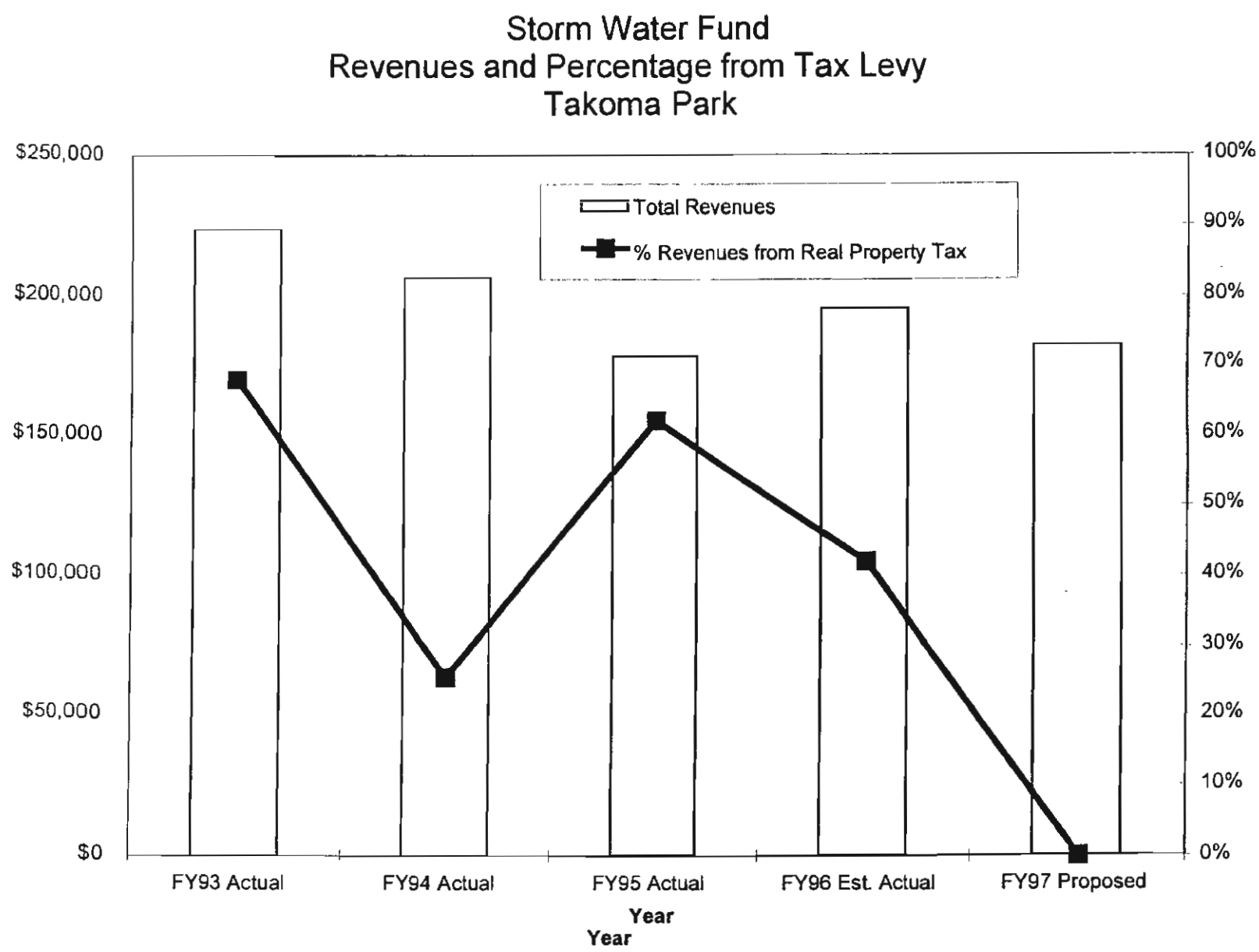

Storm Water Fund
Revenues and Percentage from Tax Levy
Takoma Park
$250,000
$200,000
$150,000
$100,000
$50,000
$0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Total Revenues
% Revenues from Real Property Tax
FY93 Actual
FY94 Actual
FY95 Actual
FY96 Est. Actual
FY97 Proposed
Year
Year

Figure 3-3 shows the proportion of expenditures that have been dedicated for capital improvements for the past 4 fiscal years. Total expenditures have been about $200,000, and have been primarily for capital improvements ($100,000 proposed in FY97), and contract work and engineering services associated with cleaning and inspection of the City's 34,000 ft of storm sewers and 788 storm drain inlets. The City has established a three year frequency for the storm sewer cleaning and inspection work. Other than frequency of inspection and maintenance, level-of-service goals have not been clearly defined for flooding, water quality, and other storm water management program elements.

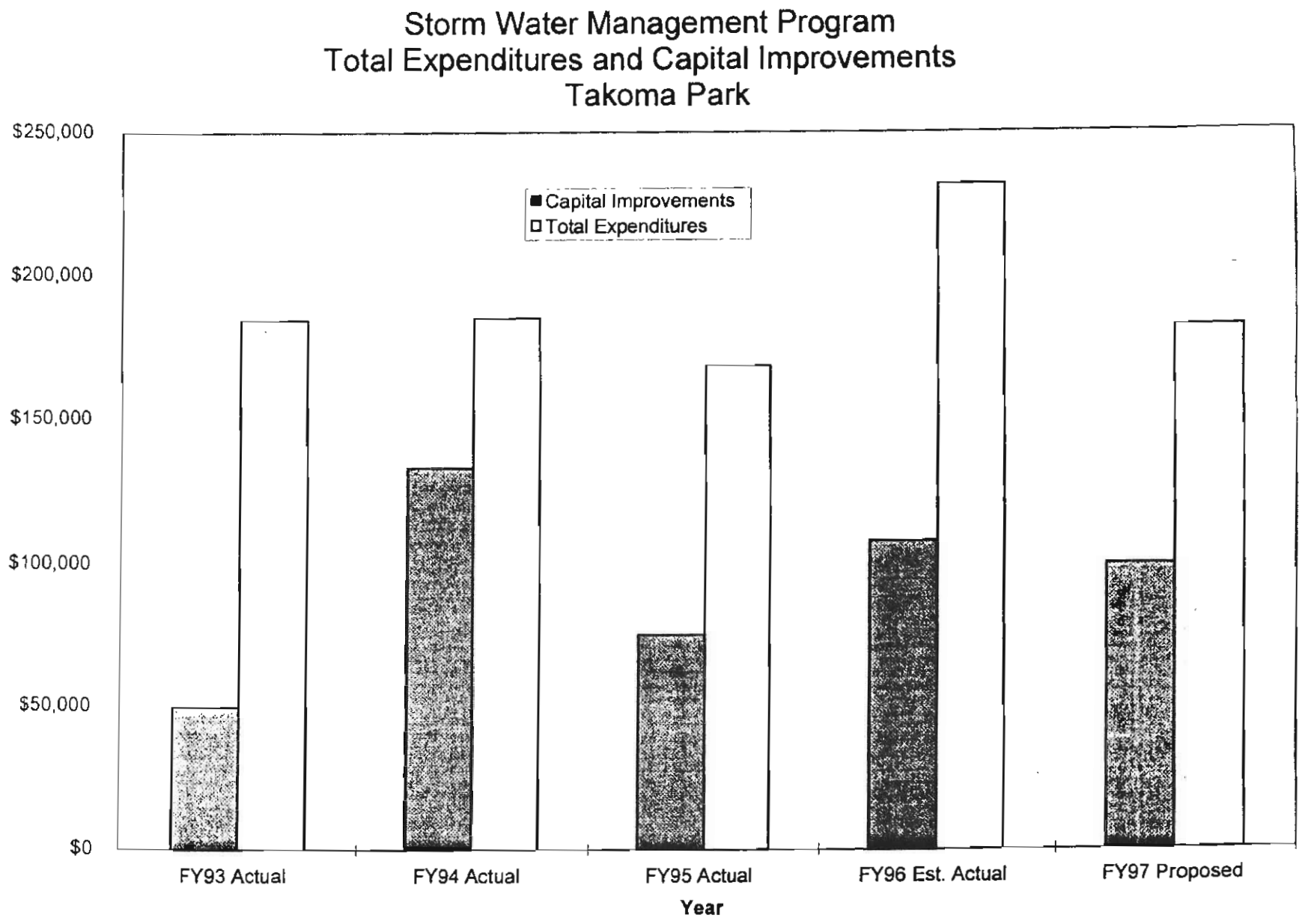
The FY97 budget proposed a stormwater management expenditure of $200,000. The City is considering increasing the revenue to $225,000, to increase level-of-service and to fund start-up and administrative costs for the stormwater management utility.

Review of Table 3-1 indicates that dedicated real property tax funding has typically generated only between 40 and 60 percent of the required revenues, with the difference being provided by appropriated surpluses from prior years unspent funds, grants, and other minor sources. The FY96 tax revenue of about $82,000 represents 42 percent of revenue requirements, and was generated by a tax levy of 3 cents per $100 of assessed property value (only the first 40 percent of assessed value is taxed).

In previous years, the ad valorem tax rate varied from 3 to 8 cents per $100 assessed value. Table 3-2 summarizes the revenue that could be generated with the ad valorem tax and the median residential tax bills at these rates based on the current assessment data (excluding exempt and exempt commercial properties).

TABLE 3-2
Revenues and Median Tax Bills
Based on 1996 Assessment Data from the Maryland Office of Planning

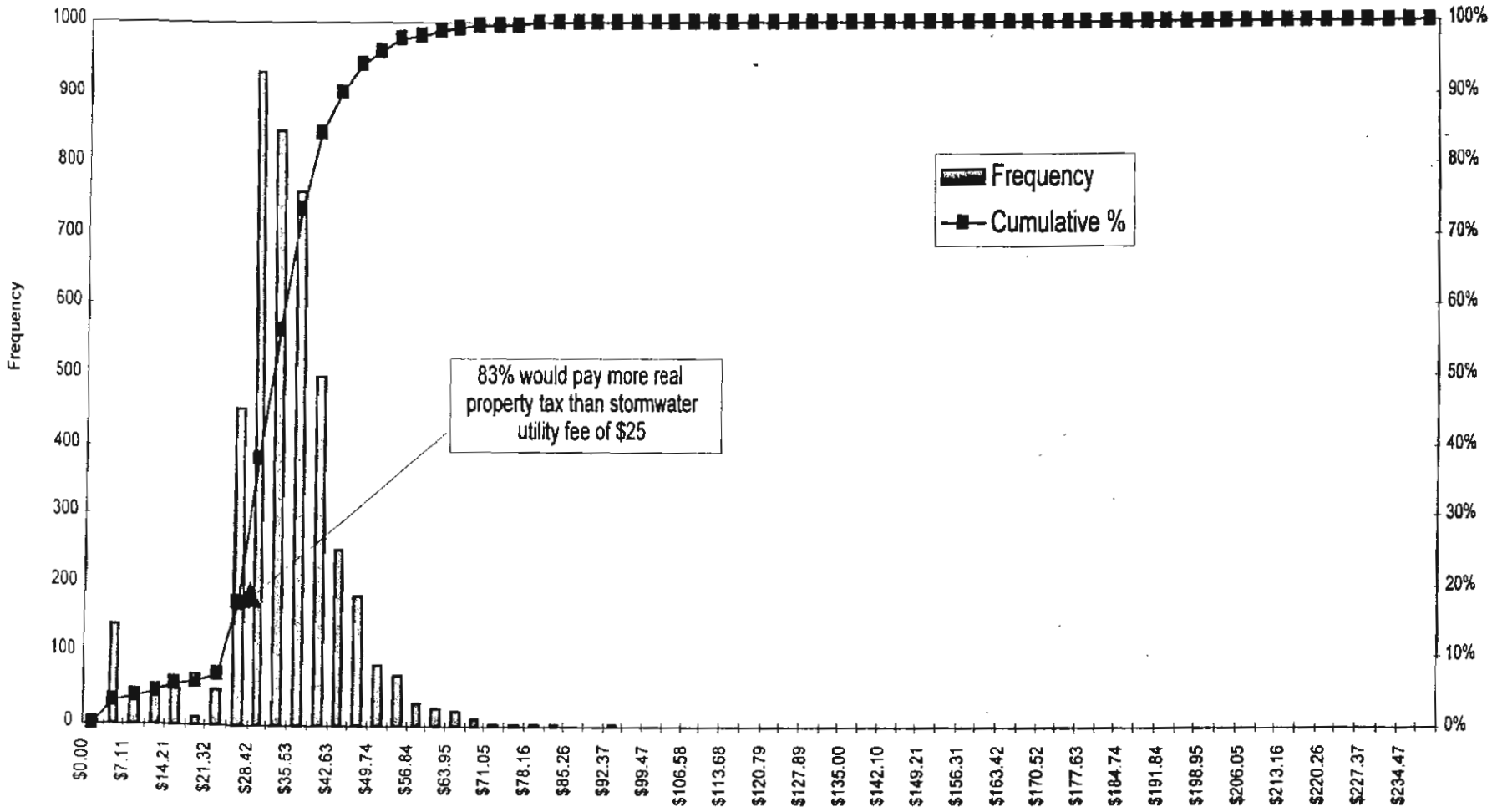
Tax Rate per $100 Value	Total Revenue (from residential, and nonresidential, excluding tax exempt properties)	Median Annual Tax on Residential Properties
3 cents	$114,000	$17.44
6 cents	$228,000	$34.88
8 cents	$305,000	$46.50


Storm Water Management Program
Total Expenditures and Capital Improvements
Takoma Park
$250,000
$200,000
$150,000
$100,000
$50,000
$0
Capital Improvements
Total Expenditures
FY93 Actual
FY94 Actual
FY95 Actual
FY96 Est. Actual
FY97 Proposed
Year

Based on current assessment data, the tax rate that would be required to generate a revenue of $200,000 and $225,000 is 5.3 cents and 5.9 cents per $100 value, respectively. Figure 3-4 shows a frequency distribution on the annual tax bill that residential properties would pay for 5.3 cents per $100 value. For both revenue levels, the recommended corresponding stormwater utility fee of $25 and $28 are lower than the tax bill that would be paid by 83 percent of the property owners.

