

# **GEORGIA WATER & POLLUTION CONTROL ASSOCIATION OUTSTANDING STORM WATER MANAGEMENT PROGRAM OF THE YEAR**

## **Contact Information**

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## **Storm Water Management Program Overview**

In 1997, the City of Griffin, Georgia established a formal Stormwater Management Program (SWMP). As a result of the establishment of this program, the City immediately created the Stormwater Department. To fund this new separate department, a Stormwater Utility was implemented, the first in the State of Georgia. The purpose of the Stormwater Management Program is to manage its watersheds and to create an example for other cities to consider when evaluating possible management models to achieve compliance with the upcoming Phase II permitting process and to project total maximum daily pollutant loads (TMDL) for impaired or threatened waterbodies within the City. . The Utility provides the City of Griffin with a financial mechanism from which to address both water quality and water quantity control issues that will be required as part of the Phase II permitting process. It will allow the City of Griffin to develop best management practices (stormwater management practices) to address nonpoint source pollution and flood control management (via infrastructure improvements) that, when implemented together, will ensure protection of the regions' water resources. To address these upcoming regulatory requirements the City of Griffin developed an Utility Action Plan that consists of policy making; institutional planning; environmental review and planning; financial strategies; and public education and involvement.

The Stormwater Utility, like a sewer or water supply utility, is user oriented with costs being allocated based on services received (Debo, 1995). Another way of saying this is, "you only pay for the demand you put on the system". Traditional structural BMPs typically consist of detention ponds, grassed swales, sand filters/filter strips, infiltration basins, associated stormwater practices, etc. Traditional non-structural BMPs include special zoning requirements, ordinances (such as erosion and sediment control ordinances), maintenance activities (such as storm drain cleaning and street sweeping), and education/outreach activities (R.W. Beck, Inc. 1998). The City of Griffin considers the Utility to be a viable nonstructural BMP that will enable the City to generate revenues for stormwater related improvements.

Stormwater Utilities have been in existence since the 1970's and over 400 utilities are currently in operation across the nation. What makes Griffin's Utility special? Griffin's Utility will be the first in the nation to address the upcoming requirements associated with the Phase II permitting process, and the Utility will be generating revenues prior to issuance of the final permit in the year 2002. At this time, it is estimated that over 4,000 communities across the nation will have to comply with the Phase II permitting regulation. The City of Griffin has made the decision that implementation of the Utility is an integral part of the Stormwater Management Program. The Utility will also be instrumental in meeting the requirements of the upcoming Phase II permitting process as well as addressing TMDLs in the watershed.

## **Mission Statement**

The mission statement of the City of Griffin Stormwater Department defines the long-term purpose of the stormwater management program. The mission statement is the foundation for the development of program objectives, goals, and policies.

This mission statement will promote the safety and well-being of the public, the protection of the environment, the encouragement commerce, and sound development decisions.

Typical basic mission and policy statements are normally designed to accomplish the following seven foundational goals:

- Protect life and health
- Minimize property losses
- Enhance floodplain use
- Ensure a functional drainage system
- Protect and enhance the environment
- Encourage aesthetics
- Guide development
- Manage watershed from a holistic approach

Based on the foundational goals the following mission statement was adopted by the City of Griffin staff:

“The mission of the City of Griffin’s stormwater management program is to develop, implement, operate, and adequately and equitably fund the acquisition, construction, operation, maintenance, and regulation of stormwater drainage systems. The program shall safely and efficiently control runoff, enhance public health and safety, facilitate mobility and access to homes and businesses during and after storm events, protect lives and property, complement and support other City programs and priorities, eliminate the discharge of pollutants to receiving waters, and enhance the natural resources of the community.”

## **Goals**

To measure the success of the SWMP the City of Griffin developed an integrated approach for addressing stormwater quality and quantity management goals at the site development level. Integrated stormwater management site design involves the integration of site design practices and procedures with the design and layout of stormwater infrastructure to attain stormwater quantity and quality management goals.

### *Water Quality*

Stormwater ordinances and regulations are used by the local government to control and manage urban stormwater systems. It also is also used for floodplain management, onsite detention and retention, erosion and sediment control, development regulation, and water quality control and enhancement (Debo, 1995). The EPA has recently required municipalities to comply with water quality regulations related to the Clean Water Act. Another factor includes the Erosion and

Sedimentation Act of 1975, which required each county and municipality in Georgia to adopt a comprehensive erosion and sedimentation ordinance pertaining to land disturbance activities. Because of these activities, numerous municipalities have adopted ordinances, regulations, and policies related to stormwater management.

### *Infrastructure System Specifications*

The stormwater infrastructure for a site should be designed to integrate drainage and water quality control, water quality protection, and downstream channel protection (ARC, 2000). The efficiency of the inlet depends on the pipe material (Debo, 1995). The City of Griffin requires using reinforced concrete pipe (RCP) or high-density polyethylene (HDPE) pipe for stormwater system piping. All storm structures shall comply with the State and Griffin Stormwater Design Manual Standards in order to provide builders and developers consistency and continuity across the state.

### *Land Disturbance Activities*

All land disturbance activities do not fall under the intent of the suggested performance goals. The following activities are suggested as potential exemptions for the performance goals:

- Additions or modifications to existing single-family structures;
- Developments that do not disturb more than 5,000 square feet of land; and
- An individual single house. (Single family houses that are part of a subdivision or phased development project should not be exempt from the recommended requirements)

Development in critical or sensitive areas may be subject to additional performance requirements, or may need to utilize or restrict certain structural controls in order to protect a special resource or address certain water quality or structural problems identified for a drainage area.

### *Performance Goal #1*

Site designs should strive to preserve and utilize natural drainage systems and reduce the generation of additional stormwater runoff to the maximum extent practicable.

- Encourage use of better site design practices and techniques to reduce impervious areas, hydrologically disconnect impervious areas so that they drain to vegetated areas, utilize natural site features for stormwater management, and incorporate onsite bioretention areas through landscaping practices.
- Prevent unnecessary stripping of vegetation and loss of soils, especially adjacent to lakes, streams, watercourses, and wetlands.
- Where feasible, conserve forested and undisturbed vegetated areas, and establish and maintain riparian buffers.

### *Performance Goal #2*

Stormwater runoff generated from new development should be adequately treated and controlled prior to discharge into a jurisdictional wetland or waters of the state.

For all new development sites, stormwater management systems (which can include both structural stormwater controls and better site design practices) should be designed to remove 80% of the average post-development total suspended solids (TSS). Acceptable structural controls should be limited to those practices that have a demonstrated ability to meet this performance criterion. It is presumed that a structural control complies with this performance standard if it is:

- Sized to capture the prescribed water quality treatment volume, which is defined as the volume resulting from the first 1.2 inches of runoff from a site;
- Designed to meet the design requirements presented in this plan;
- Constructed properly; and
- Inspected and maintained on a regular basis.

### *Performance Goal #3*

Local communities should require, as necessary, additional or site-specific management measures to control and treat stormwater runoff from certain types of development and areas draining to sensitive receiving waters.

- Redevelopment, defined as any construction, alteration or improvement exceeding 5,000 square feet in areas where existing land use is high density commercial, industrial, institutional, or multi-family residential, should be governed by special stormwater sizing criteria depending on the amount of increase or decrease in impervious area created by the redevelopment.
- Where onsite stormwater management facilities are not practical, fee in-lieu of treatment may be required.
- Stormwater discharges from land uses or activities with higher potential pollutant loadings, defined as hotspots (ex. gas stations, convenience stores, auto-recycling areas, etc.), may require the use of specific structural controls and pollution prevention practices. In addition, stormwater from a hotspot land use should not be infiltrated without effective pretreatment. For example, hotspots might be required to prepare and implement stormwater pollution prevention plans that minimize pollutant generation and contact of rainfall with pollutants.
- Stormwater discharges to critical areas with sensitive resources (i.e., cold water fisheries, shellfish beds, swimming beaches, recharge areas, water supply sources, river corridors) may be subject to additional performance criteria, or may need to utilize or restrict certain structural controls. For example, if phosphorus loading is a receiving water concern, specific phosphorus load reduction mandates may be warranted.

Adequately treated means that the designated water quality volume has been treated through one or more of the approved stormwater controls and/or site practices that are detailed in this plan. The 80% removal goal is a management measure developed by the Environmental Protection Agency (EPA) as part of the Coastal Zone Act Reauthorization Amendments of 1990. It was selected by EPA for the following factors:

- Removal of 80% is assumed to control heavy metals, phosphorus, and other pollutants
- Data show that certain structural controls, when properly designed and maintained, can meet the 80% removal performance level.

#### *Performance Goal #4*

Stream channel protection should be provided by adopting three general approaches:

- Upland sources control and detention
- Bank protection measures such as energy dissipation and velocity control; and
- Riparian corridor preservation and conservation.

This goal may not be necessary for sites draining to large water bodies such as lakes, marshes, or major rivers.

- Provide extended detention storage for the 1-year frequency storm event.
- Establish well-forested and undisturbed vegetated riparian buffers. It is recommended that 100-foot vegetated buffers be established, where feasible.
- Energy dissipation should be provided at all stormwater outfalls to ensure discharges exit at non-erosive velocities.

