Comprehensive Storm Water

Prepared for

City of Douglas Georgia
Est. 1895

ESG ENGINEERING

PREFACE

Managing the amount (quantity) of storm water runoff in a manner that prevents loss of life or property is a high priority for communities across the country. Most communities lack comprehensive and technical design regulations, routine maintenance, city system-wide master planning and Capital Improvement Programs that provide a system that adequately conveys storm water runoff to stream and river outfalls in an effective manner.

As a public planning policy document, the Storm Water Plan (SWP) is a plan that directs community action for the construction, maintenance, management, and financing of the storm water system to meet multiple community objectives and to promote flood control through adequate drainage conveyance.

Storm water runoff occurs when rainfall is unable to be absorbed into the ground. The amount of runoff is primarily dependent upon the amount of rainfall and the degree to which the natural landscape is covered with "hard" surfaces, such as roof tops and paved surfaces and secondarily by soil types. When storm water comes in contact with these hard surfaces, runoff quickly discharges into nearby streets, pipes and ditches. When pipes and ditches that were never properly designed to handle the amount runoff that current storms produce or lacks an effective maintenance program flooding can occur.

In Douglas, most of the pipes, ditches and canals that run within the city convey storm water runoff to Twenty Mile Creek to the north, south & east; a small portion in the southwest part of the city conveys runoff to Indian Creek. Both of these creeks drain to the Satilla River to the south.

In November, 2015, the Douglas City Commission adopted a Storm water Utility Ordinance. The fee structure……..

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Chapter 1: OBJECTIVES AND HIGHLIGHTS

PLAN OBJECTIVES

There were six major objectives identified in preparing the Comprehensive Storm Water Management Plan (SMP) OR DO WE CALL IT "CSWMP"?

1. Protect the public from loss of life and property damages produced by flooding;
2. Maintain the efficiency of the storm water system through an effective operations and maintenance (O&M) program;
3. Create a Storm Water Infrastructure layer in the City's GIS mapping database to better manage and maintain the asset and model storm events;
4. Present a Phase I Capital Improvement Program (CIP);
5. Identify a stable and equitable funding source;
6. Educate and inform the public about storm water related issues

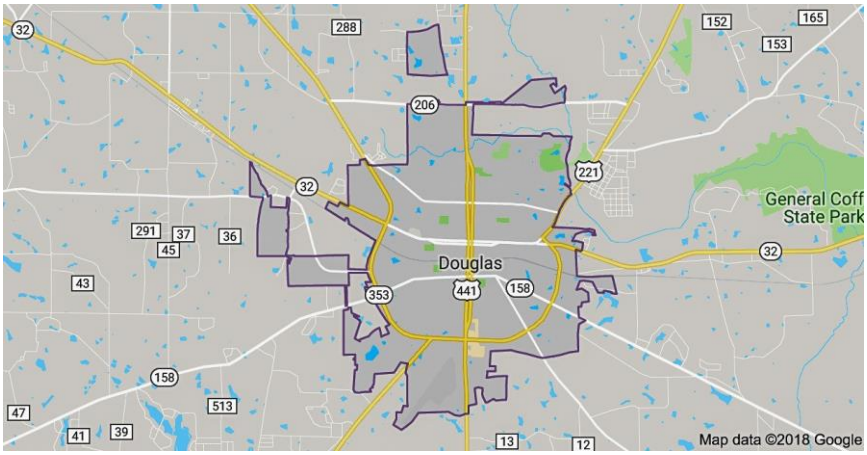
PLAN HIGHLIGHTS

The impetus for preparing the SMP grew out of the need to provide adequate conveyance of storm water runoff to prevent flooding is structures and property in the city and address long-standing maintenance neglect. The SMP will address these deficiencies by utilizing an integrated, multiple objectives approach.

The SMP marks a significant change in the way the City of Douglas manages and maintains storm water infrastructure. By reviewing the following highlights, the basics of the SMP can be understood.

AREA COVERED

The plan includes the area within the Douglas city limits. The total area within the City limits is about 14 square miles. (See map below)



IMPLEMENTATION STRATEGIES

Implementation of the SMP will be guided by a building block management approach where emphasis is placed on overhauling, improving and expanding the maintenance program, developing a new Capital Improvement Plan (CIP) to affect upgrades where needed and providing better regulatory control over new development to prevent negative impacts to the existing system.

- Basin Plans. Each of the 7 or so major storm water drainage basins of the city will be assessed and evaluated for applying management measures according to the multiple objectives of the SMP and the opportunities and constraints of the basin. These plans will provide the overall guidance for implementing the SMP.