In summary, 83 percent of residential properties would pay less under the proposed stormwater utility fee of $25 or $28 than they would under the ad valorem tax that would generate the same revenues of $200,000 and $225,000, respectively.

Distribution of Annual Tax Bills for Residential Properties in Takoma Park, for 5.3 cents per $100 valuation tax rate ($200,000 Revenue)



SECTION 4

Rate Structure Analysis and Fee Recommendations

The rate structure analysis and fee recommendations were based on properties within the Takoma Park City limits for which records could be matched between the Maryland Office of Planning's (MOP's) State Department of Assessment and Taxation (SDAT) database and the Maryland National Capital Park and Planning Commission (MNCPPC) parcel boundary and planimetric GIS data. The SDAT data provides the ownership and parcel type information critical for issuing bills, and the MNCPPC data provide impervious surface information critical for determining fees.

As explained in Section 2, the fee calculation method is based on distinguishing residential properties from other developed properties. Parcel type information are presented in the map included in the map pocket.

Other developed properties include properties identified in the SDAT database as commercial, exempt commercial, exempt, or multifamily land uses (see Section 5 for discussion of data sources).

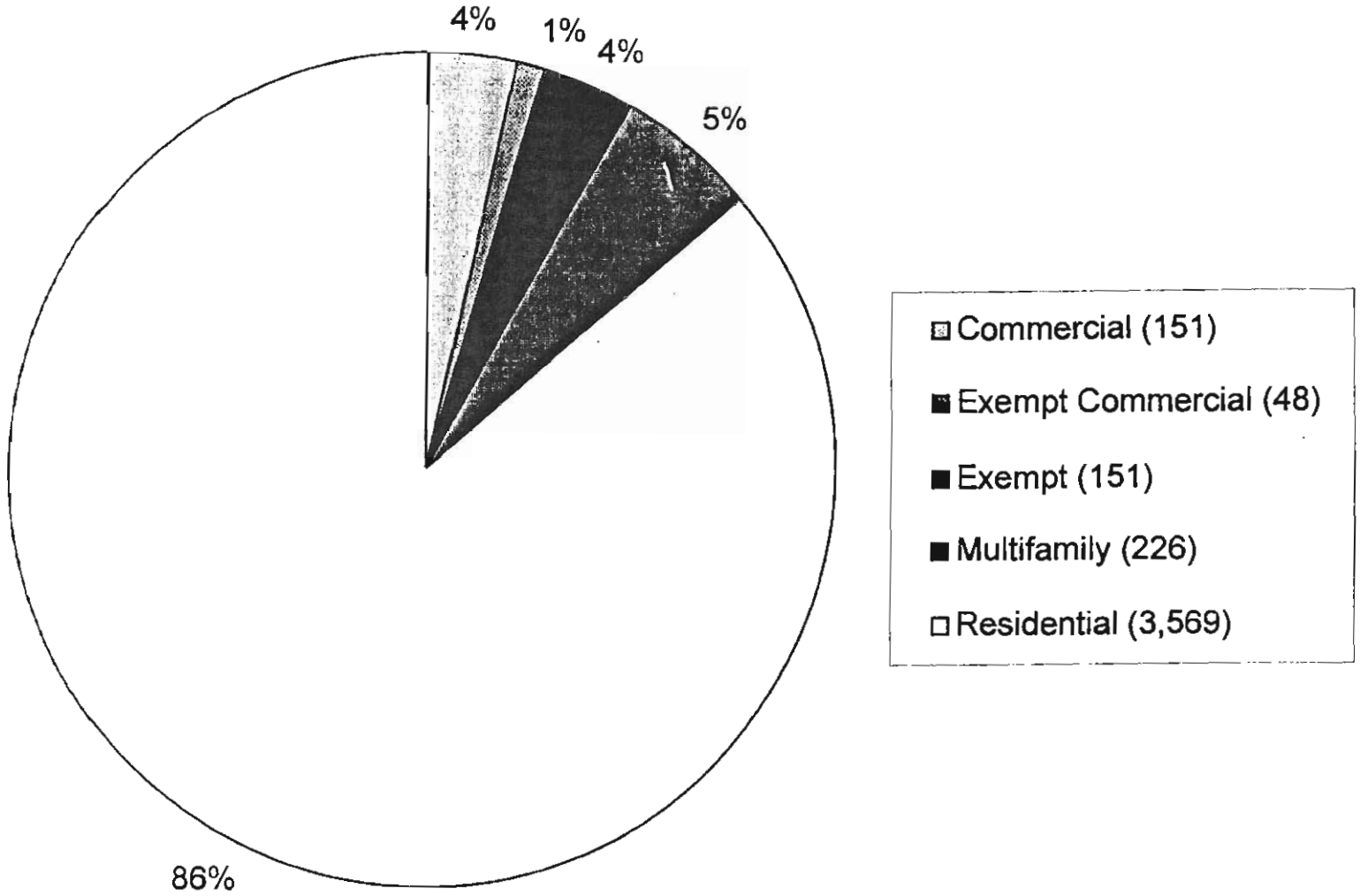
By definition in the City SMU Ordinance, developed properties are those with impervious surfaces greater than one third of a base unit.

Numbers of Accounts and Base Units by Land Use

There were 4,145 accounts that matched between the SDAT and GIS databases. In addition, seven of these properties represent multiple owner accounts with a total of 93 accounts, for a total of 4,231 accounts.

Figure 4-1 shows the number of properties of each parcel type. Overall, 86 percent of properties are identified as residential (not including multifamily properties) and would be billed for a single base unit if the properties are developed.

Distribution of Account Types in Takoma Park



However, of the 3,569 residential properties, 3,385 are considered developed and would be issued an stormwater fee because of impervious area greater than 409 square feet (one third of the base unit of 1,228 square feet). Of the 576 nonresidential or multifamily properties, 544 are considered developed and would be issued an stormwater fee.

Figure 4-2 shows the distribution of base units of each parcel type. The total estimated impervious area of all parcels in the city is 11,339,600 square feet, not including the small amount of impervious area of parcels that would be considered undeveloped under the SMU ordinance. Sixty percent, or 6,896,800 square feet, of the estimated impervious area is nonresidential or multifamily.

Fee Recommendation

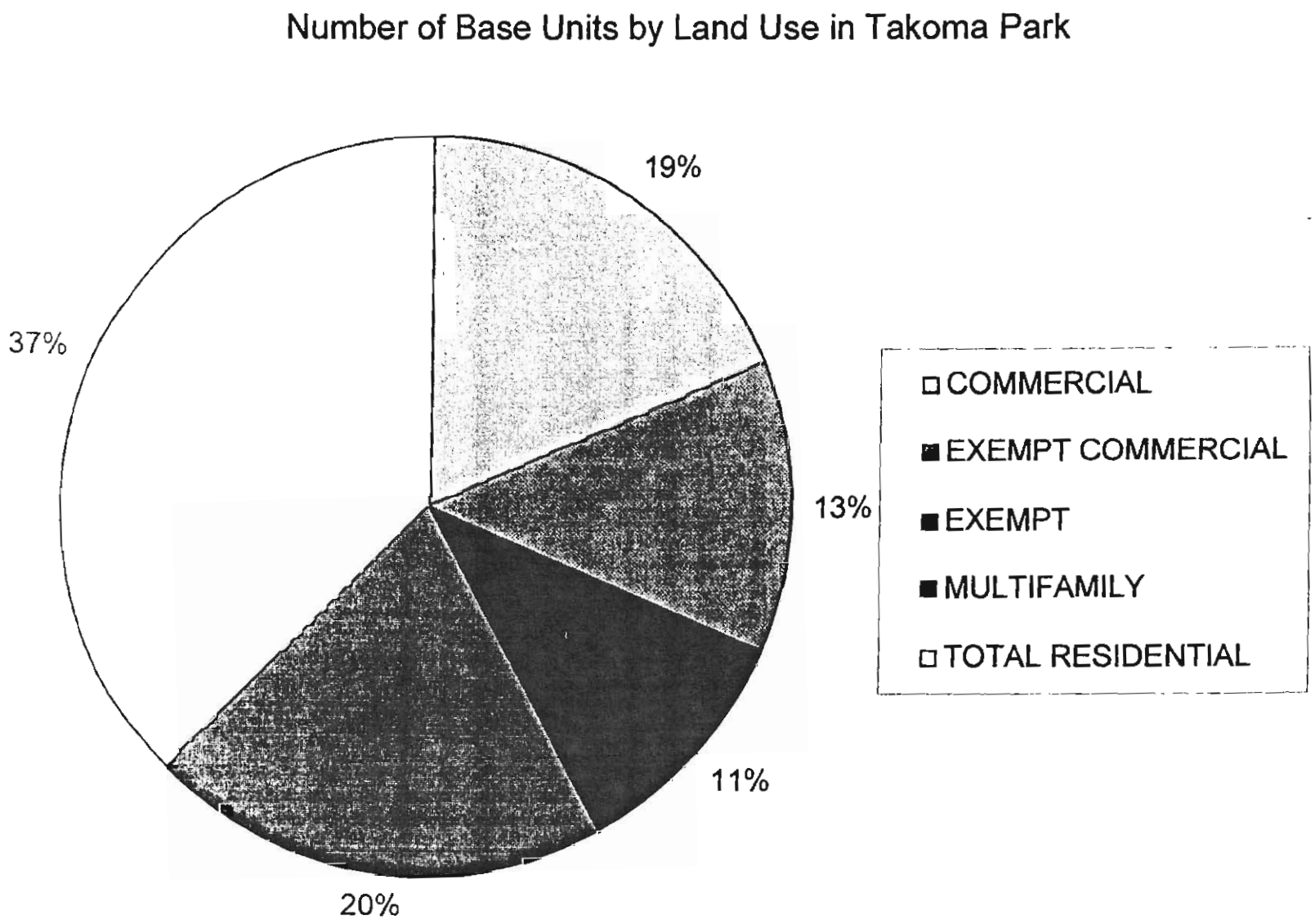
Based on the numbers of base units presented above and the revenue requirements presented in Section 3, the fee per base unit can be calculated. The annual fee that should be charged per base unit for revenues of $200,000 or $225,000 should be $22.19 or $24.97, respectively, without taking into account delinquency in payments. Figure 4-3 shows the annual fees and the estimated revenues from the different stormwater classes.