#### *Performance Goal #5*

Over bank flood protection should be provided for by all sites discharging water to a stream or river.

- Provide control of the post-development peak discharge rate to predevelopment rate for 25-year return frequency storm event.

#### *Performance Goal #6*

All habitable structures and major transportation arteries (roads, railroads, etc.) should be protected from flooding to at least the 100-year flood level for the expected life of the structure from all flooding sources, major and minor.

- The increase in runoff volumes and peaks should be minimized and kept to predevelopment levels as possible.

- The full *build-out* floodplain should be established and development restricted in these areas. Already existing flood susceptible development should be acquired or protected from flood damage.
- Citizens should be informed and warned about the flooding potential of property prior to purchase and development.

#### *Performance Goal #7*

Local communities should require effective short and long-term maintenance of all of the drainage system and structural stormwater controls.

- All structural controls and stormwater facilities should have an enforceable operation and maintenance agreement to ensure the system functions as designed.
- The condition of the drainage system should be known and maintenance decisions should be proactively made on the basis of inspections rather than solely on the basis of complaints of flooding, erosion, or pollution.

#### *Performance Goal #8*

Regional stormwater management facilities should be evaluated as an alternative for onsite water quantity and water quality controls. Regional stormwater management refers to facilities designed to manage runoff from multiple projects and/or properties through a local jurisdiction-sponsored program, where the individual properties assist in the financing of the facility, and the requirement for onsite controls is either eliminated or reduced.

- Master plans and hydraulic and hydrologic models, sufficient to provide regional information, can be used to evaluate regional stormwater facilities.
- Institutional mechanisms supporting the regional concept should be evaluated.

#### *Performance Goal #9*

To the maximum extent practicable, development projects should strive to implement non-structural pollutant prevention practices such as material use, exposure, disposal, and recycling controls, spill prevention and cleanup, illegal dumping controls, illicit connection controls, and conservation and preservation measures.

- Require a pollution prevention plan, detailing the use of specific pollution prevention practices, for all development as part of the overall stormwater management concept plan for a site.
- Develop and enforce local ordinances or regulations as necessary to support non-structural pollution prevention practices and land use controls.
- Provide opportunities and institute public education programs to inform citizens and commercials and industrial landowners about relevant pollution prevention practices.

## **Program Priorities**

Stormwater program priorities were developed to guide the program. The program priorities focus on developing and implementing a comprehensive, cohesive approach to stormwater management, with emphasis on immediate attention to correcting highly visible drainage problems throughout the City of Griffin. The program priorities which have been completed by the City of Griffin are listed by each major stormwater functional area and are as follows:

### Management and Administration

- Establish a stormwater utility as an administrative and financial focus.
- Identify stormwater problems and needs in the city.
- Adopt financial programs.
- Establish equitable, adequate, and stable stormwater program funding.
- Execute organizational and staffing changes.
- Implement public information activities in support of the program.
- Management and record keeping systems have been enhanced.
- Research interlocal agreements to optimize local government resources.
- Establish Geographical Information Systems (GIS) for the stormwater infrastructure.

### Water Quality

- Identify potential NPDES stormwater quality permit requirements.
- Establish stormwater quality management strategy.
- Establish locally practical BMPs.
- Establish retrofitting opportunities for stormwater quality improvements.

### Engineering and Planning

- Prepare a detailed stormwater system inventory utilizing GIS.
- Develop a stormwater master plan for capital investment.
- Design capital improvements for high-priority projects.
- Develop technical support resources for stormwater operations and regulation.
- Prepare a Comprehensive Stormwater Design Manual.

### Operations

- Prepared a system condition survey.
- Establish the extent, scope, and level of routine maintenance services.
- Evaluate privatization of maintenance.
- Develop routine maintenance strategy and priorities.
- Establish remedial maintenance strategy and priorities.
- Establish expanded routine and remedial maintenance programs.

### Regulation and Enforcement

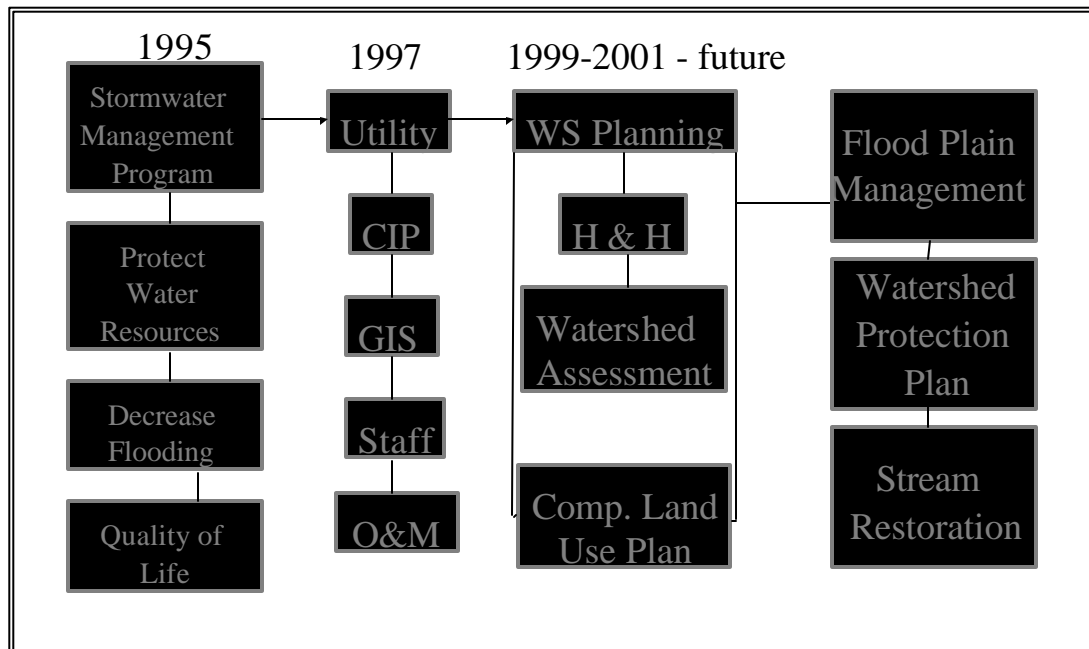
- Upgrade City regulations, codes, and requirements.
- Evaluate inspection program to verify maintenance of key private stormwater systems.

### Capital Improvements

- Address land acquisition, easements, and rights-of-entry for capital improvement and operating needs.
- Three key factors were considered in order to develop the program priorities. They are:
  - The type of drainage issues to be addressed;
  - What solutions must be done to address the issue, including financial, legal and political obstacles; and
  - The implementation steps and timing required for addressing drainage issues.
- The program priorities focus on developing and implementing a comprehensive, cohesive approach to stormwater management, with emphasis on immediate attention to correct highly visible drainage issues throughout the City.

Figure 1 presents the ongoing work and future goals of the Stormwater Management Program.

**Figure 1: Stormwater Management Program - Ongoing Work and Future Goals**



### Stormwater Quality Management

The City of Griffin’s fundamental goal is two fold: address water quantity and quality issues within the City. The Stormwater Utility Department was developed as a result of several years of researching programs and alternative funding mechanisms to address the aging infrastructure issues of the City. The City created this program to address stormwater runoff/management issues throughout the City including culverts, ditches, detention ponds, water quality, and other associated drainage issues.

The City of Griffin Stormwater Utility Department is taking action to address the new regulatory requirements for the management of stormwater quality as required in the NPDES Phase II

Regulations, including the use of BMPs to reduce pollutants from entering the stormwater system.

A stormwater quality management strategy has been initiated which includes watershed assessments for each of the six watersheds within the City. In addition to the biological assessments the City is evaluating the physical habitat of approximately 16 miles of streams within the City in anticipation of restoring and protecting degraded streams.

The City has also initiated the development of stormwater master plans for the six watersheds and 39 sub-basins within the City of Griffin to prioritize activities for improving water quality. The City of Griffin has incorporated sound planning and design requirements into the plan to reduce the potential of pollution and meet regulatory requirements.

### **Engineering and Planning**

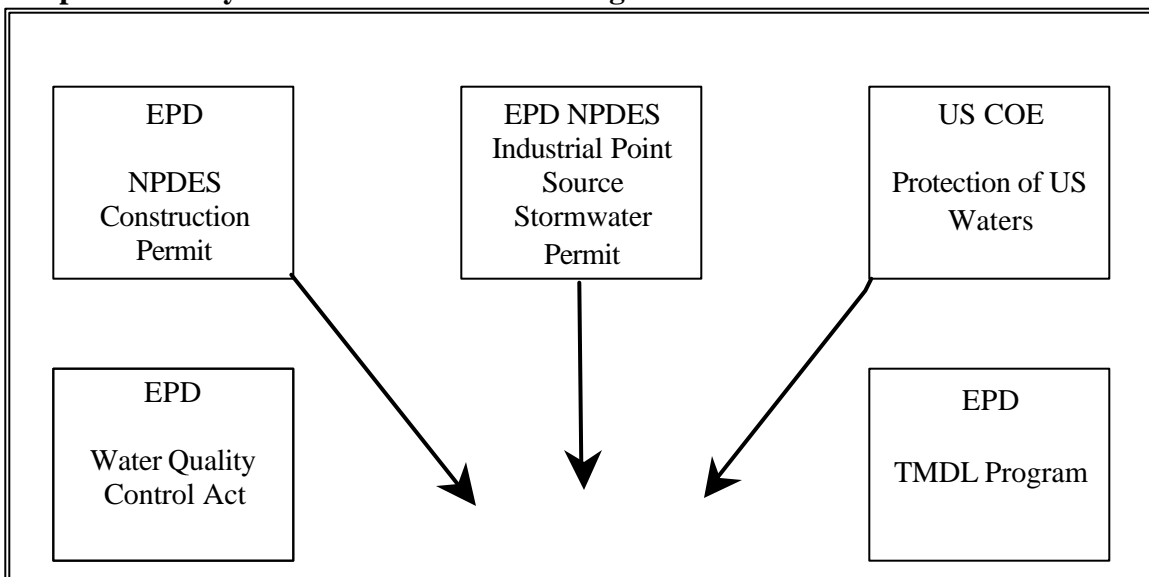
In order to improve the flooding conditions and stormwater quality within the City of Griffin, the City has revised the policies and ordinances to better suit the goals of the Stormwater Utility Department.