- Waterway Corridors. Based on the results of the Basin Plans, efforts should be made to acquire easements over the major storm water conveyance channels. Successful easement acquisition will greatly assist with the implementation of the SMP multiple objectives. Maintenance efforts will become more assured as access issues are eliminated.

- Development Standards. The City's current Storm water Management Ordinance is very sound. The City should consider a procedure for professional engineering review of storm water plans to assure conformance with these existing regulations and eliminate long-term high maintenance features in the design when possible.

- Monitoring Program. On-going monitoring and inspection efforts will help to define the problem areas. From these results, management measures will be tailored to address specific problem areas and referrals to engineers for addressing capital upgrade needs.

- Maintenance and Operations. The entire drainage system will be incorporated into ESG's PSD work order system to schedule and track all work and costs associated with maintenance and upgrades to the storm water system.

- Public Education. A public education and involvement program will be employed to help inform the public about storm water issues and ways they can help to prevent and minimize pollution and the adverse effects of disposing yard trimmings, etc. into the drainage system. Presentations can be made to age-appropriate school classes. Educational brochures can be distributed to the general public and students.

EXPANDED SERVICES

The storm water program will be expanded to include the following services:

- Provide consistent routine annual maintenance of major outfall channels with the Menzi Muck excavator to be provided by ESG to the City
- Develop a map (GIS layer) that contains the City's drainage pipes and channels and link same to ESG's PSD work order system that will provide a means of scheduling and completing routine maintenance
- Document all costs of maintenance and improvements to the storm water system in PSD
- Implement Best Management Practices (BMPs) described in this report
- LIST CRITICALITY LANGUAGE HERE
- LIST OTHERS HERE

MANAGING THE SYSTEM

The City's Public Works Department will continue to have primary responsibility for planning, designing, monitoring, and maintaining the storm water conveyance system. Professional engineering support from ESG's corporate office in Macon will be provided to assure implementation of the SMP.

FUNDING THE PROGRAM

This program will be funded by the previously adopted Storm water Utility fee.

Chapter 2: BEST MANAGEMENT PRACTICES

INTRODUCTION

This section describes Best Management Practices (BMPs) and their implementation strategies of the Comprehensive Storm water Management Plan (SMP). It is organized according to the SMP's six objectives. The scope of the SMP's storm water BMPs are limited to surface water runoff.

OBJECTIVES

OBJECTIVE NO. 1: Protect the public from loss of life and property damages produced by flooding

The City has aging drainage infrastructure which in many areas is not functioning properly due to failing or undersized pipes, overgrowth of vegetation in ditches and outfall channels and sediment/ debris filled pipes. The best way to prevent flooding to have a properly designed and constructed storm water conveyance system adequately functioning through consistent routine maintenance.

Like most communities, Douglas' storm water program in the past has concentrated mostly on reactive maintenance (responding to complaints) combined with some routine maintenance and limited system upgrades. Going forward it is proposed that the program combine an effective routine maintenance program with a robust Capital Improvement Program (CIP) that upgrades the system to provide flood protection and storm water conveyance deficiencies.

BEST MANAGEMENT PRACTICES (BMPs)

- Develop and implement a drainage easement acquisition program for existing drainage channels where easements do not currently exist to provide legal, perpetual access for equipment and labor
- Prioritize drainage maintenance by focusing first on primary ditch outfalls and pipes, then proceed to secondary elements, etc. This will provide the best chance to reduce or eliminate flooding during the execution of the O & M plan.
- Coordinate with city staff with respect to the enforcement of existing codes which give the City the legal authority to prevent and eliminate the improper disposal of debris into storm drainage system and drainage channels.
- Evaluate the feasibility of constructing regional detention ponds located in hydraulically strategic areas to provide for both attenuation of runoff and possibly recreation.

OBJECTIVE NO. 2: O & M Program

Maintain the effectiveness of the storm water system through an effective operations and maintenance (O & M) program.

The Public Works Department will use a Menzi Muck hydraulic excavator to clean major channels within Douglas on an annual basis. Where possible and where ditches don't require widening, a flail head is attached to the hydraulic excavator in lieu of an excavation bucket. The flail head pulverizes the obstructing vegetation so that it is not necessary to scrape the slopes to remove it. By not having to scrape the slopes, sediment is not released into the channel flow and the retained root systems help prevent erosion and reduce the need for extensive reseeding. The downside to this approach is that the vegetation does grow back fairly quickly which results in the need for at least annual cutting.