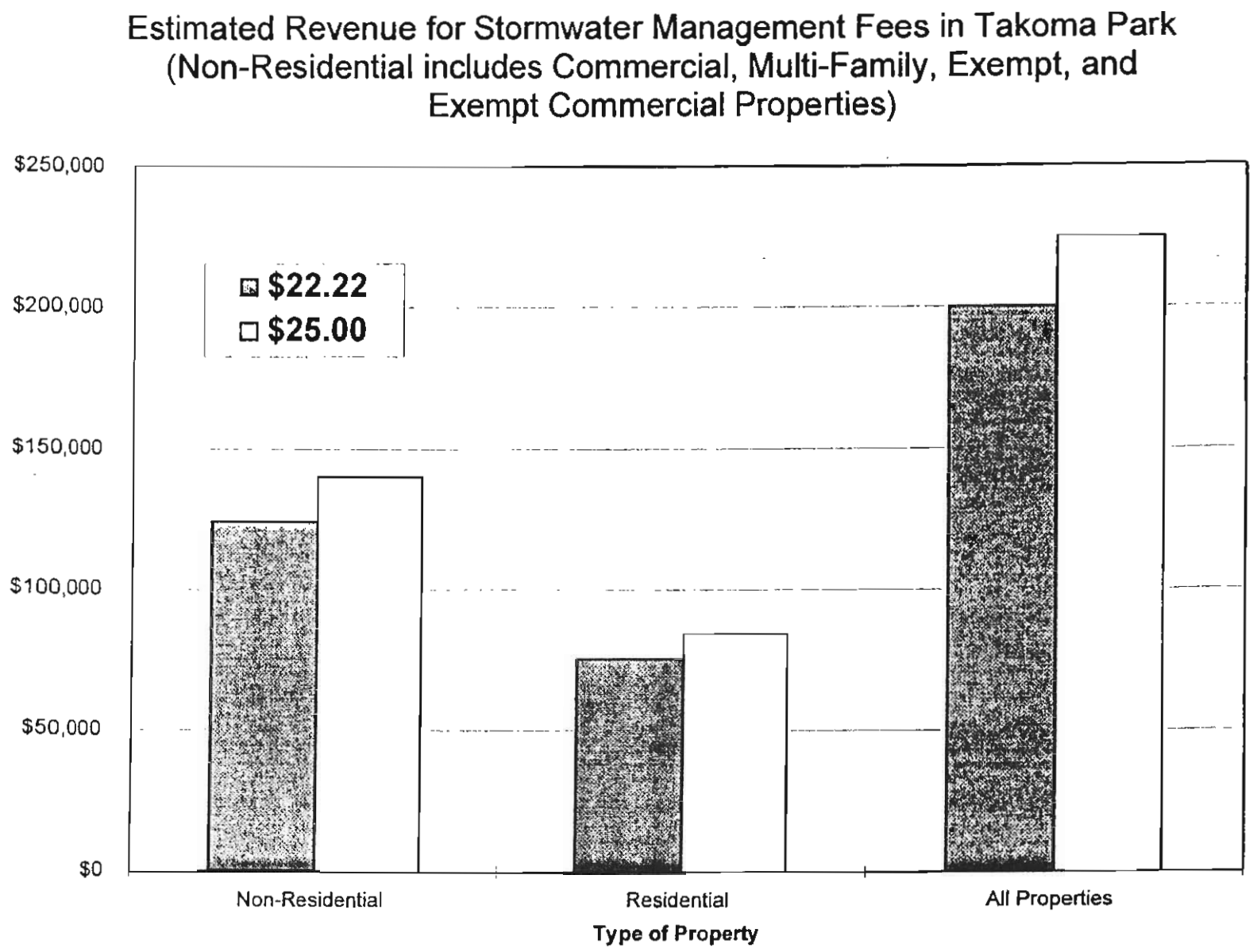
Table 4-1 summarizes the calculations of recommended fees.

TABLE 4-1
Calculation Method for Recommended Fee
City Takoma Park Stormwater Management Utility

Item	Quantity	Units
Base Unit (Median Single-Family Residential Impervious Area) =	1,228	square feet
Total Residential Units =	3,385	Base Units (ERUs)
Total Estimated Non-residential Impervious Area[1]	6,896,763	square feet
Total Estimated Non-residential Base Units[1]	5,616	Base Units (ERUs)
Total Base Units (ERUs)	9,001	Base Units (ERUs)
Fee[2] at Revenue of $200,000 =	$22.22	per Base Unit (ERU)
Fee[2] at Revenue of $225,000 =	$25.00	per Base Unit (ERU)

[1]Note: Includes commercial, multifamily, exempt, and exempt commercial, but not properties with no assigned parcel type.
[2]Fee does not include delinquency in payments.


Number of Base Units by Land Use in Takoma Park
19%
13%
11%
20%
37%
COMMERCIAL
EXEMPT COMMERCIAL
EXEMPT
MULTIFAMILY
TOTAL RESIDENTIAL


Estimated Revenue for Stormwater Management Fees in Takoma Park
(Non-Residential includes Commercial, Multi-Family, Exempt, and
Exempt Commercial Properties)
$250,000
$200,000
$150,000
$100,000
$50,000
$0
$22.22
$25.00
Non-Residential
Residential
All Properties
Type of Property

The fees presented in Table 4-1 and Figure 4-3 assume no delinquency in payments. CH2M HILL recommends that about 10 percent delinquency rate be accounted for initially; though this number should be tracked carefully and would be expected to decrease as the stormwater management utility becomes better understood. Therefore, the recommended fee per base unit per year is $25 or $28, for revenues of $200,000 and $225,000.

SECTION 5

Stormwater Billing Databases

Data for determining impervious area, property type and billing address information were obtained and combined from two sources. The data were then entered into a separate billing software system, which the City of Takoma Park will maintain and use for printing assessment notices and stormwater management fee bills. The billing software will be presented in a separate users manual.

The property type and billing address data were obtained from the Maryland Office of Planning (MOP) State Department of Assessments and Taxation (SDAT) Database (often referred to as the assessor's database). The impervious area information were obtained from the Maryland National Capital Park and Planning Commission (MNCPPC) Geographic Information System (GIS).

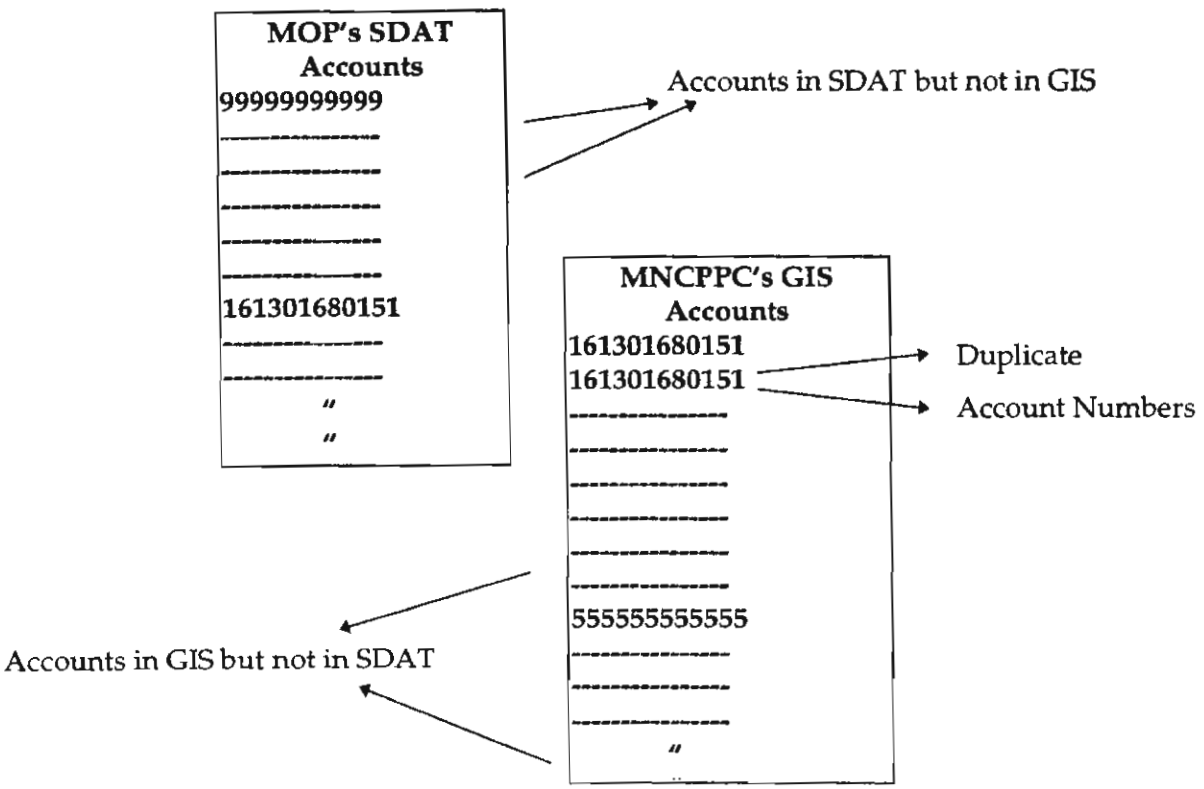
This section describes procedures used to link these databases, problems encountered and modifications made. For the majority of parcels, the account numbers in the GIS data could be readily linked to accounts in the assessor's database. However, three categories of problems were encountered when making that linkage:

- Account numbers in the GIS database that could not matched to accounts in the assessor's database
- Account numbers in the assessor's database that could not matched to accounts in the GIS database
- Duplicate account numbers in the GIS database, that is 2 or more parcels in the GIS with the same account number

Figure 5-1 shows a schematic that illustrates these account matching problems. The problem of duplicate account numbers is not significant, as these all represent adjacent parcels with a single owner, such as a strip mall. The parcel boundaries were dissolved between these parcels in the GIS, in order to have a one-to-one relationship between parcel impervious area and property owner for determining billing impervious area.

Large scale (1 inch = 200 feet) maps of the City showing the parcel boundaries, and impervious areas were provided to the City. These maps show parcel types, as well as parcels with duplicate account numbers in the original property coverage. Appendix E lists the parcels with identical account numbers in the GIS.

FIGURE 5-1
Schematic Illustrating Account Matching Problems Between MNCPPC GIS and MOP SDAT Databases



Maryland National Capital Park and Planning Commission (MNCPPC) Geographic Information System (GIS) Database

The GIS database primarily refers to the spatial data from the MNCPPC's ArcInfo system, including planimetric and parcel boundary layers. In 1996, the MNCPPC had contractors digitize the planimetric information (edge of buildings, roads and parking lots) from aerial photographs that have been rectified to state plane coordinates and converted to digital orthophotographs. The parcel boundaries and parcel account numbers were digitized by

MNCPPC's contractors from MOP tax maps for Montgomery and Prince Georges County. These data were delivered to CH2M HILL in October and December of 1996.

Working with City and MNCPPC staff, CH2M HILL developed a City limit layer in the GIS that was used to clip data from the MNCPPC property coverage that were not within the City limits.

An impervious area layer was compiled from the planimetric and property layers, and was used to calculate the total impervious areas (both building and other impervious area) on each parcel. Figure 5-2 shows a detailed view of a non-residential building (the City municipal building at 7500 Maple Avenue), that illustrates the overlay of parcel boundaries with the planimetric information and distinguishes impervious area types.

Using a survey wheel, impervious area information were field verified for 41 parcels in 24 building complexes. Table 5-1 shows a comparison of these field measurements with total impervious area data from the GIS database. Generally, the field measurements revealed that the MNCPPC planimetric layer does not contain the "other impervious" area (parking lots and driveways) for smaller parcels. For larger parcels, the field measurements indicated that the GIS impervious data were sufficiently accurate for billing purposes, with most records being within 15 percent, and GIS records tending to be equal or smaller than field measurements, which suggests that individual bills are likely to reflect actual or be slightly less than actual impervious surfaces.