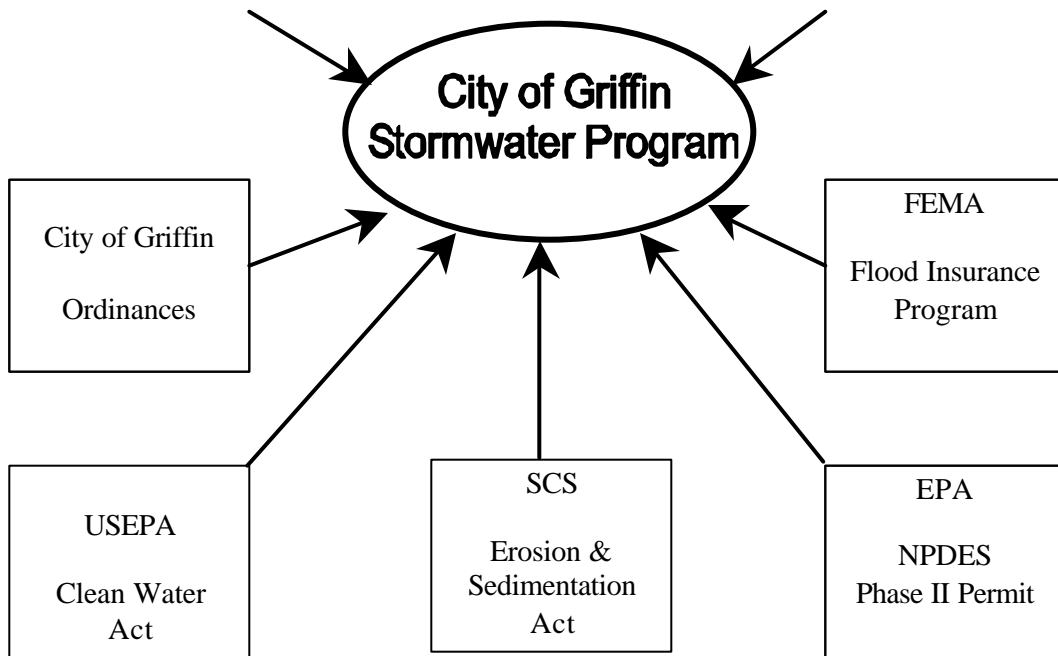
The City is in the process of creating a comprehensive land use plan as a non-structural BMP. A geographic information system (GIS) for the stormwater infrastructure has been developed. Engineering analysis and improvement initiatives of the stormwater system within City limits have been started.

This plan is tailored to provide capital improvements for the stormwater system in the City. High-priority improvements have been completed to demonstrate the programs effectiveness as discussed in Section 11.3. Engineering policies are presented in the Policy Statements Manual.

Griffin's population is around 25,000 people and its size is approximately 15.5 square miles. The City has approximately 165 miles of roads, six drainage basins and 39 sub-basins equaling a total of 16,403 acres. The City is 157 years old, and has an estimated 10,000 drainage structures. The City is responsible for the operation and maintenance of the entire drainage system. The size of this system requires a substantial operating budget. After reviewing all the alternatives, Griffin decided to help fund its Stormwater Management Program by creating a Stormwater Utility. Please see Attachment B for the Stormwater Utility Presentation Update created in 1998. Figure 3 on the following page depicts the six watersheds.

### **Impacts on City of Griffin Stormwater Program**



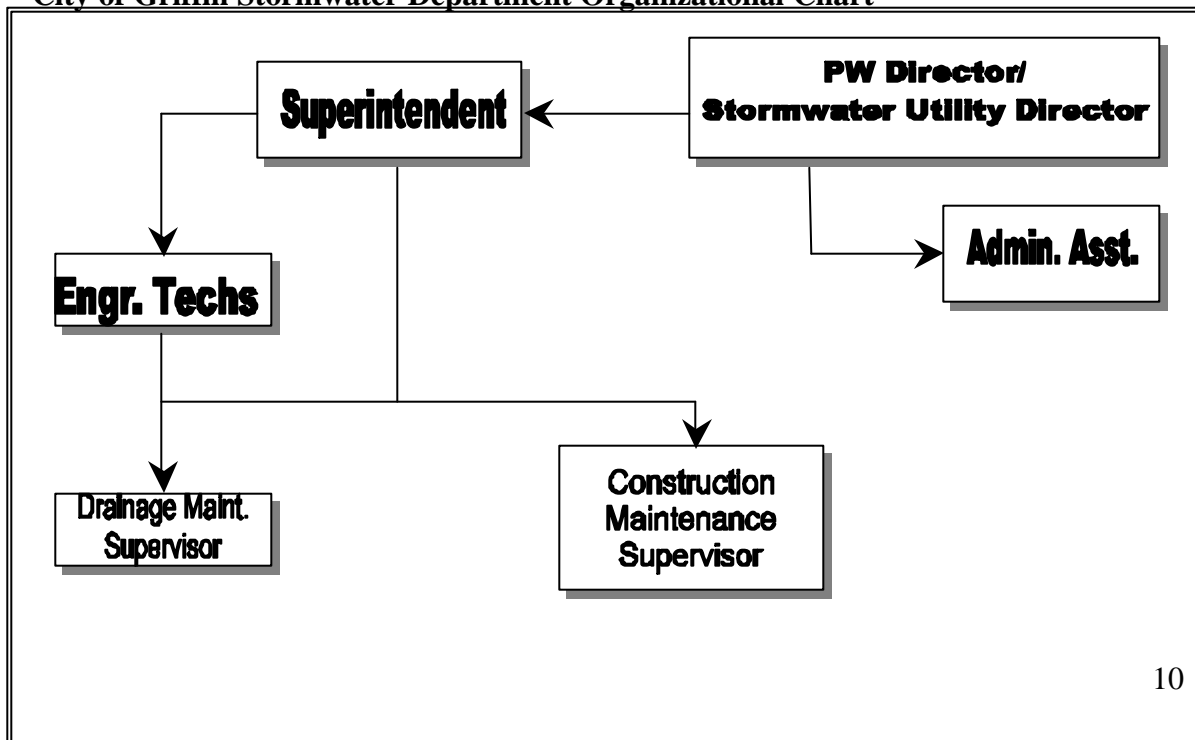


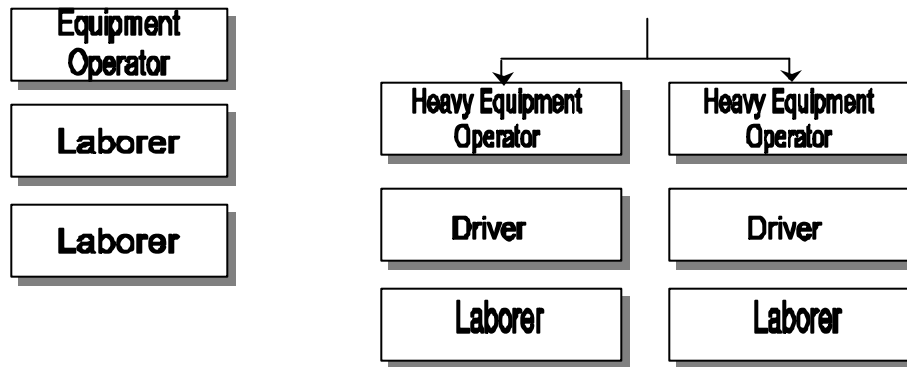
**ADMINISTRATIVE/ORGANIZATIONAL**

The City of Griffin Stormwater Program is managed by the Director of Public Works and Stormwater Department. The Streets Superintendent and Administrative Assistants provide support to the Director of Public Works.

Below is an organizational flow chart representative of the organizational structure once all staffing has been completed.

**City of Griffin Stormwater Department Organizational Chart**





## WATERSHED-BASED STORMWATER PLANNING

The purpose of this section is to provide an overview of the basics of planning for stormwater management as well as an approach to developing comprehensive watershed-based plans.