We propose to conduct a regular schedule of sweeping of all major curb and gutter streets and selected city-owned parking lots. In addition, cleaning of the throats/grates of inlets on the arterial streets are performed annually. The goal of this program is to prevent grit, sediment, and other debris from entering the storm drain system resulting in clogging and occasional blockage of the system which can result in flooding.

In order for the system to function properly, the inlets, catch basins, and small diameter connecting lines must be kept free of obstructing debris and built-up sediments. To accomplish this, ESG operates a program of scheduled routine system inspection and maintenance of these structures. One of its goals is to clean 20% of all inlets, catch basins, and connecting lines at least once each year.

A two member crew operates the City's vac truck that is used primarily to clean sewer lines and lift stations but this truck is used part-time to clean storm drain inlets and pipes. The City does not currently clean the storm drainage system's main lines on a routine basis. However, the main lines will be inspected bi-annually. All major storm drains that have a critical impact on the conveyance of runoff during heavy rainfall events will be inspected prior to, and during, these times to assure they are not obstructed.

Other O & M practices include:

- Identify catch basins and other inlets/outlets that have a known history of needing frequent cleaning maintenance.
- Develop improved cleaning schedules and practices for cleaning catch basins and inlets/outlets.

Assessment Methods:

- Document the number of catch basins and other inlet/outlet structures cleaned (this will be accomplished through the use of the PSD work order system).

Operations and maintenance (O&M) on the storm drainage system are performed on a regular basis to ensure the system functions as designed and to protect the public investment of the constructed system. The costs associated with operations and maintenance include channel cleaning, vegetation management, pipe system cleaning, street sweeping, leaf pickup and drainage system upgrades.

OBJECTIVE NO. 3: Map Storm water Infrastructure on GIS & Integrate into PSD

Create a Storm water Infrastructure layer in the City's GIS mapping database to better manage the asset and model storm events. ESG's current contract includes GIS mapping services. By mapping the ditches and pipes networks it will provide an extremely valuable tool to program maintenance, analyze drainage basins and model target areas for upgrades.

RECOMMENDED IMPLEMENTATION ACTIVITIES:

- Map basins and waterways and identify properties that are currently owned by the City or are covered by City easements.
- Identify and prioritize drainage basins and waterways of critical concern for easement acquisition activities.
- Delineate the City into drainage basins

OBJECTIVE NO. 4: Phase I CIP

A sound Comprehensive Storm water Management Plan should contain a list of projects to be funded over a period of years that address existing noted deficiencies in the system. Capital Projects are the physical improvements to be constructed and maintained to carry out the long-range plans and policies of the City. These include replacing undersized or structurally deficient pipes (see below).

Failed Storm Drain Pipe Under E. Gordon Street

The following is a Phase 1 list of projects and preliminary cost estimates for each:

Project	Cost
Fleetwood Circle Drainage Improvements	$220,000
E. Gordon Street Drainage Improvements	$230,000
E. Jackson Street Cross Drain Replacement	$100,000
E. Sellers Street Cross Drain Replacement	$100,000
Ethel Street/Sibbett Avenue Drainage	$230,000
Cherry Street Pump Station Upgrades	$TBD

OBJECTIVE NO. 5: Identify a stable & equitable funding source

A. FUNDING THE PROGRAM

Because the system is city-wide and because the entire community contributes to the storm water system in terms of quantity of runoff, the funding should be provided funding through the Storm Water Utility (SWU) fee.

The SMP proposes to change the basis for determining storm water user fees charges from the current method to one based on impervious surface area contained on each parcel. This change is proposed to more accurately place the cost for the maintenance of upgrades to the storm water system on those who generate the runoff to be managed. Impervious surface includes roofs, streets, and parking lots.
Rain that hits these hard surfaces is unable to be absorbed into the ground and, as a result, runoff occurs. The runoff is collected into the City's storm water facilities such as curbs, gutters, pipes, and channels, and eventually discharged into creeks on the outskirts of the City. The City designs, builds, and maintains its storm water system to accommodate this runoff. Thus, there is a linkage between the users of the storm water system and the basis of the user fee.

To encourage on-site storm water management practices that mitigate quantity and quality impacts to the system, customers are eligible for credits or exemptions to those components of the user fee through use of the provisions contained in the proposed Credit Manual. Depending on the amount of on-site effort and City policy priorities, the user fee may be adjusted to minimize or eliminate the fee if there is no runoff leaving the site.