Further discussion with MNCPPC indicated that their contractor was instructed not to digitize parking lots and driveways with lengths smaller than 200 feet on any given parcel. Excluding these surfaces would result in non-residential properties with smaller stormwater management bills and reduced revenues, or higher fees for residential properties that would be inequitable. It was agreed with City staff that the other impervious area would be estimated from parcels having that data. Out of 576 non-residential parcels, 199 (35 percent) have "other impervious" area data. These were 48.6 percent impervious, of which 30.9 percent is from "other impervious" area and 17.7 percent is from "building impervious" area. The 30.9 percent was used to estimate "other impervious" area and added to "building impervious" area to obtain the total for these non-residential parcels

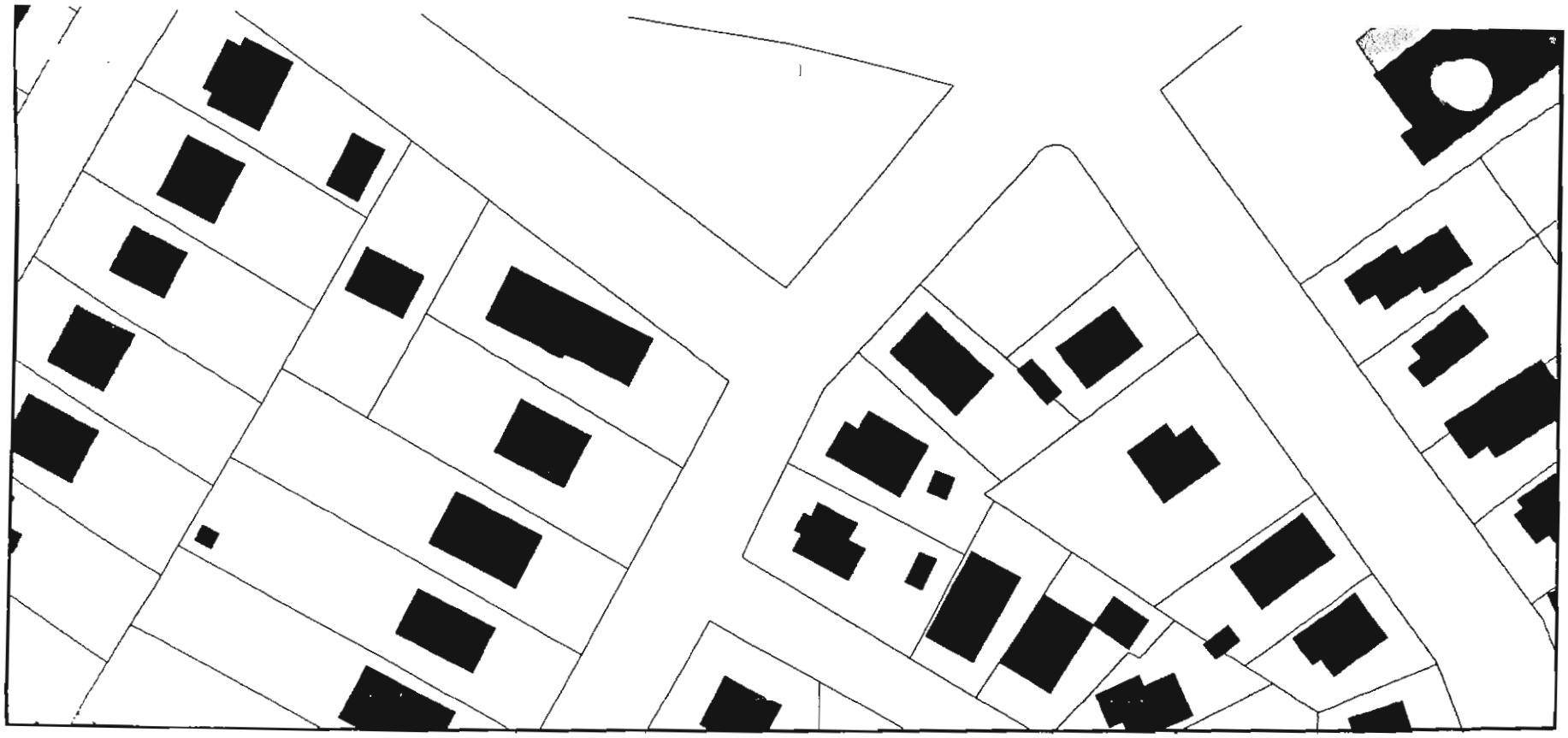
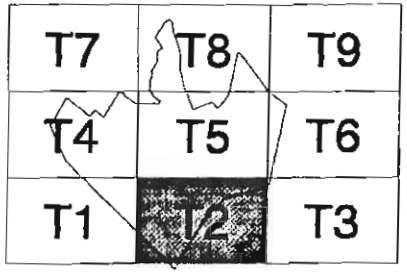


Figure 5-2
Non-Residential Parcel
Impervious Area
Takoma Park, Maryland
Stormwater Utility

Location of
Tile T2



Parcel Account No: 01680151

Area in Sq. Ft.

Building Footprint	23,729
Other Impervious	44,039
Permeable	90,792

N

Location of Parcel
within T2

Scale 1 : 981

TABLE 5-1
Comparison of Impervious Area Field Measurements with Data from MNCPP GIS
Takoma Park

Address	Truncated Parcel IDs	Total Impervious Areas (Square Feet) Field Measurements	GIS/ MNPPC	Difference in Total Impervious Area Square Feet	Percent	Comments
SHOPPING MALL, 101 University Blvd.	P1837624 P1837632	418,524	180,500	-238,024	-57%	Missing Parking on GIS Coverage. Total area of parcels = 431,747 sf
SUPER TRAK WAREHOUSE, 6360 New Hampshire	P1926807 P1901677	92,295	34,438	-57,857	-63%	Missing Building and Parking on Adjacent Tile
SLEEP DISORDER CLINIC, 7523 Carroll Ave.	01077453	39,489	17,403	-22,086	-56%	Missing Parking on GIS Coverage
WASHINGTON ADVENTIST HOSPITAL and WASHINGTON MISSIONARY COLLEGE	01080256 13-125 02320924 01079986	672,761	652,158	-20,603	-3%	
PINEY BRANCH ELEMENTARY SCHOOL	01058370 01058392 01058335 01058381 01058368 01058357 01058346	75,052	55,277	-19,775	-26%	
TOKOMA PARK ELEMENTARY SCHOOL	01779797 01058404	73,144	61,190	-11,954	-16%	
CITY BLDG	01680151	78,447	67,768	-10,679	-14%	
THE CAMBRIDGE APPT, 676 Houston Ave.	01067363	19,969	9,466	-10,503	-53%	Missing Parking on GIS Coverage
7676 CROSSROADS PROFESSIONAL OFFICE BLDG	P1913268 P1913250	88,869	78,904	-9,965	-11%	
7 ELEVEN at 902 Merrimac St.	01066984	15,679	5,752	-9,927	-63%	Missing Parking on GIS Coverage
8240 FLOWER AVE, FLOWER GARDENS APPT	01057661	11,749	4,908	-6,841	-58%	Missing Parking on GIS Coverage

TABLE 5-1
Comparison of Impervious Area Field Measurements with Data from MNCPP GIS
Takoma Park

Address	Truncated Parcel IDs	Total Impervious Areas (Square Feet)		Difference in Total Impervious Area		Comments
		Field Measurements	GIS/ MNPPC	Square Feet	Percent	
7710 MAPLEVIEW APPT	01066233	78,770	72,571	-6,199	-8%	
7777 ESSEX HOUSE APT	01063673	76,180	70,983	-5,197	-7%	
STORES at 6901, 6915, 6923, 6931 Laurel Ave.	01075113 01075124 01075135 01075102	53,739	58,651	4,912	9%	
SLIGO STATION CONDOS	13025	22,212	26,907	4,695	21%	No Match: Incomplete Account Number in GIS
Stores at 7601 Maple Ave.	01066461	8,736	5,225	-3,511	-40%	GIS Missing Parking Area
8640 FLOWER AVE	01073581	21,170	>4770	N/A	N/A	Duplicate/Subdivided Lot/Total Impervious area N/A
ZION LUTHERAN CHURCH, 7410 New Hampshire Ave.	P1984269 P1984277	19,764	16,357	-3,407	-17%	
GNH MARKET at 8000 Flower Ave.	01065284	7,575	4,206	-3,369	-44%	Missing Parking on GIS Coverage
POPS-N-SON REST., 6500 New Hampshire Ave.	P1959485	41,224	37,939	-3,285	-8%	
PARK VIEW TOWER APT, 7667 Maple Ave.	01080416	70,111	67,668	-2,443	-3%	
8632 FLOWER AVE	01066450	7,652	5,218	-2,434	-32%	Missing Parking on GIS Coverage
GLOBE AUTO BODY, 8435 Piney Branch Rd.	01067204	3,845	2,182	-1,663	-43%	Missing Parking on GIS Coverage
SUNOCO GAS STATION, 6907 New Hampshire Ave.	P1860030	19,305	19,980	675	3%	

lacking that data. Based on the field measurements, the 30.9% is a conservatively low estimate for most of the medium and smaller commercial and multi-family lots, though not for the larger ones in each category, of which there are a few. Including this 30.9 percent other impervious area estimate increases the total revenue (impervious area and number of ERUs) from all non-residential parcels by 52 percent.

It is recommended that the City estimate actual "other impervious" area for the 377 properties without that data before the FY98 billing cycle. Refining the data base is an important step to ensure long-term credibility with the program.

As described earlier, another observation on the GIS data was that there are __ records present in the MNCPPC property coverage, that could not be found in the assessors database. Appendix F lists those parcels from the GIS that could not be matched to the SDAT database. Most of these parcels are parks and right-of-way, and therefore would not receive bills under the stormwater management utility because they are either owned by the City of Takoma Park or are not developed.

Maryland Office of Planning (MOP) State Department of Assessments and Taxation (SDAT) Database

The most current data from MOP's SDAT database were provided to CH2M HILL in December 1996. The data include property type, ownership, and assessment information through July 1996 for properties in the Montgomery County portion of Takoma Park, and through September 1996 for the Prince Georges County potion of the City. Data were transmitted in five separate files. Appendix G includes MOP's explanation of the contents of those files.

As described in the previous section, another observation on the SDAT data was that there are __ records present in the assessors database that could not be found in the GIS database (not including the properties with multiple owners listed in Appendix C). Appendix H lists those parcels from the assessors database that could not be matched to the GIS database. Most of these parcels are residential, and many are outside the City limits. Therefore, not including them in the SMU will not have a significant impact on revenues.

Prior to the FY98 billing cycle, an effort should be made by the City together with MOP staff to resolve whether these properties are in the City and should receive bills.

A final observation on the SDAT data was that several parcels were inappropriately classified as single-family residential properties based on the classification presented in Table 2-1. The primary cause of this is that a number of multifamily properties (land use codes M for apartments or U for residential condominiums) were identified as residential based on land use codes in the assessors database. These properties would have been inappropriately assessed a fee for a single base unit. Therefore, their stormwater class was changed to multifamily (RM) or non-residential (NR) as appropriate so that they would be assessed an SMU fee based on actual impervious area. These properties were identified by listing the residential properties with the largest impervious area and checking whether the large properties were appropriately classified. Appendix I shows the remaining large residential properties after other properties were reclassified.

SECTION 6

Administrative Policies

Appendix A
Stormwater Management Utility Fee Ordinance

Introduced by:
Councilmember Rubin

First Reading: June 3, 1996
Second Reading: June 10, 1996
Effective Date: June 10, 1996

ORDINANCE NO. 1996-15

(Establishing a Stormwater Management Fee System)

WHEREAS, the City of Takoma Park is responsible for stormwater management in the City; and

WHEREAS, the governing body of a municipality is authorized by Section 4-204(d), Environment Article, Annotated Code of Maryland to adopt a system of charges to fund the implementation of stormwater management programs; and

WHEREAS, the City wishes to enact a stormwater management fee system based on factors that influence runoff, including land use and the amount of impervious surface on the property, as an alternative to an *ad valorem* tax; and

WHEREAS, all real property in the City, including property owned by public and by tax-exempt entities, contributes to runoff and either uses or benefits from the stormwater system; and

WHEREAS, stormwater runoff contributes to nonpoint source pollution to the streams of the City's watersheds and a stormwater management program can reduce this type of pollution; and

WHEREAS, a stormwater management fee system offers additional financial management options that could assist the City to improve stormwater and drainage services; and

WHEREAS, it is in the interests of the public to fund stormwater management with a user fee system that allocates the costs of stormwater management to all property owners in the City and that further seeks to base the amount of the stormwater management fee on the extent that each parcel of real property contributes to the need for stormwater management.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF TAKOMA PARK, MARYLAND.

SECTION 1. The Takoma Park Code is amended by adding a new Chapter 10D, Stormwater Management Fee System, as follows:

CHAPTER 10D - STORMWATER MANAGEMENT FEE SYSTEM

Sec. 10D-1. Findings.

(a) The City maintains a system of storm and surface water management facilities including, but not limited to, inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basins, infiltration facilities, and other components as well as natural waterways.

(b) The stormwater system in the City needs regular maintenance and improvements.

(c) Water quality is degrading due to erosion and the discharge of nutrients, metals, oil, grease, toxic materials, and other substances into and through the stormwater system.

(d) The public health, safety, and welfare is adversely affected by poor ambient water quality and flooding that results from inadequate management of both the quality and quantity of stormwater.

(e) All real property in the City either uses or benefits from the maintenance of the stormwater system.

(f) The extent of use of the stormwater system by each property is dependent on factors that influence runoff, including land use and the amount of impervious surface on the property.

(g) The costs of improving, maintaining, operating, and monitoring the stormwater system should be allocated, to the extent practicable, to all property owners based on the impact of runoff from the impervious areas of their property on the stormwater management system.

(h) Management of the stormwater system to protect the public health, safety, and welfare requires adequate revenues and it is in the interest of the public to finance stormwater management adequately with a user charge system that is reasonable and equitable so that each user of the system pays to the extent to which he contributes to the need for it.