### Stormwater Master Planning

Practicing onsite stormwater management controls alone does not fully protect against the impacts from the cumulative effect of multiple sites on receiving waters. Therefore, stormwater management also needs to occur at the watershed level in a manner that integrates and is consistent with the site level approach presented in the previous section. Receiving water degradation and downstream impacts can result even with modest levels of development within a watershed. Difficult management decisions that involve input from a broad array of stakeholders need to be made at the watershed level to optimize the interrelation between urban growth and water resource health.

Stormwater master planning is an important tool with which communities can assess and prioritize (in terms of impact and cost) existing and potential future stormwater problems, as well as alternative stormwater management solutions and options. Traditionally, stormwater master planning has addressed such subjects as peak rates of runoff and volumes for various return frequency storms; locations, criteria, and sizes of stormwater controls and conveyances; cost/benefit analyses, and risk assessments.

A multi-objective stormwater master plan seeks to broaden the traditional definition of stormwater management to include the following:

- Land use planning and zoning
- Water quality
- Habitat
- Recreation
- Aesthetic considerations, etc.

Under multi-objective stormwater master planning, land use planning is integrated with stormwater management and resource protection goals so that sustainable development may

occur. Sustainable development is thought of as development that is economically feasible and attractive and at the same time recognizes the importance of the natural environment and takes necessary steps to protect it. This Stormwater Master Plan seeks to combine stormwater management and protection goals with land use planning.

Stormwater master planning is extremely broad and can cover a myriad of important issues. This section presents an overview of different types and levels of master planning. Emphasis is placed on how watershed planning so that both water quantity and water quality goals can be achieved. This section also presents the specific elements the City of Griffin will be addressing as presented in this plan.

### *Basic Types of Stormwater Master Planning*

There are several reasons for a stormwater master plan. A master plan can focus on:

- Fixing existing problems in developed neighborhoods, or avoiding new problems in areas facing development.
- Solving many small drainage problems on minor systems, or solving major flooding along creeks and streams.
- Water quantity issues and/or water quality issues.
- Primarily technical issues or consideration of institutional issues as well.
- The development of computer and GIS based stormwater quantity and/or quality models.
- Develop watershed approach to ensure that land use and economic development will occur simultaneously while meeting the environmental concerns of the quality of life.
- Integrating public input for corroboration of drainage system.

There are several types of master plans that can be prepared. This master plan focuses on flood management, land use planning, and watershed protection. The following sections provide information concerning the specific elements of this master plan.

### **Flood Management Plan**

A flood management plan is the simplest form of master planning, where only the essential components, alignment, and functions of a drainage system are analyzed. The focuses of these types of studies are on water quality control and flood prevention or protection. Flood studies might be performed to assess the nature of and determine solutions for out-of-back flow events that adversely impact public and private lands. Frequently, a flood assessment study typically analyzes both existing conditions and projected future “build-out” discharges for selected return frequency runoff events. The selected events are based on the City of Griffin standards. The hydrology and hydraulics of the system are analyzed to determine surface water profiles and elevations. This provides information as to where impacts are expected to occur.

Examples of a flood assessment are examining the effects of detention on flooding and providing improved flood protection (e.g., flood proofing structures, levies, etc.). The City of Griffin is currently developing HEC-1 and HEC-RAS models for the hydrology and hydraulics of the watersheds for the purposes of estimating the full build-out floodplain and regulating new development on this basis rather than the ever-changing existing condition. As part of the studies, cross-sectional data has been collected from several of the waterways within Griffin.

## **Community Rating Program**

The National Flood Insurance Program (NFIP) regulations require that new buildings and substantial improvements to existing buildings be protected from the base flood. Therefore, the City of Griffin is implementing a Community Rating System (CRS). The purpose of the CRS is to provide insurance premium rate reductions to the City. Three goals of CRS are to:

- Reduce flood losses
- Facilitate accurate insurance rating
- Promote awareness of flood insurance.

Several programs must be implemented by the City to receive credits are provided to the City for implementing the following programs or activities:

- Flood Protection Assistance
- Open Space Preservation
- Higher Regulatory Standards
- Flood Data Maintenance
- Erosion Sedimentation Control Regulations (ESC)
- Water Quality Regulations
- Floodplain Management Planning
- Retrofitting
- Drainage System Maintenance
- Flood Warning Program
- Levee Safety
- Dam Safety
- Comprehensive Management Plan, etc.

The City is in the process of collecting the necessary data to submit to the Federal Emergency Management Association (FEMA) in order to receive stormwater credits. To receive credits, the city has to develop a master plan with comprehensive reviews of watershed or basin hydrology to include regulations or set regulations standards to prevent new development from aggravating stormwater problems.

## **Comprehensive Land Use Management Plan**

The City is developing a land use plan that will be helpful in managing growth and development. The land use plan will help to preserve sensitive areas, maintain or reduce the impervious cover within a given sub watershed, and redirect development toward sub watersheds that can support a particular type of land use and/or density. The land use plan will be completed in March 2001.

## **Watershed Protection Management Plan**

As part of the watershed protection management plan, the City will be estimating the pollutant loads from stormwater runoff to calculate the Total Maximum Daily Loads (TMDLs) for the major watercourses within the city limits. This will provide the foundation from which to develop water quality assessments. Stormwater quality studies will analyze water quality impacts

to receiving waters and groundwater if applicable and develop structural and nonstructural strategies to reduce or minimize the pollutant loads.

The City is currently conducting several watershed assessments. The City will use a water quality model to support the watershed assessments.

As part of the watershed protection plan, the City is also conducting chemical and bacteriological sampling, biological and habitat assessments, and sediment sampling. The biological and habitat assessment focus primarily on the biological and fish communities within the specific watersheds.

## **Policy Statements**

The purpose of the Policy Statements Manual is to review existing policies, ordinances, and to establish proposed new and modified drainage policies. The review work focused on laws, ordinances, and plans that might impact stormwater in an effort to eliminate conflicts, and more importantly, to identify necessary new regulations. The newly established policies guided the development of the Stormwater Master Plan and the formation of the design criteria and standards to implement the program.

The major categories of policies include the following:

- Institutional
- Financial
- Engineering
- Operations and Maintenance

The policies listed in this plan are based upon the City of Griffin's goals and objectives for the stormwater management program as well as the requirements of regulatory agencies at the local, regional, state, and federal levels resulting in a unified approach to watershed management. The following sections detail each of the four policies listed above.

### *Institutional*

This category pertains to the development and administration, service levels, intergovernmental/agency cooperation, public involvement, and regulation enforcement. The subcategories within this policy area include:

- Management
- Coordination with other programs
- Emergency preparedness/disaster control
- Development submittals
- Erosion and sedimentation control
- Floodplain management
- Land
- Records management
- Inspection
- Enforcement
- Customer (public response)
- Public information/involvement
- Research



### *Financial*

The Financial category pertains to the customer billing systems and other financial programs, including funding for stormwater management. The specific policy areas include:

- General Policies
- Funding Options
- Rate Structure
- Billing Method
- Service Charge Credits and Exemptions
- Asset Management

### *Engineering*

This category pertains to the technical management of the drainage system and facilities. Specific policy areas include:

- Planning and Design
- Construction of Public and Private Facilities
- Water Quality

### *Operation and Maintenance*

This category pertains to the day-to-day insurances that the facilities are performing as intended. Specific policy areas include:

- General
- Inspection

### **Family of Documents**

The work performed to develop and implement the Stormwater Master Plan (SWMP) and Storm Drainage Utility for the City of Griffin was comprehensive, varied, and required many tasks. The work resulted in the production of numerous documents. The significant documents that comprise the initial SWMP are collectively termed the Family of Documents.

### **Background**

This document presents existing and proposed policies and guidelines for the City of Griffin and the participating local agencies to utilize relative to implementation of the Comprehensive Stormwater Master Plan. It is important that there be a unified approach for the Stormwater Program, however, it is likewise important to recognize that the City of Griffin does not have total control to impose and implement policies, standards and procedures to achieve the goals and objectives of the Comprehensive Storm Master Plan for the City of Griffin.

The authority and responsibilities assigned to the City of Griffin for managing the storm and surface water program are set forth in Ordinance No.99- (STORMWATER MANAGEMENT), Section 22-135 – Section 22-146.

Specific elements include:

- Scope of Responsibility for the City Drainage System
- Requirements for onsite stormwater systems: Enforcement Methods and Inspections
- Determinations and Modifications of Stormwater Service Charges
- Effective Date of Stormwater Service Charges
- Stormwater Service Charges
- Exemptions and Credits Applicable to Stormwater Service Charges
- Water Service Charges
- Stormwater Service Charge Billing
- Delinquencies, Collections
- Stormwater Utility Service Charges Billed in Common
- Appeals

The “Stormwater Management Systems” address the issues of drainage management (flooding) and environmental quality (pollution, erosion, and sedimentation) of receiving rivers, streams, creeks, lakes, ponds, and reservoirs through improvements, maintenance, regulation, and funding of plants, works, instrumentalities and properties used or useful in the collection, retention, detention, and treatment of storm water of surface water drainage for which the City of Griffin is responsible.