OBJECTIVE NO. 6: Public Involvement & Education

Lack of public awareness about storm water issues may contribute to flooding. Public communication and education is important to the overall strategy of the SWP's implementation. Educational outreach will be community wide, and special programs will target specific user classes who likely have the most impact on the system (i.e., residential, commercial, industrial). Every individual in the community has the power to impact local water resources in both positive and negative ways. The SWP encourages citizens to be given the tools needed to cultivate behaviors that support community water goals. In addition, opportunities for volunteer activities such as "adopt-a-stream" and storm drain stenciling will be provided.

Certain construction and landscape maintenance activities are known to contribute to reduced capacity of the storm water conveyance systems by partially or completely stopping up pipes, catch basins, filling in ditches, etc.

- Coordinate efforts to label storm drain inlets and provide signs along the banks of drainage
- channels and creeks explaining the negative impacts of dumping wastes into drainage way.
- Introduction to school students of effects of illegal dumping on the storm water system and aquatic life.
- Develop a series of handouts for distribution to targeted audiences.
- Develop an education program for property owners regarding the protection of natural resources on their property.

Chapter 3: PROGRAM IMPLEMENTATION

INTRODUCTION

This chapter describes the highlights and implementation timeline of the Comprehensive Storm wa- ter Management Plan (SMP). It also contains a map of the City's major outfalls which are the arteries through which the storm water runoff must flow to drain the City during a storm event.

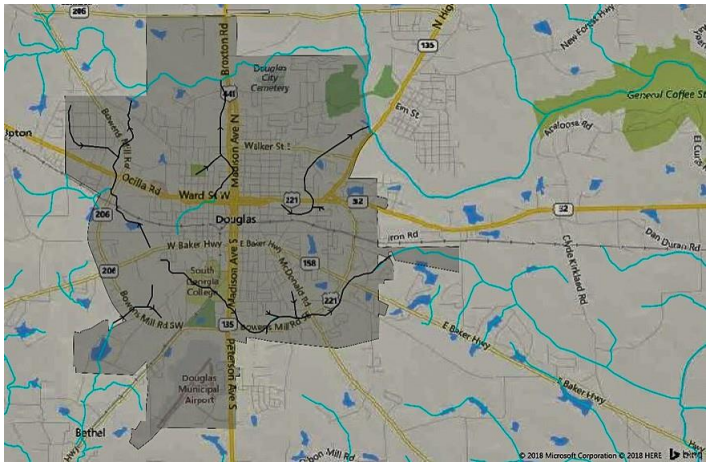
HIGHLIGHTS OF PROGRAM ELEMENTS

A. INTRODUCTION

This section provides highlights of the program elements as they will be managed through the SMP. Program implementation will occur through proper planning and scheduling of routine maintenance, timely response to complaints from citizens, capital projects, enforcement of existing codes and ordinances and Public Communication/Education. These elements provide the means to realize a fully integrated storm water management approach that balances the services of flood protection to the maximum benefit of the citizens of Douglas.

Plan implementation will be accomplished in various stages. Changes to operations and maintenance procedures have already been implemented. The GPS work required to create a GIS layer containing storm water infrastructure elements is already funded in the ESG Operations, Inc. contract and work is underway. As analysis of individual drainage basins are performed, additional capital project needs will be identified and presented to the Mayor and City Commission for funding consideration.
Educational outreach will be introduced throughout the community. Easement acquisition serves to provide legal access to critical drainage pipes and ditches which require routine or periodic maintenance that enhance flood control and runoff conveyance.

Comprehensive Storm water Management Plan Major Outfalls



TIMELINE

The following is a schedule of the implementation of various tasks described above:

TASK	TENTATIVE SCHEDULE
Develop Routine Maintenance Schedules of Major Outfall Ditches	
Create GIS Layer of Storm Water Infrastructure	
CIP, Phase 1	
Develop Routine Maintenance Schedules of Secondary Outfall Ditches	
Develop Inspection Schedule of Major Storm Drain Pipes	
Develop Schedule for Cleaning Secondary Storm Drain Pipes	
Drainage Easement Acquisition on Major Ditches	
Drainage Easement Acquisition on Secondary Ditches	
Enforcement of Illegal Dumping into Drainage Ways	
Create Street Sweeping Schedules	
Document All Work Orders Completed	
Delineate Major Drainage Basins	
Model Major Drainage Basins	
Update SWU Fee	
Stencil Storm Drain Inlets	
Create Drainage Education Brochures	
General Public Education (Schools, Commercial, Residential)	