Sec. 10D-2. Authority.

Authority for the adoption of a system of charges to fund the implementation of stormwater management programs is conferred on the City by Section 4-204(d), Environment Article, Annotated Code of Maryland, as amended.

Sec. 10D-3. Definitions.

For purposes of this Chapter, the following words and phrases shall have the meanings indicated:

(a) *Assessment Roll* means the official listing of assessments of real property maintained by the State Department of Assessments and Taxation of Maryland.

(b) *Base Rate* means the Stormwater Management Fee charged on a base unit. The annual (fiscal year) Stormwater Management Fee for single family residential property in the City equals the base rate.

(c) *Base Unit* means the median impervious surface area associated with a single family residential property in the City.

(d) *Board* means the Stormwater Management Board for Takoma Park established under Article XII of the Municipal Charter. In accordance with the Municipal Charter, the Council of the City of Takoma Park has been designated the Stormwater Management Board.

(e) *City Administrator* means the City Administrator for the City of Takoma Park, Maryland or his or her designee.

(f) *Developed Property* means real property which has been altered from its natural state by the addition of any improvements such as buildings, structures, or other impervious area.

(g) *Fee or Stormwater Management Fee* means the charge established under this Chapter and levied on owners of parcels or pieces of real property to fund the costs of stormwater management and of operating, maintaining, and improving the stormwater system in the City.

(h) *Fiscal Year* means July 1 of a calendar year to June 30 of the next calendar year, both inclusive.

(i) *Impervious Surface Area* means the number of square feet of horizontal surface covered by buildings and other impervious surfaces. All building measurements shall be made between exterior faces of walls, foundations, columns or other means of support or enclosure.

(j) *Impervious Surface* means a surface area which is compacted or covered with material that is resistant to infiltration by water, including, but not limited to, most conventionally surfaced streets, roofs, sidewalks, patios, driveways, parking lots, and any other oiled, graveled, graded, compacted, or other surface which impedes the natural infiltration of surface water.

(k) *Multi-Family Dwelling* means a building with more than two dwelling units.

(l) *Other Developed Property* means developed property other than single-family residential property. Such property shall include, but not be limited to, multi-family dwellings, commercial properties, industrial properties, parking lots, hospitals, schools, recreational and cultural facilities, hotels, offices, and churches.

(m) *Property Owner* means the property owner of record as listed in the State assessment roll. A property owner includes any individual, corporation, firm, partnership, or group of individuals acting as a unit, and any trustee, receiver, or personal representative.

(n) *Single Family Residential Property* means a developed property which serves the primary purpose of providing a permanent dwelling unit and which is classified as residential in the State assessment rolls. A single family detached dwelling or a townhouse containing an accessory apartment or second dwelling unit is included in this definition.

(o) *Stormwater Management Fund* or *Fund* means the Fund created by this Chapter to operate, maintain, and improve the City's stormwater system.

(p) *Stormwater Management* means the planning, design, construction, regulation, improvement, repair, maintenance, and operation of facilities and programs relating to water, flood plains, flood control, grading, erosion, tree conservation, and sediment control.

(q) *Stormwater System* means the system or network of storm and surface water management facilities including but not limited to inlets, conduits, manholes, channels, ditches, drainage easements, retention and detention basin, infiltration facilities, and other components as well as all natural waterways.

(r) *Undeveloped Property* means any non-single family residential property which has one-third or less of the base unit of impervious surface area.

(s) *Water* means any storm water, surface water, snow melt or ground water.

Sec. 10D-4. Establishment of Stormwater Management Fund.

(a) The stormwater management program is established and the stormwater system is provided to protect the waterways and land in the City by controlling flooding and to protect the

natural environment. The costs of designing, developing, improving, operating, maintaining, and monitoring the stormwater system required in the City should, therefore, be allocated, to the extent practicable, to all property owners based on their impact on the stormwater system. In order to provide revenue to fund those costs and to fairly allocate those costs, a Stormwater Management Fund ("the Fund") is established.

(b) All revenues collected from the Stormwater Management Fee and from grants, permit fees and other charges collected under Chapter 10C, Stormwater Management, shall be deposited to the Fund. The Council and the Board may make additional appropriations to the Fund. All disbursements from the Fund shall be for the purposes of the Fund as set forth in Section 10D-5.

Sec. 10D-5. Purposes of the Fund.

The Fund shall be used for the following purposes:

(a) The acquisition by gift, purchase, or condemnation of real and personal property, and interests therein, necessary to construct, operate, and maintain stormwater control facilities.

(b) All costs of administration and implementation of the stormwater management program, including the establishment of reasonable operating and capital reserves to meet unanticipated or emergency stormwater management requirements.

(c) Engineering and design, debt service and related financing expenses, construction costs for new facilities, and enlargement or improvement of existing facilities.

(d) Operation and maintenance of the stormwater system.

(e) Monitoring, surveillance, and inspection of stormwater control devices.

(f) Water quality monitoring and water quality programs.

(g) Retrofitting developed areas for pollution control.

(h) Inspection and enforcement activities.

(i) Billing and administrative costs.

(j) Other activities which are reasonably required.

Sec. 10D-6. **Stormwater Management Fee.**

An annual service charge is imposed upon all real property in the City, as of July 1 of each fiscal year, beginning July 1,

1996, to fund stormwater management programs. This service charge shall be known as the Stormwater Management Fee ("Fee"). Any real property completed or added to the State assessment roll after July 1 or annexed into the City after July 1 may be subject to a partial year charge. The Fee is based on: (1) The extent to which each property creates a need for the stormwater management program; (2) the amount of impervious area on each property; and (3) the cost of implementing a stormwater management program.

Sec. 10D-7. Classification of Property for Purposes of Determination of the Stormwater Management Fee.

(a) For purposes of determining the Stormwater Management Fee, all properties in the City are classified into one of the following classes:

(1) Single family residential property; or

(2) Other developed property.

(b) *Single Family Residential Fee.* The Council finds that the intensity of development of most parcels of real property in the City classified as single family residential is similar and that it would be excessively and unnecessarily expensive to determine precisely the square footage of the improvements (such as buildings, structures, and other impervious area) on each such parcel. Therefore, all single family residential properties in the City shall be charged a flat Stormwater Management Fee, equal the base rate, regardless of the size of the parcel or the improvements.

(c) *Other Developed Property Fee.* The Fee for other developed property (*i.e.*, non-single family residential property) in the City shall be the base rate multiplied by the numerical factor obtained by dividing the total impervious surface area (square feet) of the property by one base unit. The impervious surface area for other developed property is the square footage for the buildings and other improvements on the property as listed in the State assessment roll. Alternatively, at the sole discretion of the City Administrator, the impervious surface area of other developed property may be determined through site examination, mapping information, aerial photographs, and other available information. The minimum Stormwater Management Fee for other developed property shall equal the base rate for single family residential property.

Sec. 10D-8. Base Rate

The Council acting as the Board shall, by Ordinance, establish the annual (fiscal year) base rate for the Stormwater Management Fee. The base rate shall be calculated to insure adequate revenues to fund the costs of stormwater management and

to provide for the operation, maintenance, and capital improvements of the stormwater system in the City.

Sec. 10D-9. Charges for Tax-Exempt Properties; Exemptions.

(a) The Council finds that all real property in the City contributes to runoff and either uses or benefits from the maintenance of the stormwater system. Therefore, except as otherwise provided in this Section, all real property in the City, including property that is exempt from property tax by Title 7 of the Tax-Property, Annotated Code of Maryland, as amended, shall be charged the Fee.

(b) Property which is owned by the City shall be exempt from the Fee.

(c) Undeveloped Property shall be exempt from the Fee.

Sec. 10D-10. Assessment Notices.

(a) The City Administrator may, but is not be required to, send assessment notices for the Fee to property owners prior to the billing for the Fee.

(b) If assessment notices are sent, the notice shall include the following information:

(1) The classification of the property for purposes of determining the Fee;

(2) For property classified as Other Developed Property:

(i) The impervious surface area of the property; and

(ii) The method by which the impervious surface area of the property was determined; that is, whether the computation of the impervious surface area of the property is based on information in the State assessment roll, site examination, mapping information, aerial photographs, or other available information.

(3) The amount of the base rate (*i.e.*, the Single Family Residential Fee) and, for Other Developed Property, the number of base units on the property.

Sec. 10D-11. When Stormwater Management Fee Payable; Interest and Penalties; Lien on Real Property; Abatement of Small Amounts Due.

(a) The Fee that is due for a fiscal year must be paid within 30 days after the bill is mailed or issued to the property

owner and is overdue after that date. An overdue Fee bears interest and penalties at the rate of 1.67% for each month or fraction of a month that the fee is overdue.

(b) The Fee, including interest and penalties, when overdue is a lien on real property and may be collected in the same manner as delinquent real property taxes or by a suit against the property owner.

(c) The City Administrator may abate the Fee, including interest and penalties, if the cost of collection is reasonably estimated to exceed the amount of the Fee, including any interest and penalties, due and payable.

Sec. 10D-12. Requests for Correction of the Stormwater Management Fee.

(a) A property owner may request correction of the Fee by submitting the request in writing to the City Administrator within 30 days after the date the assessment notice or the bill is mailed or issued to the property owner. Grounds for correction of the Fee include:

(1) Incorrect classification of the property for purposes of determining the Fee;

(2) Errors in the square footage of the impervious surface area of the property;

(3) Mathematical errors in calculating the Fee to be applied to the property; and

(4) Errors in the identification of the property owner of a property subject to the Fee.

(b) The City Administrator shall make a determination within 30 days after receipt of the property owner's completed written request for correction of the Fee. The City Administrator's decision on a request for correction of the Fee shall be final.

(c) A property owner must comply with all rules and procedures adopted by the City when submitting a request for correction of the Fee and must provide all information necessary for the City Administrator to make a determination on a request for correction of the Fee. If a property owner alleges an error under Section 10D-12(a)(2), then the request for correction must include a certification by a registered engineer or professional land surveyor of the impervious surface area of the property. Failure to comply with the provisions of this subsection shall be grounds for denial of the request.

SECTION 2. This Ordinance shall be effective immediately.

Adopted this 10th day of June, 1996, by roll-call vote as follows:

Aye:	Elrich, Porter, Rubin, Sharp, Williams
Nay:	None
Absent:	Chavez, Davenport
Abstain:	None

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Appendix B
Enabling Legislation

§ 4-203. Duties of Department.

(a) *Implementation.* — The Department of the Environment shall implement the provisions of this subtitle and shall consult the Department of Natural Resources from time to time concerning the impact of stormwater on waters of the State.

(b) *Adoption of rules and regulations.* — The Department shall adopt rules and regulations which establish criteria and procedures for stormwater management in Maryland. The rules and regulations shall:

(1) Indicate that the primary goal of the State and local programs will be to maintain after development, as nearly as possible, the predevelopment runoff characteristics;

(2) Make allowance for the difference in hydrologic characteristics and stormwater management needs of different parts of the State;

(3) Specify that watershed-wide analyses may be necessary to prevent undesirable downstream effects of increased stormwater runoff;

(4) Specify the exemptions a county or municipality may grant from the requirements of submitting a stormwater management plan;

(5) Specify the minimum content of the local ordinances or the rules and regulations of the affected county governing body to be adopted which may be done by inclusion of a model ordinance or model rules and regulations;

(6) Indicate that water quality practices may be required for any redevelopment, even when predevelopment runoff characteristics are maintained; and

(7) Specify the minimum requirements for inspection and maintenance of stormwater practices.

(c) *Public hearing.* — Before the regulations required under this subsection are final, the Department shall hold at least one public hearing in the affected immediate geographic areas of the State and shall consult with the affected counties and municipalities.

(d) *Assistance to local governments.* — The Department shall provide technical assistance, training, research, and coordination in stormwater management technology to the local governments consistent with the purposes of this subtitle. (1982, ch. 682; 1984, ch. 538; 1987, ch. 306, § 3; 1988, ch. 578; 1990, ch. 32.)

APPENDIX E

§ 4-204. Submission of management plan prior to development of land.

(a) *Required.* — After July 1, 1984, unless exempted, a person may not develop any land for residential, commercial, industrial, or institutional use without submitting a stormwater management plan to the county or municipality that has jurisdiction, and obtaining approval of the plan from the county or municipality. A grading or building permit may not be issued for a property unless a stormwater management plan has been approved that is consistent with this subtitle.

(b) *Certification by developer.* — The developer shall certify that all land clearing, construction, development, and drainage will be done according to the plan.

(c) *Review and approval by local government.* — Each county or municipality may provide by ordinance for the review and approval of stormwater management plans by the local soil conservation district.