Under the State statute and the above-cited ordinance, the purpose of the City of Griffin Storm Water Program includes (for all public storm and surface water drainage facilities and systems within the City of Griffin Drainage Service Area):

- Drainage system possession, control, and domination.
- Drainage system maintenance, improvement, operation and repair.
- Effective management and financing.
- Improvement of the public health, safety, and welfare.
- Safe and efficient capture and conveyance of stormwater runoff.
- Correction of stormwater problems.
- Establishment and implementation of a storm drainage master plan which addresses design, coordination, construction, management, operation, maintenance, inspection, enforcement.
- Establishment of reasonable stormwater service charges based on contribution of runoff to the City of Griffin system.
- Facilitation of the use of urban water resources management techniques including detention/retention.
- Maximize the use of natural drainage conveyance systems.
- Enhancement of the environment.

## **Approach**

The policy statements proposed in this document are organized around the City of Griffin's goals and formatted into four major categories:

- Institutional
- Financial
- Engineering
- Operations and Maintenance

The Institutional category pertains to the development and administration of a program for storm drainage including staffing, equipment, service levels, intergovernmental/agency cooperation, public involvement, and regulation enforcement. Financial pertains to the rate structure, mix of funding options, level of service charges, customer billing systems and other aspects of funding the drainage program. Engineering pertains to the planning, analysis, design, and construction of the drainage system and facilities. Operations and maintenance pertains to the day-to-day insurances that the facilities are performing as intended when built.

The relevant regulatory and jurisdictional requirements and proposed policies for the program are presented for each of the major elements of the City of Griffin's Stormwater Program. For a program to be effective and progressive, its direction must be clearly stated and periodically refined. The mechanism for establishing program direction is the formulation and implementation of policies. Policies are based on goals of the organization as well as on the requirements of regulatory agencies at the local, regional, state and external impacts pertaining to policy making for the City of Griffin's Storm Water Program.

Where no policies exist, proposed policies have been developed. As such, this document is intended as a basis for discussion leading to formalization of the policy statements, which will effectively guide the City of Griffin's Program.

## **Proposed Policies**

Policies provide the framework (philosophy, timing, direction) and set the boundaries for stormwater management services to be provide by the City of Griffin. The policies directly impact the need for labor, materials, equipment, and other capital investments, which in turn define the level of financial commitment required. The policies presented within this plan are designed to guide the development of the Stormwater Master Plan. The statements were developed to be compatible with existing policies, and to meet future needs based on analysis and interviews with elected officials, staff members, and local professionals in the City.

## **Funding**

The City of Griffin used the momentum gained through the successful implementation of the Utility to secure additional funds to address Stormwater related issues. Specifically, the City of Griffin secured: \$750,000.00 Hazard Mitigation Grant from the Georgia Emergency Management Agency (GEMA) to address flooding along a major urban roadway in a commercial and retail area of the City; \$1.0 million from Spalding County's Special Purpose Local Option Sales Tax

(SPLOST) Program to construct a regional stormwater detention facility in North Griffin, \$358,000.00 Section 319 (h) Non-point Source Implementation Grant from the Georgia EPD and USEPA; \$2.6 million State Revolving Fund (SRF) Loan from the Georgia Environmental Facilities Authority (GEFA) for non-point source projects and equipment and TEA-21 for \$40,000. The loan was the first granted in the State of Georgia specifically to address non-point source issues; The City plans on going to the revenue bond market in 2001, backed by Stormwater Utility revenues.

The Stormwater Master Plan is a comprehensive planning and guidance process takes a holistic approach to stormwater management. The plan integrates decision-making tools including, policy criteria guidelines, watershed master plans, and financial programs used to collect drainage service charges to fund the program. Implementation of services includes maintenance, public information and education, and capital improvement projects. The program will be an ongoing process of updating and upgrading these tools to improve the decision-making process and services provided to the City of Griffin customers within the drainage service area.

The current physical issues facing the City of Griffin include the flooding of minor drainage systems, erosion of ditches and streams, water quality issues, and degradation of habitat. These issues are described in the following sections of this document.

The physical issues with stormwater management have been brought about by non-structured past development practices and lack of adequate resources to perform maintenance of the drainage system. Flooding occurs primarily as the result of the following:

- More water is flowing the in drainage system following urban development than the system was designed to handle;
- Structures are permitted to be located too close to streams;
- Pipes and channels have become clogged with sediment or debris; and
- Poor design.

## **INVENTORY COLLECTION**

### **GIS Mapping**

The City of Griffin is the first city in Georgia to develop a Geographic Information System (GIS) database by compiling an inventory of all stormwater drainage structures/features (both natural and manmade attributes) within the City limits. The GIS database contains information concerning the infrastructure system as well as tax parcel information, topographic information, land use information (March 2001), and aerial photography. A current project, which the City of Griffin Stormwater Department has under taken, is the Stormwater Inventory Program. The City has taken a physical inventory of the entire stormwater infrastructure both natural and man-made attributes of the city. This process includes taking measurements on structures such as curb inlets, grate inlets, junction boxes, headwalls and all associated pipes. Measurements include such data as the width of the grates found throughout the city as well as the shape, size and type of piping running between the structures. Following the measurement of the structure, the location of the structures are located based on state plane coordinates to centimeter level accuracy using the Global Positioning System.

The Global Positioning System or GPS is a surveying system in which a radio receiver mounted in a backpack reads signals from a constellation of Department of Defense satellites orbiting the planet every 12 hours and interprets these signals into an exact location on the earth. Finally having obtained attributes and locations on these structures, a digital photo is taken of each structure. Once the fieldwork is complete, the data is then converted into a Geographic Information System database. The Geographic Information System or GIS database is computer system in which information is displayed graphically by location. The City is currently in the process of using the GIS to identify existing problems as follows:

- Predict future problems;
- Evaluate opportunities for enhancement of stormwater use; and
- Develop cost estimates for construction as well as assigning priorities for infrastructure improvement.

Hydrologic and hydraulic models such as HEC-1 and HEC-RAS are being used to determine flow elevations, velocities, distribution and pressures using flow rates and boundary characteristics as inputs. Hydrologic models are used to determine flow rates at various points throughout a watershed or pipe network given the typical inputs of rainfall, basin characteristics and basin structure. Survey information, such as cross-sectional information and ponding elevations are used to create models using HEC-RAS. Using the information obtained using HEC-1 and HEC-RAS the City is able to delineate basins and calculate times of concentration using curve numbers obtained by using zoning maps. The City is currently developing existing conditions models and future conditions models. Zoning maps will be utilized to determine the future curve numbers of a specific basin.

### **Drainage System Evaluation**

The stormwater drainage system evaluation consisted of evaluating drainage facilities. Deterioration of drainage facilities will be noted during the evaluation. During heavy rain events, flooding conditions will be observed noting specifically any roadway flooding and structural flooding as well as non-structural flooding. The existing drainage system will be evaluated under existing and future land use scenarios and any problem areas identified (hot spots) for both scenarios. The needed improvements will be prioritized and preliminary cost estimates and benefit levels will be determined. The City of Griffin will be performing hydrologic and hydraulic modeling for each of the six basins within the city limits and 39 sub-basins. Figure 4 depicts the sub-basin boundaries within the City of Griffin.

At the completion of the master planning and watershed assessment activities, the City will have the 100-year floodplain mapped for all creeks in the city limits. The urbanized floodplain limits can then be submitted to the Federal Emergency Management Association (FEMA) for map revisions. As a result, the City of Griffin residents will benefit by having lower Flood Insurance Rates.

### **WATERSHED ASSESSMENTS**

As part of the City's Stormwater Master Plan each of the Watersheds will be studied to determine the "health" of each watershed and its ecosystem. The Watershed Assessment shall consist of

two major components. The first component will consist of looking at and evaluating the biological integrity of the aquatic life in the streams of the watershed. The second component will consist of evaluating the water quality of the water flowing through the streams.

### **Watershed Characterization**

In order to perform the watershed characterization it is necessary to perform biological evaluations consisting of physical habitat assessment, benthic macroinvertebrate sampling, and fish sampling. As part of the study, a reference site will be selected that approximates the size and ecological characteristics of the watersheds to be studied. The reference site will be a location that represents ideal ecological conditions within the same ecoregion. The reference station selected should represent undisturbed or undeveloped conditions to serve as a benchmark for comparison to the study area.

- A physical habitat assessment will look at the quality of the structure of the surrounding habitat that influences the aquatic life, and which is not water quality related. The benthic macroinvertebrate sampling quantifies the existing aquatic life in such environments as riffles, bank and root zones, woody debris zones as well as leaf packs / particulate organic matter zones.
- Biological diversity has been shown to have a direct correlation to water quality, and is an excellent indicator of impairment or stressors.
- Finally, fish sampling may be conducted to identify chemicals and other water quality pollutants present in tissues, as well as to assess the biodiversity of the study area.

The characterization of water quality will also establish conditions at locations where no BMPs have been implemented, for comparison against conditions after BMPs have been implemented.

As part of the Watershed Assessments, water quality assessments will be conducted. The water quality evaluation shall include the following parameters:

- Total Suspended Solids;
- Total Nitrogen;
- Chemical Oxygen Demand;
- Heavy Metals;
- Dissolved Oxygen; and
- Other chemicals to be determined.

### **Overview and Objectives**

The City of Griffin, in anticipation of redevelopment, future growth, and infrastructure development, has determined the need to assess water quality within its city limits and to protect its water resources. The EPD now requires that watershed assessments be performed on an area where new sewer plants will be constructed or where existing plants will undergo expansion to acquire a National Pollutant Discharge Elimination System (NPDES) permit.