(d) *System of charges.* — (1) Each governing body of a county or municipality may adopt a system of charges to fund the implementation of stormwater management programs, including the following:

(i) Reviewing stormwater management plans;

(ii) Inspection and enforcement activities;

(iii) Watershed planning;

(iv) Planning, design, land acquisition, and construction of stormwater management systems and structures;

(v) Retrofitting developed areas for pollution control;

(vi) Water quality monitoring and water quality programs;

(vii) Operation and maintenance of facilities; and

(viii) Program development of these activities.

(2) The charges shall take effect upon enactment by the local governing body.

(3) The charges may be collected in the same manner as county and municipal property taxes, have the same priority, and bear the same interest and penalties. (1982, ch. 682; 1985, ch. 728; 1987, ch. 306, § 3; 1989, ch. 102; 1992, ch. 135.)

§ 4-205. Construction activities of State or federal agencies.

(a) *Section 4-204 inapplicable.* — The provisions of § 4-204 of this subtitle do not apply to the construction activities of State or federal agencies.

(b) *Approval of management plan from Department.* — After July 1, 1984, a State or federal agency may not undertake any land clearing, soil movement, or construction activity involving soil movement unless the agency has submitted and obtained approval of a stormwater management plan from the Department.

(c) *Submission of plan for review and comment.* — (1) On the request of a county or municipality, the Department of the Environment shall require that a State or federal agency submit a stormwater management plan to the requesting jurisdiction for review and comment, which review and comment shall be completed, returned, and received by the State or federal agency within 21 calendar days of receipt of the plan.

(2) The Department shall require that the State or federal agency include the local jurisdictions' comments that are received within the time period required under paragraph (1) of this subsection as part of its stormwater management plan which is submitted for approval to the Department. (1982, ch. 682; 1985, ch. 728; 1987, ch. 306, § 3; 1989, ch. 102.)

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Five Phases in Developing and Implementing a Stormwater Utility

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Abstract

This paper describes five phases that a city, county, or regional agency should anticipate in the development and implementation of a stormwater utility. The information and conclusions are drawn from the experiences of more than one hundred communities that have undertaken this significant change, some successfully and others with less stellar results.

Overview

Each and every community is different. It is not possible to specify precisely what steps must be taken to conceptualize, develop, and irnplement a stormwater utility, or what order they should take. The experiences of hundreds of communities over the past twenty years suggest, however, that a fairly consistent process involving at least five phases occurs from the initial investigation and conceptual discussions through implementation of a stormwater utility, its service (user) charge, and achievement of an effective stormwater management program. This paper is therefore strategic in tone and content rather than tactical, and conveys the full scope of the development and implementation effort and how the process typically occurs.

The Challenge of Devloping! a Stormwater utility

Establishing, a *utility* to address stormwater management needs demands that a workable strategy be defined. There needs to be a well-articulated reason for establishing a utility. Unfortunately, many local governments enter into the process with no strategy in mind, and even proceed through the phases of developing and implementing a utility without knowing where they are going.

One of the greatest strengths of the utility approach to stormwater management and funding is the extraordinary flexibility it offer . Stormwater utilities have emphasized various priorities, ranging from remedial repairs to deteriorating systems, to capital improvements, to stormwater quality. They have used many different rate methodologies to distribute the costs of services and facilities among ratepayers. However, there is no "cookbook" solution. Under the umbrella of a utility, each city, county or regional district can design its rate structure differently and selectively integrate other funding methods with a schedule of service charges. Similarly, there is no specific set of tasks that fit every situation. The diverse experiences of many cities and

counties confirm that no single approach to a stormwater utility and stormwater service charge fits every situation equally well.

Summary of the Five Phases

The five phases of developing and implementing a stormwater utility are described in this paper as **Preparatory, Concept Development, Detailed Analysis, Data Assembly and Systems Implementation, and Public Information/Education.** The **Preparatory and Public Information/Education** phases are primarily political. The **Concept Development, Detailed Analysis, and Data Assembly and Systems Implementation** phases are mostly technical, but include numerous political steps as well.

The five phases are not necessarily sequential. For example, elements of the **Public Information/Education** phase typically run parallel with all of the other phases. The phases are often linked at critical points. Technical and political steps must be undertaken throughout the process of conceiving, developing, implementing, and (ultimately) operating a stonnwater utility. The political steps primarily involve elected officials, administrators, key stakeholders, and the general public. The technical steps primarily involve staff and consultants.

Preparatory activities focus on presenting the basic idea that a change is needed in the way stormwater is managed and funded. It is the initial support building step in which sponsorship is sought for assessing the shortcomings of the current situation and searching for alternatives. Fundamentally, this phase involves establishing that there is a reason for the local government to be involved in stormwater management (usually problems such as flooding and erosion), that the existing approach is not meeting the needs, and that other approaches (both program and funding) ought to be examined.

Transition to the next phase, **Concept Development,** is attained when the elected officials and administrators accept the premise that a change is needed. Decision makers must first understand the basic need for a change before a concept for solving the problem is presented. It is possible to proceed to the **Concept Development** phase without fully gaining the level of understanding and support of elected officials and administrators that is needed when conceptual solutions are presented. The danger is that the elected officials or an administrator might push staff proponents of a utility back to the **Preparatory** phase if either wonders "why are we doing this" when the products of the **Concept Development** phase are presented.

The **Concept Development** phase involves assembling, information needed to evaluate the basic feasibility of various options and select preferred concepts. In most cases, much of the necessary information to conduct the **Concept Development** phase is assembled in one form or another by local staff and/or consultants during the **Preparatory** phase. An *Action Plan* can provide a basic exposition of the utility concept, but first there should be broad acceptance of the fundamental notion that stormwater problems exist and solving them is a valid priority.

The **Detailed Analysis** activities focus on the policy, program, and financial analyses required to establish a stormwater utility, assuming that the **Concept Development** phase has resulted in the production of sufficient technical information and documentation and that political concurrence has been attained that the utility approach is desirable. Some key policies will typically have been developed as the concept was explored, and may even have been agreed to formally. Others might addressed in the **Detailed Analysis** phase.

For example, a conceptual Rate Structure Analysis will often be prepared in the **Concept Development** phase to reassure elected officials that utility rates would be of a type and level that the community can accept. Such an analysis identifies a preferred rate methodology from among several alternatives. It may examine specific rate modifications and secondary funding methods that may be needed to meet local circumstances, but does not constitute a detailed Rate Study. A preferred conceptual approach identified through a Rate Structure Analysis would typically be subjected to a more detailed Cost of Service, Rate Base, and Revenue/expenditure Analysis, culminating in a Rate Study Paper and recommended Rate Ordinance during the **Detailed Analysis** phase.

The **Data Assembly and Systems Implementation** phase is driven by the technical and political conclusions and direction gained through the **Preparatory, Concept Development, Detailed Analysis, and Public Information/Education** phases. The **Data Assembly and Systems Implementation** steps include but are not limited to the development of a master account file and the capability to bill service charges, receive and process payments, and properly account for the utility's revenues. Preparations must also be made to answer customer's questions about the utility approach to stormwater management and funding, which bridges into the **Public Information/Education** phase.

The **Public Information/Education phase** is absolutely essential in successfully implementing this type of program. Many techniques, tools, and types of media have been used to inform and educate the various "publics" about stormwater utilities. An advisory committee is often the primary focus of efforts to formulate policy decisions in an inclusive "public" forum, but additional efforts need to be made to identify and involve all key stakeholders and the general public. An on-going information/education program involving elected officials in the issue will also pay dividends when support is needed at critical decision points.

Detailed Analysis of the Five Phases

Preparatory Phase

Three activities are typical in the **Preparatory** phase, information gathering, idea structuring, and political acceptance testing. The first two are largely technical, the third is political. It night also be described as the first step in the **Public Information/Education** phase.

Information gathering involves assembling data on the character and magnitude of stonnwater problems, the present management approach, and options that may be available. This

information is useful in the third activity, testing of political acceptance. In the **Preparatory** phase a local government should assemble an inventory of stormwater problems and impacts, even if only in the form of a fist of citizen/property owner complaints. The existing program should be documented, and any inadequacies identified. The level of performance of the program might be benchmarked (in the most basic sense) against others to demonstrate where it is on the spectrum. Basic legal authority should be investigated to ensure that further efforts to establish a utility are worthwhile. If the authority does not exist, it can often be addressed while **Concept Development** activities are underway.

Once the necessary information is assembled, idea structuring can move ahead. There is a great deal of information available from trade organizations, consultants, and other local governments that can contribute to idea structuring and guide the development of an approach suitable for a local situation, but care must be exercised because transferability from one community to another is often limited. Questions like "What do we really need?" and "What can work here?" need to be asked and answered as ideas are considered. The product of this step is a kernel from which political acceptance can be tested and steps begun to develop the concept fully.

Political acceptance testing reveals the practicality of pursuing the utility approach. If an administration or elected officials simply do not think there is a problem either with stormwater control itself or the present management and funding approach, have no time for it on their agenda, or are unalterably opposed to any form of new funding, a severe obstacle is posed. The Information assembled documenting present problems may convince appointed and elected officials that a change should at least be considered, especially if a possible solution has been identified.

Concept Development Phase

The following activities are typically done in developing a concept and gaining concurrence on it.

A stormwater program mission and priorities statement is prepared to describe the stormwater problems, define a program, and guide its implementation.

Key policy issues associated with developing and implementing a stormwater utility are identified and a process defined for resolving them. Those issues that must be resolved to reach agreement on the moving ahead are expedited.

The feasibility of a menu of funding methods for stormwater management is assessed. A full range of funding options is often considered, including alternatives to a utility, to ensure that it is the best approach. Alternative rate methodologies, modifying factors which can be applied to rate methodologies, and secondary funding methods such as developer fees and system development charges are often examined. This feasibility assessment step weeds out unrealistic approaches and concentrates subsequent work on options which are practical in the local setting.

A utility implementation strategy is formulated specifying how the utility itself can be implemented.

A program implementation strategy is often formulated. Organizational, management, and operational options might be identified (such as interim or long-term contracting with other agencies and private sector vendors for some services).

The experiences of other counties, cities. and special districts in similar situations are often compiled and papered.

Alternative approaches to public information/education regarding the stormwater utility are usually examined as part of the **Concept Development** phase and a recommended program presented.

The **Concept Development** phase may include more detailed examination of specific issues and needs that bridge into the **Detailed Analysis** phase. The work required to assemble a master account file consistent with rate and funding policy decisions may have to be determined to reassure appointed or elected officials that a utility is practical and achievable. Alternative means of assembling the file may be evaluated, and an efficient approach identified. Possible consultant roles in developing a master account file might be assessed. Means of billing, collecting, and properly accounting for stormwater service charges and providing customer service might be evaluated. The cost of service might have to be translated to a budget format if the utility implementation is to be incorporated into the budget process. A scope of work and budget may even be prepared for detailed stonnwater capital improvement master planning.

Evaluating stormwater funding and rate options, developing a program and policies, and implementing a new financing method or methods is exacting work that must be done in a procedurally correct manner. The approach and products need to be consistent with the standards that courts in several states have applied in determining that the decision process involved in forming a utility and setting rates was objective and procedurally correct. Flexibility also needs to be emphasized. The activities required to develop and implement adequate, stable, and equitable stonnwater funding should be oriented to each local government's decision-making process, budget, and other timing considerations.

Defining the problems and needs is a basic starting point in determining what mix of financing will be most appropriate, and what considerations should be accounted for in rate parameters. The type, geographical extent, and severity of drainage problems, including but not limited to flooding, erosion and sedimentation, restrictions on land-use, impacts on public safety, damage to roads and other infrastructure, and water quality are often inventoried. Records of flooding and other drainage complaints might be reviewed, conditions in the field examined, and land-use and growth management policies researched. A summary statement of problems and needs will be prepared, Much of this information should have been assembled in the **Preparatory** phase to define the magnitude of the problem clearly.

Local stormwater management goals should be a major consideration in determining the feasibility of stormwater funding options. Local problems and needs will dictate the priorities and "functional requirements' of the stormwater program, which in turn will drive the design of a funding strategy and rates. A concise statement of the program mission and priorities may be needed to define the utility concept in terms that laypersons can understand.

The resources presently and potentially available for stormwater management and possible constraints on the use of those resources should be inventoried. Resources are an important consideration in estimating an agency's ability to fulfill the functional requirements of the program. They play a large role in determining the pace of change that can be realistically expected. The conceptual level of investigation should identify and qualitatively assess resources such as manpower and skills, equipment, materials, and information management capabilities and constraints. It should consider outside as well as in-house resources, including those of the private sector, local and neighboring jurisdictions, and state and federal agencies.

Controversial issues in the community that may directly or indirectly influence stormwater financing decisions should be identified. Experiences across the country indicate that unrelated issues have the potential to interfere with the development and implementation of a stormwater utility and/or its associated service charge, especially when a regional or county-wide program is being considered.

The functional requirements of the stormwater program are a key consideration in assessing the feasibility of various funding and rate options. The functional requirements of a comprehensive stormwater management program typically include a mix of administrative activities, engineering, operations, regulatory functions, and capital improvements.

Key policy issues associated with developing and implementing a utility should be identified and a process defined for resolving them. Some need to be resolved immediately. Others can be addressed as part of the **Data Assembly and Systems Implementation** phase. Policy Papers examining specific issues can be developed, leading to recommended Policy Statements which would be adopted by elected officials as the guiding principles of the stormwater program.

The basic feasibility of a menu of funding and rate methods is usually assessed in **Concept Development** phase. This is normally done in the context of the problems, needs, issues, resources, goals, and functional requirements and helps to eliminate unrealistic approaches and concentrate subsequent work on the options which are most practical. A preferred rate methodology is also typically identified, setting the stage for adoption and implementation. The feasibility of a utility service charge as a source of stonnwater funding is somewhat independent of the specific details of a rate methodology, modifying factors, and secondary funding methods that might ultimately be selected through a detailed Rate Structure Analysis. The basics can be properly addressed in the **Concept Development** phase, with the final details of the rate methodology being determined in **Data Assembly and Systems Implementation** phase

A projected cost of service should be developed as part of the utility concept, considering operating, capital, and non-operating expenses consistent with the program strategy. The cost of service information provides a revenue objective against which funding/rate options can be gauged. Organizational, management, and operational implications of various program, funding, and rate options should also be estimated as the concept is formulated. Means of optimizing available resources need to be considered, such as interim or long-term contracting with other agencies and private vendors for some services. Possible use of interlocal agreements among the local cities and counties having a role in stormwater management should be examined.

Alternative means of billing for, collecting, and properly accounting for stormwater service charges should be investigated as part of **Concept Development.** Data processing requirements, customer service opportunities, and accounting paper capabilities are important considerations. This is a bridge to the **Data Assembly and Systems Implementation** phase.

Alternative approaches to providing effective public information and education regarding the stonnwater utility should be examined even as the concept is being investigated. This is a linkage to the **Public Involvement/Education** phase. A variety of mechanisms have been used elsewhere for involving key stakeholders and the general public in the process of developing a stormwater program and funding. Their experiences might be investigated, and examples of brochures, audio and visual presentations, media kits, and other tools assembled.

Detailed Analysis Phase

The priority of specific issues will determine how the **Detailed Analysis** phase is approached. Experience suggests that all of the issues that need to be addressed cannot be identified during the earlier phases of this process. Full closure of some of the issues is likely to require more time, since they are closely related to and sometimes dependent upon other work that is underway.

The policy resolution process identified in the **Concept Development** phase should continue into the **Detailed Analysis** phase. Some policies need only an approval at the administrative level. Others should to go to an advisory committee assuming one exists. Some issues will have to be addressed by elected officials. To facilitate the review at various levels, a structured and disciplined process should be followed. It should provide two vitally important products: 1) full documentation of the policy resolution process; and 2) a written paper consolidating the policies in a single document that the public can easily grasp.

Based on the program strategy defined in the **Concept Development** phase and the preliminary operating and capital costs of stonnwater services and facilities, a detailed cost of service is often projected as part of the **Detailed Analysis** phase for a period of three to five years to provide a basis for final determination of the level of service charge and need for other funding methods. An integrated computer spreadsheet Rate Model is sometimes developed to evaluate the details of rate design. This modeling should combine cost of service, rate base, and cash flow information and perform analyses of possible adjustments in any of those input items.

A detailed Rate Study report documenting the application of the preferred rate methodology to the costs of service should be prepared at the conclusion of the **Detailed Analysis** phase.

Data Assembly and System Implementation Phase

A stormwater utility service charge rate methodology must be applied to individual properties and bills generated and delivered to each customer. The first step requires a master account file. This task has sometimes been done by a consultant, sometimes by staff Existing databases such as property tax roles and water/wastewater files are typically used as the foundation for a stormwater utility service charge master account file. Regardless of the database employed, there will be account additions and exceptions identified in the development of the billing database that will have to be resolved. The type of additions and exceptions to be resolved typically include: wrong addresses, wrong classifications, public properties not subject to property taxes or other utility service charges, property aggregations, property disaggregations, properties not included in the database for various reasons, and second party billings.

If a stonnwater service charge is to be implemented, a means of billing, collecting, and accounting for service charge revenues must be identified and instituted. Experience has been that the requirements of a stormwater utility service charge billing often challenge the capacity of existing systems and can pose a potential major obstacle to timely implementation.

Most stonnwater utility rate methodologies include credits for on-site systems and activities that mitigate the peak flow, total volume, and/or pollutant loading impacts of stormwater runoff from individual properties. Several activities must be performed to develop and implement a service charge crediting mechanism, ranging from policy resolution to preparation of application forms.

A rate resolution or ordinance must be developed for implementation of a stormwater utility and service charge. This may be done in-house or through a consultant or special counsel such as bonding experts.

Public Information/Education Phase

A process needs to be developed for involving the public in decisions about stormwater financing. It should initially: (1) evaluate the current status of community's understanding of and potential support for a stonnwater program and utility service charge financing and (2) determine what methods would be most effective in improving this understanding and support. The public information, education, and involvement methods which have previously proven successful in local area should be given greatest consideration to maintain continuity with the normal practices in the community. A variety of public information and education approaches and materials have been used, ranging From advisory committees to media kits, audio/visual shows, brochures, booths at street fairs, and local radio/television interviews. A public relations specialist or consultant is sometimes hired to coordinate the public information and education program

Experiences nationwide suggest been that an initial stormwater service charge billing generates an enormous number of calls to a local government customer service staff, mostly of a general nature. A customer service staff, perhaps including a team of specially-trained temporary employees, needs to be prepared for the type of questions that might be asked. Such preparation can result in a high degree of customer satisfaction and acceptance of a utility service charge.

Some activities in the **Public Information/Education** phase have a close linkage with **Data Assembly and Systems Implementation** phase tasks, especially with regard to the assembly of service charge data for major ratepayers and processing of service charge credits for on-site stormwater systems and activities. It is especially important that ratepayers who will have high stormwater service charges not be "surprised" one day when their stonnwater bill arrives. One of the most important and effective public information activities involves meeting with each of these "big ticket holders" before the first billing. Such meetings are opportunities to explain face-to-face why the local government is making changes in its stormwater program and instituting a service charge, how the charge is calculated, what crediting opportunities that exist, and what the service charge will be for their property. This requires careful coordination with the master account file data as it is being developed to identify the properties involved, verify the data, and schedule meetings.

Local government employees are an often overlooked "public" that should be fully educated about the utility approach to stormwater management throughout the long process of development and implementation. Knowledgeable employees are one of the most effective public relations channels that local government can foster. Their friends and neighbors often ask them questions about what their local government is doing and why. Many have regular contacts with the general public through their work. Rarely, however, are they fully informed and utilized.

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Financing Retrofit Projects: The Role of Stormwater Utilities

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To achieve national water quality objectives, we must retrofit existing stormwater infrastructure to manage pollution in runoff. Many public works and water resources professionals have suggested that stormwater utilities are an important, if not essential, funding source for retrofit projects. We examine in this paper the role of stormwater utilities in financing retrofit projects and programs. Based on a broad assessment of the need for funding and a brief overview of the evolution of stormwater utilities, we conclude that stormwater utilities are perhaps the best institutional approach to financing retrofit programs, but that they are not a panacea. The major issues in implementation of effective retrofit programs will be economic and therefore political. Stormwater managers can help constrain and focus political debate through careful analysis.

How Much Do Retrofits Cost? What is the Need For Funding?

The answers to questions about the costs of retrofits and programs to control the quality of stormwater runoff depend on many different factors. These factors include the characteristics of runoff quantity and quality, the size of the watershed where projects are being planned, the severity of water quality problems, the water quality objectives, and the types of best management practices that are being proposed. A short, safe answer that recognizes variability among places is that programs will be expensive, ranging from tens of thousands of dollars in relatively small places to achieve modest objectives, to tens or hundreds of million dollars in larger cities with moderate to severe problems.

We provide here several brief examples of the potential magnitude of costs of retrofit programs. Our examples are by no means exhaustive and they are not necessarily representative. We have chosen published estimates or used cases with which we are familiar simply to demonstrate that experts believe costs will be significant and controversial. These examples should be sufficient to convince skeptics or individuals who have not thought systematically about the economic aspects of retrofit programs, that a critical task in implementation of a program is identification of sources of revenue.

Our examples include estimates of the costs of programs at the national level, for a watershed, for a large city, and for a small town (Table 1). In a project for the American Public Works Association, James M. Montgomery (1992) estimated the capital and operation and maintenance (O&M) costs for large and medium cities to comply with EPA's stormwater rule. Capital estimates ranged from $147 million to more than $400 billion, depending on assumptions about the level of treatment for runoff. Estimates of O&M costs ranged from $1.2 billion to more than half a trillion dollars, again depending on assumptions about level of treatment. Reasonable questions can be raised about these estimates. Some experts suggest that they are too high because advanced treatment never has been contemplated for stormwater. Other critics contend that these estimates were made primarily for political purposes and to support opponents to the then-proposed federal stormwater rule who argued that costs were prohibitive. Regardless, they are suitable for our purposes. They demonstrate clearly the need for financing and they show that the costs of programs will be controversial.

More recently, EPA modeled the Phase I Storm Water needs to inform Congress of the costs of programs to control pollutants in urban runoff. Approximately 266 Phase I stormwater permits that regulate about 850 municipalities will be issued. The Phase I needs estimates were prepared to determine the stomwater management costs that might be eligible under state revolving fund (SRF) loan programs. The SRF-eligible costs include costs for developing and implementing municipal management programs, including capital costs for structural controls and BMPs. The total modeled costs are $7.4 billion. These costs do not include O&M costs, costs of land acquisition, permitting costs, costs of developer-financed BMPs; or several other categories of costs. These estimates, which were subject to peer review prior to their release, also are significant. These esti-

Table 1. Selected Costs for Stormwater Programs

	Estimated Costs for BMPs in Regulated Municipalities (Montgomery 1992)	
	Capital	O&M
1. Source controls	$147,100,000	$1,155,000,000
2. Increased maintenance + 1	$147,000,000	$32,607,800,000
3. Construction of moderate controls + 2	$83,139,500,000	$86,223,700,000
4. Construction of detention basins + 3	$91,130,900,000	$90,097,500,000
5. Advanced treatment plants + 4	$406,734,900,000	$542,036,700,000
Estimated Costs for Phase I Storm Water Programs (EPA 1997)		
Modeled SRF-eligible costs	$7,400,000,000	
Costs for Pollutant Reduction in the Menomonee River Watershed, Milwaukee, Wisconsin (WDNR 1992)		
Core (source controls)	$3,400,000	
Segment (planned, new areas)	$11,700 000	
Segment (existing areas)	$94 - $184,000:00	
Total	$110 - $200,000,00	
Estimated Rehabilitation Costs in Indianapolis, Indiana		
Capital	$283,000,000	
Household	$54	

mates also have political dimensions; they were prepared to inform Congressional debate over funding for water quality programs.

In general, better cost estimates can be made for smaller geographic areas because site specific factors can be taken into consideration and fewer general assumptions need be made. The Wisconsin Department of Natural Resources (1992) has estimated the costs to achieve pollutant reduction objectives for the Menomonee River in Milwaukee, Wisconsin. The Menomonee River watershed is 136 square miles, is 60% urban, and contains 18 municipalities and parts of four counties. To meet ambient water quality standards, programs are needed to reduce sediment by 50%, phosphorus by 50%-70%, and lead by 35%-70%. The corresponding cost estimates for “segment” controls for existing areas of development range from $94 million to $184 million.

In many of the nation’s larger cities, stormwater infrastructure has fallen into disrepair, and significant investments will be required simply to meet generally accepted engineering standards for stormwater conveyance and flood control, let alone implementation of BMPs to meet water quality objectives. In Indianapolis, Indiana, for example, a mayor’s blue-ribbon panel estimated the costs to rehabilitate stormwater infrastructure at $283 million. The infrastructure includes 1750 miles of storm sewers, more than 1000 outfalls, more than 50 miles of levees, and a number of regional detention ponds. The panel did not estimate costs for programs to manage pollution in runoff.