Urban growth and development can adversely affect the water quality and biotic integrity of streams and water supply reservoirs. These affects are directly related to urban and agricultural land runoff, also known as nonpoint source pollution. According to the Environmental Protection Agency (EPA), nonpoint source pollution is the largest source of water quality problems facing the nation today. Nonpoint source pollution is the reason that 40% of the nations assessed water bodies are unsafe for basic uses. Understanding the sources and magnitudes of stream impairment is critical to the development of management strategies for achieving water quality improvements and the restoration or maintenance of biotic integrity. In summary, the results of the Watershed Assessments will provide recommendations for:

- The improvement of City Watersheds with respect to water quality standards and biotic integrity, and the implementation of strategies for reducing or eliminating sources of pollution that have resulted in stream impairment;
- The implementation of specific BMPs to watersheds;
- The use of watershed model predictions of pollutant loadings and impacts from both point and nonpoint sources, for land-use management strategies for the immediate improvement of water quality;
- Watershed management strategies that can be successfully implemented to restore or maintain water quality and designated uses into the future; and
- Methods for the Involvement and education of the public and stakeholder groups regarding the reasons for, and benefits of developing efficient watershed management strategies that satisfy regulatory requirements and public interest.

The ultimate goal of the assessment is to provide the City of Griffin with technically sound and defensible recommendations for making informed watershed management decisions, through the balancing of economic growth, and with the planning and management of the long-term health of the City's water resources. Long-term monitoring may be required to assess changing conditions through the effects of continued city development and BMP implementations.

The models used in the assessments will be used for recommendations for:

- Supporting NPDES permitting decisions;
- Developing total maximum daily loads (TMDLs) for water quality parameters as are appropriate and as required in the Ocmulgee and Flint River Basins; and
- Identifying realistic combinations of flexible and economical management scenarios for enhancement and maintenance of stream water quality in the future.

### **Roles and Responsibilities**

Once the City watersheds have been assessed and water quality status is known, specific enhancement and protection strategies will be implemented. Several tools and methods have been described above as ways in which water quality within the city's watersheds can be improved and maintained. It is the City of Griffin's responsibility to ensure the preservation and enhancement of water quality within its city limits through this assessment process and smart

development and land use decisions. With this responsibility, the City of Griffin has developed City Ordinances to ensure protection of its water resources. Continued amendments and new ordinances are expected as a tool to implement growth strategies, which protect water quality. Through this process, there are several avenues of Public Information and Education, as presented in Section 12.0, to empower citizens through this decision making process. The citizens of the City of Griffin which ultimately decide how and when water resource preservation and enhancement occurs, through public education, the election process, public hearings, and voting.

### **Current Environmental Assessments**

The City of Griffin is performing comprehensive watershed assessments for each of the watersheds within the City of Griffin. The watershed assessments will provide vital information as to the health of the watercourses within the City. The City of Griffin will keep the public abreast of the ongoing watershed assessments.

### **Environmental Data Integration**

Following completion of the watershed assessments, the environmental data collected during the assessment will be integrated into a computer-modeling program. The model will be developed for non-point source pollutant loadings.

Once all data is collected, the computer modeling will begin. The computer modeling system will provide information as to how effectively installed BMPs are functioning. This data will be used to establish pollutant-loading estimates for the watershed. The initial modeling scenarios will be developed to match existing land uses with the collected data in order for the simulations to produce representative results. This process known as calibration, and will allow the second phase of the modeling to proceed with a higher level of accuracy. The goal of the watershed assessment will lie in the second phase of the model. After calibration, modeling of land uses in various locations can occur. As a result, the affects on water quality and biotic integrity can be based on various future land uses can be demonstrated.

### **Monitoring**

#### *Rainfall and Flow Gauging*

The City of Griffin is currently performing rainfall gauging at selected locations throughout the City. Rainfall and flow gauging provides important historical rainfall information as well as provides a calibration tool to help create the models used in the stormwater modeling efforts of the entire community watershed. The City will utilize this information to evaluate the characteristics of the existing stormwater systems. The initial sites selected for rainfall gauging are as follows:

- Honey Bee Creek at Hill Street
- Potato Creek at Maple Drive
- Cabin Creek at Colonial Pipeline
- Shoal Creek at Lyndon Avenue

Additional sites for rainfall and flow gauging stations will be selected and monitored within the watershed until all six basins have been assessed and baseline data created.

### *Stormwater Flow Monitoring*

The City of Griffin has positioned several flow monitor systems in select drainage structures throughout the City. The flow monitoring provides historical data concerning the amount of stormwater within the watershed. This information can then be compared to the rainfall data collected through rain gauging to calibrate the stormwater master plan. Stormwater flow monitoring will be conducted at the following locations and other locations as necessary:

- Heads Creek at Oakview Drive (2 channels monitored)
- Heads Creek at Mobley Street (1 channel monitored)
- Shoal Creek at Pine Hill Road (3 channels monitored)
- Honey Bee Creek at Hill Street (1 channel monitored)
- Potato Creek at Maple Drive (2 channels monitored)
- Potato Creek at Grandview Drive (3 channels monitored)
- Cabin Creek at Colonial Pipeline (1 channel monitored)
- Shoal Creek at North Griffin Regional Detention Pond (2 channels monitored)
- Shoal Creek at Lyndon Avenue (3 channels monitored)

### *Dry Weather Screening*

The City will conduct dry weather screening during dry weather conditions. Dry weather screening involves inspecting for illicit discharges during dry weather. The USEPA Nationwide Urban Runoff Program (NURP) indicated that many stormwater outfalls still discharge during substantial dry periods. Urban runoff pollutants include the following:

- Total Suspended Solids (TSS)
- Biological Oxygen Demand (BOD)
- Heavy Metals
- Total Kjeldahl Nitrogen
- Bacteria
- Oil & Grease
- Pesticides
- Other pollutants as necessary.

Pollutants levels in these dry conditions have shown to be high enough to significantly degrade receiving water quality. The illicit discharge detection and elimination program would not necessarily need to address all types of non-stormwater discharges. The USEPA has listed general categories of non-stormwater discharges or flows that would need to be addressed only in those municipal stormwater programs where such discharges are identified as significant contributors of pollutants.

### *Chemical/Bacteriological Analysis*

Chemical and bacteriological sampling will be conducted throughout the watershed as part of the watershed assessments. This information will be used along with existing data on watershed

characteristics to identify primary factors causing any stream impairment with respect to water quality standards and designated uses. In addition, these data will be used to support modeling efforts to examine possible options for future watershed management strategies for improving water quality in local streams and water supply reservoirs, and to compare the effects of recently implemented best management practices (BMP) within the watershed.

### *Biological Assessment*

The technical approach to biological assessment is based on the concept that the ecosystem health can be measured in terms of the composition, structure, and function of the resident biotic communities. Fish and benthic macroinvertebrate communities serve as continual monitors of biotic integrity. “Biotic integrity” is the ability of an aquatic ecosystem to support and maintain a balanced, integrated, and adaptive community of organisms comparable to that of the natural habitat of the region. The information can then be analyzed to determine the causes of the impairments and methods to reduce impairment can be investigated. The plan might include riparian corridor planning, institutional changes, and planned habitat restoration.

The biological integrity of a watershed is an excellent indicator of the overall ecological integrity of aquatic environments. Biotic integrity includes stream energy resources, water quality, habitat quality, biotic interactions, and flow regime (Karr et al., 1986). The aquatic environment can provide insight to the environmental status that relates directly to the overall integrity of the watershed. The resulting data may be used in the design and development of habitat improvement and stream restoration projects, stormwater ordinances, riparian buffers, structural BMP retrofits, etc.

### *Sediment Sampling*

The technical approach to sediment assessment is based on the concept that sediment contamination can involve deposition of toxicants over long periods of time and are responsible for water quality impacts in some areas. Several pollutants such as pesticides, heavy metals, and several of the organic priority pollutants will accumulate in sediment. Sediment assessment is performed to analyze and assess the occurrence, abundance, and distribution of these chemical constituents in surface-water systems. Sediment assessment addresses a broad spectrum including surveillance monitoring, mass transport loading, remediation, effectiveness, presence or absence of contaminants, and spatial extent and temporal change of chemical constituents (Radtke, 1997).

Hydrologic and hydraulic models such as HEC-1 and HEC-RAS are being used to determine flow elevations, velocities, distribution and pressures using flow rates and boundary characteristics as inputs. Hydrologic models are used to determine flow rates at various points throughout a watershed or pipe network given the typical inputs of rainfall, basin characteristics and basin structure. Survey information, such as cross-sectional information and ponding elevations are used to create models using HEC-RAS. Using the information obtained using HEC-1 and HEC-RAS the City is able to delineate basins and calculate times of concentration using curve numbers obtained by using zoning maps. The City is currently developing existing conditions models and future conditions models. Zoning maps will be utilized to determine the future curve numbers of a specific basin.

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## **CAPITAL IMPROVEMENT PROJECTS**

The City of Griffin is in the process of identifying land, easements, and rights-of-entry for capital improvement and operating needs. The City of Griffin Stormwater Utility has implemented several projects to improve the stormwater issues within the City of Griffin. These completed and future capital improvement projects are described briefly in the following sections.