In smaller towns, individual projects that in larger cities would be considered routine can pose significant burdens. In Vincennes, Indiana, a city with a population less than 20,000 and a median household income two-thirds of the state median, the city is responsible for pumping water from a drainage ditch over levees into the Wabash River whenever water in the ditch reaches specified elevations. The pumps are more than 50 years old and are in poor repair. The city estimates annual costs for City Ditch to be approximately $50,000, but no existing sources of revenue are available to pay for rehabilitation and related O&M costs.

In sum, while the estimated costs of retrofits vary tremendously with the scale and scope of a program, invariably new sources of revenues will be required to pay for new programs. The costs of programs are debated by officials who have responsibility for implementation of them. Stormwater utilities have emerged from these debates as the option of choice to fund new programs.

How Can Retrofit Programs Be Funded? What Are Stormwater Utilities?

Most jurisdictions historically have paid for investments in stormwater infrastructure with revenues from property taxes and other general revenues. Many, if not most jurisdictions, now rely on a variety of sources to finance comprehensive stormwater programs. Table 2 is an abbreviated list of sources of revenues available to pay for different elements of stormwater programs. One key observation from this list is that the sources of revenues most important for retrofit programs are property taxes and stormwater user charges.

Stormwater user charges or fees are charges based on some indicator or proxy for the actual volume of stormwater runoff that leaves a property. The most common type of charge is based on the amount, or square footage, of im-

Table 2. A Functional Approach to Stormwater Financing

BMP	Option
• Watershed planning	- general revenues (property, income taxes) - stormwater user charges
• Source controls - Enforce ordinances - Development regulation	 - general revenues, stormwater user charges - plan review & inspection fees
• Maintenance (e.g., street sweeping)	- general revenues - stormwater user charges
• Capital projects - new development - retrofit existing areas	 - developer exactions, fees-in-lieu - bonds, sinking funds - general revenues, stormwater user charges

pervious area on a parcel. Other bases for stormwater charges include the area and proportion of impervious cover on a parcel, the intensity of development, and the type of land use. In some instances, an estimate of the actual volume of runoff or some estimate of the concentration of pollutants in runoff may be used as the basis of charges. Examples of rate structures are shown in Table 3.

Stormwater charges usually are administered by a stormwater utility, an administrative unit or institution established within or across jurisdictions for the purpose of managing runoff and related problems. Revenues collected by utilities are placed in separate enterprise funds or accounts and can be used only for stormwater related expenditures. The first stormwater utilities were established in the mid-1970s, primarily to provide sources of revenue for maintenance of stormwater infrastructure. Since the 1970s, the number of utilities has grown tremendously, fueled in part by the efforts of stormwater managers desperate for funds to do their jobs.

Since the 1980s, as part of efforts to develop new sources of revenues for stormwater programs, a number of surveys of stormwater utilities have been completed. Table 4 is a summary of some of the results of these surveys. Important observations include:

- Average annual charges for residential property owners range from $15 to $130.
- Average annual charges have increased over time.
- Stormwater charges are the source of most revenues for most stormwater utilities.
- The proportion of charges from different types of property varies considerably.
- Total revenues from charges are significant and increasing.

What Are the Advantages and Disadvantages of Property Taxes and Stormwater User Charges? Why Has the Number of Stormwater Utilities Increased?

Stormwater utilities and user charges offer a number of advantages over property taxes, the main alternative, although taxes are preferable by some criteria (Table 5). It is useful to consider the drawbacks of charges first. Stormwater user charges are more difficult and costly to implement than are taxes because institutions and procedures to levy and collect taxes are already in place. User charges are not deductible from federal and state income taxes, and they are not elastic. Property taxes, on the other hand, are deductible, and revenues from them increase as property values appreciate without explicit decisions by officials to increase rates or levies. Revenues from user charges increase only if officials vote to increase rates.

Despite these disadvantages, reliance on stormwater user charges is increasing, partly because user charges are perceived as a more stable source of revenues. As noted above, revenues from charges are placed in enterprise funds and can be used only for stormwater related expenditures. Funding from general revenue sources like property taxes is never secure because of fierce competition among political leaders and program managers for scarce dollars. Under property tax systems, stormwater managers often cannot count on budget allocations, do not have as much control over their budgets, and cannot plan as well.

Perhaps the most important reason that the number of user charge systems is increasing is that property owners believe charges are fairer. Impervious area - the basis for most stormwater charges - can be measured and is a reasonably objective measure. The idea that property owners pay in proportion to the measured amount of hard surface on their property seems fair. Property values, conversely, are unrelated to the problem of runoff and perceived as highly subjective. Many surveys suggest that property taxes are the least popular form of tax.

A final reason that charges are preferable to taxes is that they provide incentives for property owners to reduce the amount of impervious area on their property and thereby reduce volumes of runoff. Depending on how credits against charges are structured, they also can provide incentives for on-site management

Local officials routinely consider these tradeoffs when evaluating sources of funds for new programs like retrofit programs. Because perception of fairness is such an important factor in public finance, it is useful to elaborate on the issue of equity.

Who Pays More Under Property Tax and User Charge Systems?

Although charges typically are perceived as fairer than property taxes, this does not necessarily mean that any

Table 3. Utility Rate Structures in Austin, Cincinnati, and Ft. Collins

	Austin, Texas		Cincinnati, Ohio	Ft. Collins, Colorado		
Land Use Categories	Rate Factors	Rate Categories	Intensity of Development Factors	Basic Category Development	Runoff Coefficient	Rate Factor
• Undeveloped	.10	•Class A Residential (< 10,000 sq. ft.)	.25	•Very Light	.00-.30	.25
• Residential	.40	•Class B Residential (> 10,000 sq. ft.)	.20	•Light	.31-.50	.40
• Nonresidential	.80	•Class C		•Moderate	.51 -.70	.611
		- Commercial	.85	•Heavy	.71-.90	.80
		- Industrial	.75	•Very Heavy	.91-1.0	.95
		- Multi-family	.60			
		- Transportation	.50	Runoff Coefficient (C)		
		- Institutional	.40	C = Percent Impervious Area x 0,95		
		- Agriculture	.08	+ Percent Pervious Area x 0.20		
		- Park	.05	+ Percent Semipervious x 0.50		
		- Undeveloped	.00	where		
		Area Range Numbers	Area (sq. ft.)	-impervious means roof, concrete, etc.		
		1	0-2000	-pervious means lawn, open space, etc.		
		2	2001-4000	-semipervious means gravel, etc.		
		3	4001-6000			
		4	6001-8000			

Table 4. Overview of Selected Stormwater Utility Surveys, 1988-1996 (Ungan 1997)

Date	Survey	Range of Population Served	Range of SFR* Charges	Range of Total Utility Revenues (000)	Range of Total Revenues from Charges (000)	Range of Charge Revenues as % of Total Revenues	Range of SFR Charges as % of all Charges
1988	Stormwater Management Adminstration, Maryland Department of the Environment (MDE) (Lindsey, 1988)	20,000-684,565	$1.25-$3.63	$263-$8200	$425-$8200	78%-100%	24%-62%
1990	MDE (Update of 1988 Survey) (Lindsey, 1990)	NA	$1.07-$7.45	$75-10,471	$75-$10,471	82%-100%	15%-78%
1991	The Florida Department of Environmental Regulation (1991)	NA	$1.00-$4.50	$118-$6850	$118-$6850	19% - 100%.	NA
1992	Black & Veatch Communications (1992)	11,000-329,227	$0.24-$9.06	NA	NA	62% - 100%	NA
1992	Apogee Research Inc. (1992)	4,300-535,000	$1 -$4.50	NA	$75-$18,316	8%-100%	NA
1993	Apogee Research Inc. (1994)	NA	$0.24-$9.08	NA	NA	NA	NA

(continued)

Table 4. Continued

Date	Survey	Range of Population Served	Range of SFR* Charges	Range of Total Utility Revenues (000)	Range of Total Revenues from Charges (000)	Range of Charge Revenues as % of Total Revenues	Range of SFR Charges as % of all Charges
1995	Delaware Survey (1995)	6000-2,000,000	$0.50-$7.16	S19.7-$21,600	NA	NA	NA
1995	Florida Association of Storm Water Utilities (1995)	6000-2,000,000	$0.50-$7.43	S19.7-$21,600	NA	NA	NA
1996 March	Raftelis (Water and Wastewater Survey) (1996)	NA	$0.15-$10.46	NA	NA	NA	NA
1996 July	Indiana University, Center for Urban Policy and the Environment (Ungan,1997)	11,141-487,779	$0.24 $10.98	$53-$28,000	$1.8-$28,000	1%-100%	0.7%-92%
1988-1996	Min:	4300	$0.15	$53,000	$1880	1%	0.7%
	Max::	3,489,779	$10.98	$28,000,000	$28,000:000	100%	92%

Table 5. Advantages and Disadvantages of Taxes and Charges

Criteria	Charges	Taxes
• Cost of implementation	-	+
• Ease of implementation	-	+
• Deductible by property owner	-	+
• Elasticity of revenues	-	+
• Stability of revenues	+	-
• Fairness		
- user (polluter) pays	+	-
- ability to pay	+	-
- Incentives for on-site controls	+	-

particular property owner will be better off under a charge system than a system of property taxes. It is useful, therefore, to examine the relative burden on property owners under the two systems. Analyses of the relative burden typically show that, to generate a fixed sum of revenues, residential property owners pay less under a user charge system than under a property tax system. Non-residential property owners like owners of commercial and industrial properties typically pay less under a property tax system. For example, to generate $500,000 in Roseville, Minnesota, residential property owners would bear 51% of the burden under a property tax system but only 28% of the burden under a user charge system (Table 6). Similar results have been reported in most jurisdictions where utilities have been considered or established. The main reason is clear: non-residential properties are highly impervious, while residential properties are only moderately impervious, depending on their density. Another reason for the difference in burden is that tax-exempt property owners like churches, hospitals, and school pay charges. For residential property owners, the benefit is partially offset by the fact that charges are not deductible. Nevertheless, they typically are better off under charge systems.

What Are Obstacles To Implementing User Charge Systems?

Stormwater utilities are an attractive source of funds for retrofit programs, and the number of utilities has grown constantly over the past 20 years. Nevertheless, there are a number of obstacles that limit their use. We believe that the main obstacles are economic and therefore political. Many people are opposed to all new taxes, regardless of whether the taxes are perceived as fair. Hence, any time a utility is proposed, property owners will debate the merits of the proposal, and political debate will occur. Two recent cases from Indiana illustrate this point well.

In Vincennes, the Mayor sought new sources of funding to pay for pumps in City Ditch. The Vincennes City Council adopted an ordinance that established a mechanism for allocating charges among property owners in the City Ditch watershed based on parcel-level estimates of runoff volumes. The Council did not, however, pass a companion ordinance to establish a volume-charge. The Mayor lost the next election, and efforts to establish the charge system have foundered.

In Indianapolis, background studies for creating a utility were completed in the 1980s, but no action to establish a utility was taken. In 1997, following endorsement by the Chamber of Commerce, a member of the City-County Council proposed a new utility. The Mayor, who had been

Table 6. Distribution of Property Taxes and User Charges in Roseville, Minnesota (Honchell, 1986)

	Utility Charges		Property Taxes	
User/Land Use Category	Total Revenues	Percent of Revenues	Total Revenues	Percent of Revenues
1 . Residential	$148,000	28.5%	$260,000	50.1%
2. Cemeteries/Golf Courses	$4,000	0.8%	$10,000	1.9%
3. Parks	$10,000	1.9%	–	–
4. Schools	$11,000	2.1%	–	–
5. Apartments/Churches	$44,000	8.5%	$46,000	8.9%
6. Commercial	$302,000	58.2%	$203,000	39.1%
Total	$519,000	100%	$519,000	100%

elected on a pledge of no new taxes, did not endorse the utility, but did not publicly oppose it. Many citizens and some taxpayer groups opposed the proposal, as did some individual members of the Chamber of Commerce. Votes to establish the utility have been delayed because the proposal lacks the necessary number of votes.

These cases are instructive because they demonstrate that proposed new utilities will be controversial even when stormwater problems are long-standing and well known and the proposals are backed by political leaders. In many communities, political leaders are unwilling to endure the high cost of advocating new charges or taxes. Advocates for retrofit programs necessary to achieve water quality objectives must convince political leaders that the benefits of retrofit programs exceed the costs.

Stormwater managers can inform debates through careful analysis. For example, the perceived equity of a proposed system can be enhanced through careful design of the rate structure, including features such as credits for on-site controls. Experience of local jurisdictions that have successfully established utilities demonstrates that there is not a single, correct approach. Innovative applications of basic concepts can help provide funds for retrofit programs.

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