### **Completed Capital Improvement Projects**

#### *North Griffin Detention Pond*

The City of Griffin completed construction on the first phase of the North Griffin Detention Pond in 1998, which is located within the 180-acre North Griffin Drainage Basin. The pond provides detention for approximately 90% of the upstream basin thus eliminating downstream flooding (particularly within the Waterford Subdivision) while at the same time utilizing a natural wetland system to provide water quality enhancement for approximately 95% of the basin. Flooding conditions prior to construction of the detention pond are shown to the right.



The second phase of this project involved construction of a bioengineering system (spring of 1999) within the pond itself and within the existing forested wetland area downstream of the pond. The bioengineering system phase of the project is detailed in the section entitled “North Griffin Basin Water Quality Enhancement”.

Several funding mechanisms have assisted the City of Griffin in the design and construction of this project. Revenues from the SPLOST funded construction; a grant from the Georgia EPD Section 319(h) Grant Program funded the bioengineering phase of the project; and funds from the City of Griffin's Stormwater Utility are being used for detention pond maintenance. A photo of the completed detention pond is shown to the right.



### *5<sup>th</sup> and Wall Detention Pond*

The objective of this project was to correct an improperly operating stormwater drainage system. The existing piping system was undersized which results in inadequate operation and flooding of areas between Taylor Street, Solomon Street, Fourth Street and Fifth Street. The proposed design called for the rerouting of stormwater beginning at the intersection of 5th Street and Wall Street and continuing east to an existing creek. The proposed design included the installation of a 72-inch aluminized corrugated metal pipe that replaced the existing undersized storm piping system. Additionally, a detention/water quality pond was constructed at the outfall of the pipe to reduce the flooding and non-point source pollution impacts downstream of the project. A photo of the conditions prior to construction is shown above. Shown below is a photograph of the completed detention pond.



The Georgia Environmental Facilities Authority (GEFA) State Revolving Fund (SRF) Loan was used to fund the design and construction of this project.



### *Lyndon Avenue Flood Mitigation Project*

The purpose of the Lyndon Avenue Flood Mitigation Project was to alleviate flooding along North Expressway and at the Wal-Mart Shopping Center. The project involved replacement of the two undersized 66-inch pipes by the City under the shopping center property. The project was funded through Hazardous Mitigation Grant Program (HMGP) from the Georgia Emergency Management Association (GEMA) and the Federal Emergency Management Association (FEMA) as well as GEFA and State Revolving Funds (SRF). A photograph of the completed project is shown to the right.



### *MacArthur Drive Drainage Improvements*

The objective of the MacArthur Drive Drainage Improvement Project was to improve the flow of stormwater runoff through a residential area. In the past, stormwater runoff flowed over land through an earthen channel with minimal slope. During moderate to heavy storm events, the channel overflowed causing flooding to the surrounding residential areas. The earthen channel was replaced with a properly sized storm pipe system. The outfall of the new piping discharges in the same location as the earthen channel did in the past. A photograph of the completed project is shown to the right. This project was funded through GEFA SRF.



### *Carriage Hills Subdivision*

The objective of the Carriage Hills Subdivision Project was to improve the existing pavement conditions while also improving the drainage system along Carriage Hills Drive and Carriage Trace. The asphalt throughout the two streets had extensive damage and was in need of significant repairs. Shown to the right is a photograph of the damaged pavement within the subdivision. The



cause of the damaged pavement was the result of poor soil conditions and inadequate surface drainage. The drainage problems exacerbated the pavement damage by allowing surface water intrusion into the pavement section and underlying subgrade. This condition resulted in degradation of the underlying fill materials and damage to the surface pavement.

The pavement has been repaired to correct the damaged pavement and correct the drainage problems. Additional inlets were added to help the poor drainage. Additionally, the slope of the roads was increased to compliment the storm design. Shown to the right is a photograph of the completed project.



## **Future Capital Improvement Projects**

### *Oakdale/Evergreen Drainage Improvements*

The objective of the Oakdale/Evergreen Drainage Improvement Project is to improve the flow of stormwater runoff through two residential subdivisions, Oakdale and Evergreen. The existing drainage system is a combination of pipes and open earthen channels. Several of the pipes and channels are undersized and selected drop inlets have not been constructed at the proper elevation. The resulting effect is that the entire drainage system does not function properly. Periodic flooding of certain areas is common.

The proposed design will eliminate all open channel flow except for the portion of the channel that connects the two subdivisions and the existing channels will be replaced with properly sized polyethylene pipes and bituminous coated corrugated metal pipe. Several raised inlets will be added at the correct invert elevations in selected locations to improve the overall drainage throughout the area. All drop inlets and catch basins will be replaced with double wing catch basins. This project was funded through GEFA.

### *Oakview Drive Drainage Improvements*

The Oakview Drive Drainage Improvement Project will alleviate flooding along Oakview Drive and surrounding areas. The proposed improvements include increasing the capacity of the

existing detention facilities and increasing the culvert capacity in the public right-of-way. This project is a joint effort of the GDOT and the EPD 319 Grant.

#### *North Lyndon Basin Improvement*

The purpose of this project is to improve the stormwater drainage through the entire 138-acre basin. The drainage basin conveys stormwater via a combination of open earthen channels and a piping network. Most of the existing piping network will be replaced due to its existing poor condition and selected pipes will be upsized to handle the volume of runoff.

#### *Terracedale Drainage System Improvement*

The purpose of the Terracedale Project is to provide bank stabilization along the unnamed drainage system that flows parallel to Terracedale Road. Several options have been evaluated to address this issue. These options include bank stabilization and restoration in place. This method would be the most ecologically sound approach, however it would take a significant amount of time to see improvements. The second method involves backfilling the drainage channel. This method would cause the least amount of impact to adjacent properties. The channel would be backfilled with suitable material and the drainage path rerouted to discharge into the natural low area. This approach would reunite the flow to the natural channel identified on the quad map thus recharging the natural floodplain and wetland systems as well as improving water quality. The last method will involve evaluating the drainage channel to identify the optimum location for installation of a pipe system. The drainage channel would have to be modified for installation of a pipe system.

#### *DOT Box Culvert*

This project involves increasing the capacity of the existing double 6-foot by 6-foot concrete box culvert under North Expressway by the adding two additional 6-foot by 6-foot barrels to the system. The existing structure currently conveys runoff from an unnamed tributary to Shoal Creek, a tributary of the Flint River. The primary purpose of enlarging this structure will be to reduce the risk of water encroaching into or over topping the roadway and causing upstream flooding by reducing the headwater elevation of the structure. Currently, no flood plain elevation data has been established by the Federal Emergency Management Agency (FEMA) for the creeks/rivers that lie within the city limits of Griffin, Georgia. It is the understanding of this report that any additional barrels constructed at this site will be standard Georgia Department of Transportation (GDOT) 6-foot by 6-foot concrete box culverts. Additionally, all barrels of this system will be lengthened to accommodate a future roadway-widening project by the GDOT. For the purpose of evaluating the limits of the flood plain, this study examined the stream of interest from US Highways 19/41 to Melrose Avenue in Griffin.

#### *Stream Mitigation Bank*

The goal of this project is to improve stream quality and wetland restoration within the boundary limits of the City of Griffin. This project will enhance water quality within the city's watershed and to restore streams and associated riparian corridors from their current degraded condition.

Mitigation has long been a need for many development projects. The need will become even greater with the recent changes in the Department of the Army Corps of Engineers' (ACOE) Nationwide Permits for working within wetlands and streams. To summarize, most impacts to open waters (streams, rivers, etc.) will now require compensatory mitigation in an effort to achieve a no net loss of functions or acreage of streams and wetlands. Furthermore, most impacts that exceed 0.1 acre of any wetland will now require mitigation. Stream mitigation can be especially expensive because of the required ecological and engineering studies and designs, and because of construction costs.

The existing condition of streams and associated riparian corridors within the City of Griffin would be classified as highly degraded. The streams have been channelized and severely entrenched by high velocity runoff. Stream bank undercutting and collapses are common through many reaches reviewed during the past weeks. The implementation of corrective measures for servicing storm water runoff was an impressive step forward in returning water quality and biological functions to surface waters; however, years of erosive flows and man induced alteration of the watershed requires a Phase II step. Phase II would be the physical restoration of the features within the watershed.

The City will be required to hold a conservation easement on all lands involved in the restoration effort, which would prevent future development from impacting the areas that have been rehabilitated. Conservation easements mean a legally binding, recorded instrument, approved by the Department of the Armies Office of Council, that conserves a site. While the easements seem restrictive, the City could wisely prepare the easement to allow for future trail systems and other desired projects that have insignificant impacts. Trails provide many passive and active recreational uses, and are much desired by many that enjoy getting out of the car and enjoying a natural setting. The conservation easements could provide a green corridor that provides non-automotive access through the city limits.

## **Stormwater Quality Research & Development**

### *Tea-21 Project*

The goal of the TEA-21 Project is to provide quantitative baseline data regarding the effectiveness of various water quality improvement BMPs for stormwater runoff that originates along highly developed and urbanized highway corridors. Based on empirical evidence collected and analyzed using both traditional and high-tech methods and procedures, the City of Griffin will endeavor to show the effectiveness of the proposed BMPs. Successful implementation of stormwater BMPs should result in improved water quality, stabilization of eroded stream banks, reduction in pollutant loadings in downstream receiving waters, improved wildlife habitat and other associated environmental benefits.

## **Roles and Responsibilities**

Once the City watersheds have been assessed and water quality status is known, specific enhancement and protection strategies will be implemented. Several tools and methods have been described above as ways in which water quality within the city's watersheds can be improved and maintained. It is the City of Griffin's responsibility to ensure the preservation and

enhancement of water quality within its city limits through this assessment process and smart development and land use decisions. With this responsibility, the City of Griffin has developed City Ordinances to ensure protection of its water resources. Continued amendments and new ordinances are expected as a tool to implement growth strategies, which protect water quality. Through this process, there are several avenues of Public Information and Education, as presented in Section 12.0, to empower citizens through this decision making process. The citizens of the City of Griffin which ultimately decide how and when water resource preservation and enhancement occurs, through public education, the election process, public hearings, and voting.

## **PUBLIC INFORMATION & EDUCATION**

The continuing degradation of water bodies in urban and urbanizing watersheds remains one of the most serious environmental issues facing Georgia today. The non-point source pollutant loading of these streams, rivers, and lakes has not only affected the water quality, but has also adversely affected the quality of life of the citizens of Georgia. By not viewing these streams, rivers, and lakes as a resource to be protected, we have forfeited numerous economic and recreational benefits that could have otherwise been enjoyed.

The City of Griffin has initiated an aggressive and proactive approach to water quality preservation and restoration within its city limits. The first step in this initiation is the assessment of water quality within the city limits of Griffin. Once this first step is completed, water quality issues can be addressed through best management practices, public education, and land use planning and development strategies to ensure the future enhancement, and preservation of our water resources.

This Stormwater Master Plan is the cornerstone of efforts to protect and restore water quality in the City of Griffin. It encompasses all the tools necessary to accomplish this objective. The processes within, will involve all aspects of the community. It is the community of Griffin, which will benefit from improving urban stream environments and water quality. There are eight groups who should be aware of the problems of water quality impairment, and what they can do to contribute to the solution. The eight groups are as follows:

- General Public
- Environmental Interest Organizations
- Civic Associations
- Business Associations
- Educators
- City Government
- County Government
- State Government

In order to ensure a broad audience is reached during this process, several avenues of communication will be used. Sources of information on the process of managing the City of Griffin's stormwater include:

- Classroom Education: Local educators will present various information topics at city schools classrooms and colleges (i.e. Water Wise).

- The City of Griffin Stormwater web page: The web page presents a forum for information and community feedback directly to the City Stormwater Department at [www.griffinstorm.com](http://www.griffinstorm.com).
- Flyers: Utility bills and mail-outs will incorporate information flyers with information on pollution prevention, current city projects and information on citizens' responsibilities and efforts they can take to improve water quality.
- The Stormwater News Letter: This locally produced information letter will present information and updates on stormwater utility management projects and ongoing system upgrade and maintenance efforts.
- Brochures: Through the chamber of commerce and local city government offices, project profiles and updates will be available.
- Stormwater Resident Surveys: Utility bills and civic actions (automobile registration, utility hook-up, etc.) will present opportunities for citizen feedback through surveys.
- Complaint Database: Maintained by the City of Griffin Stormwater Department, a "drainage complaint hotline" may be used to help identify complaint areas and quickly address infrastructure issues.
- Stenciling Programs: Illicit Discharge Program
- Road Signage at Named Tributary crossings: At tributary crossing locations, water protection and project information will be communicated.
- Hazardous Material (HAZMAT) Recycling Programs: Griffin's comprehensive HAZMAT recycling programs will present opportunities for program results to be displayed and new program information to be presented.
- The Georgia Adopt-A-Stream Program: This established and effective State program has been implemented within the City and will continue to be a curtail water quality preservation program supported by Griffin.
- Local Media notifications: Local newspaper, radio, and television stations will be forums for the presentation of program status and results.

It is vitally important to keep political leaders, stakeholders and the general public abreast of the concept and development of the stormwater utility and specific decisions that are made. There are eight groups who should be aware of the problems of water quality impairment, and what they can do to contribute to the solution. The groups are as follows:

- General Public
- Environmental Interest Organizations
- Civic Associations
- Business Associations
- Educators
- City Government
- County Government
- State Government

In order to ensure a broad audience is reached during this process, several avenues of communication will be used by the City. The local media, city forums, and educational institutes will be a source of information during this assessment. Questions and information can be exchanged through the City Government.

## **OPERATIONS & MAINTENANCE PROGRAM**

As a result of an extensive stormwater system condition assessment, the City has determined that a remedial maintenance program is necessary in order to restore the system to its original capacity. The growth of the maintenance operation will be managed and controlled based on a priority list. The operation and maintenance program is responsible for keeping the stormwater system functional. City maintenance crews clean catch basins and inlets, clear and open ditches, clear debris, and repair stormwater infrastructure (culverts, pipes, etc.). We distinguish two types of maintenance: routine and remedial. Routine maintenance involves cleaning and clearing the existing system. Remedial maintenance involves repairing the existing system to its normally constructed condition.

The current maintenance program in Griffin spends about 50% of its efforts responding to citizen complaints and 50% of its efforts in performing routine maintenance chores not triggered by complaints. The complaints are funneled to the Stormwater Department office where they are logged in and given to one of the staff for investigation.

The maintenance staff is dedicated to 50% drainage work. The crew consists of two drivers, two heavy equipment operators, and two part-time laborers. An additional labor crew works about 10 to 15% in stormwater cleaning of catch basins and ditches. Maintenance Operations are described in the Policy Statements Manual.

The City has developed and implemented a plan to clean the storm drain lines using a JetVac truck purchased in 1999. The City is in the process of constructing new vehicle wash racks at City facilities that will minimize contact with stormwater.

### **Inspection**

The City has developed a program of periodic routine inspection and maintenance of the stormwater system.

### **Results Data**

Over a period of five years, Griffin will add two five-man work crews, add an environmental science team to the staff, and establish a capital construction program. In addition to the items listed above, the City has contracted an engineering consultant to inventory the City's stormwater drainage network into a GIS database using state-of-the-art GPS equipment. The consultant will utilize the GIS database for its overall master planning effort.

### **Keys to Success**

Developing and successfully implementing a Stormwater Utility is unique to each community because "each and every community is different". The City of Griffin's approach is summarized below:

- Griffin solicited support of important officials early in the process and discussed the City's needs, the overall approach as well as the expected results.
- We retained a consultant with a proven record of accomplishment in Stormwater utilities and management.
- The City developed a truthful and direct approach with the general public and key stakeholders.
- Griffin sold the utility as one key part of overall Stormwater management program, but not the 100% solution to all Stormwater related problems and issues.
- Griffin developed a viable program and a solid sales strategy then we followed the prescription through the tough times and good.
- The elected officials put one person in charge of all aspects of the work and became the focal point and major cheerleader for the Utility's development and eventual success (Reese, 1998).

## CONCLUSION

The City of Griffin is no different than any other community, or business, by trying to do more with less, down sizing in-house staff, out-sourcing certain tasks while at the same time trying to provide the essential services to the citizens. The City of Griffin feels that the "user charge system" concept is the most dependable and equitable approach available to local governments for financing Stormwater management (APWA, 1991). The term Stormwater management provides euphoniums for a broad range of related topics such as erosion control, flood plain management, wetlands mitigation, detention/retention, and drainage facility design (Pyzoha, 1994).

The City of Griffin's successful implementation of the Utility has proven that a community can take a proactive approach to overall watershed management. Implementation of a Stormwater Utility (as a non-structural BMP) can provide a community the financial mechanism, to fund the design and construction of structural BMPs, to address both water quantity control and water quality issues. Design and implementation of effective BMPs can result in the following:

- Decreased flooding;
- Improved water quality;
- Improved habitat for wildlife;
- Land preservation due to erosion control measure;
- Reduction of pollutant loadings in downstream receiving waters;
- Reduction in water treatment costs; and
- Protection of wetlands and other jurisdictional areas.

The Georgia EPD and USEPA have stressed the importance of individual communities becoming stakeholders to protect our regions' water resources. As additional communities develop and implement effective BMPs, the entire region will realize the benefits. The City of Griffin feels that successful implementation of a Stormwater utility can be the first step towards better overall management of our regions' watersheds.

## **Recommendations**

The City of Griffin considers itself a leader and pioneer in the areas of Stormwater management and water quality enhancement (Feldner, 1999). The City hopes that its efforts associated with the successful implementation of the first Stormwater Utility in the State of Georgia will encourage other community leaders to consider this unique nonstructural BMP in the future. The City supports that a statewide association be created to assist with the dissemination stormwater management related information to interested parties. The City would encourage the various regulatory agencies to participate in the stormwater management association meetings. In this manner, they could provide the necessary guidance and advice to community leaders as they attempt to address the challenges of effective watershed management. Finally, it will be imperative that our State and Federal government agencies develop programs to allocate up front “seed money” to assist communities in the development of Stormwater Utilities around the state and region.

