

ATHENS-CLARKE COUNTY STORMWATER MANAGEMENT PROGRAM

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Abstract. In 1995, the citizens of Athens-Clarke County approved a special local option sales tax which included a component for stormwater management. The comprehensive stormwater management program is intended to help minimize future damage to property, protect existing watersheds, manage land development activities, and plan for needed drainage improvements. This program includes procedures to identify problem areas, to perform the hydrologic and hydraulic analyses necessary to quantify the magnitude of the problems, to develop and evaluate remediation alternatives, and to establish priorities for project implementation. Stormwater management is a dynamic process. New development, changes in land use plans, and changes in state and federal laws and regulations require changes in various components of the program as they occur.

PROGRAM OBJECTIVES

The objectives of the Comprehensive Stormwater Management Program are:

- Protect life, property, and the general public welfare from the effects of stormwater runoff.
- Provide for improvements to existing storm drainage systems.
- Eliminate or reduce flooding problems.
- Provide for safe, functional, and maintainable storm drainage systems.
- Provide guidelines for future community development.
- Provide for the maintenance of storm drainage facilities through the use of either public or private resources.
- Protect and enhance the physical environment.
- Encourage the consideration of aesthetics in the design and construction of stormwater management facilities.

PROGRAM COMPONENTS

The Comprehensive Stormwater Management Program consists of five components. Each component addresses program development, implementation, and administration. Each component is structured so that it can be easily

updated and revised as required by changing conditions.

Stormwater Program Administration Manual

This document will be developed and used by the Public Works Department staff to implement and administer the Stormwater Management Program. Some of the items presented will include program objectives, staff duties and responsibilities, public and private responsibilities, drainage complaint procedures, maintenance and inspection program, overall planning process, and system maps and computer models maintenance. The manual will also contain the various ordinances and regulations pertaining to stormwater management in Athens-Clarke County.

Stormwater Design Criteria Manual

This manual is intended for use by engineers and developers. It will present approved procedures for the design of stormwater management facilities together with examples and supporting data such as design rainfall depths. This manual will ensure that new facilities will be designed and constructed in a manner which is consistent with the objectives of the Stormwater Management Program.

Watershed Studies

The watershed studies are the basis of the Areawide Stormwater Master Plan. The Federal Emergency Management Agency (FEMA) has studied 38 streams having a combined length of 100 miles in Athens-Clarke County. In addition, approximately 110 miles of unstudied streams have been identified for study under this program. To manage the large amounts of information generated as a result of the study effort, individual watershed studies are being prepared for the principal streams and their tributaries.

Each watershed study presents the results of the hydrologic and hydraulic analysis of each watershed. The report identifies existing and anticipated problem areas, describes the remedial alternatives considered, and presents the recommended project list for the watershed. In addition to the report, supporting calculations and computer input and output files are also presented.

Drainage Structure Inventory

A key element of the watershed study is the preparation of a drainage structure inventory. Drainage structures such as culverts, bridges, catch basins, dams, etc. were located using a global positioning system and photographed, and the appropriate data was entered on a data collection sheet. The structure locations, photographs, and pertinent data will eventually be linked to the County's Geographic Information System. This will allow the Public Works Department staff to quickly locate a structure and access pertinent data about it. In addition to making it easier to address drainage problems, the information contained in the drainage structure inventory will also be useful in upgrading and maintaining the County's overall infrastructure.

Stormwater Improvement Master Plan

The final component of the program is the Stormwater Improvement Master Plan. This document will present general information relating to stormwater management, a list of the projects developed as a result of the individual watershed studies ranked in the recommended order of implementation, and recommendations for changes to the current Athens-Clarke County Flood Insurance Study and ordinances and regulations.

OVERVIEW OF THE PLANNING PROCESS

By its very nature, the Comprehensive Stormwater Management Program addresses a large number of problems. Some of these are relatively simple to solve, while others require the expenditure of substantial sums of money. To ensure that funds are spent in the most cost-effective manner, a systematic planning process is required. This process consists of the following steps:

- Establish Watershed Priority for Study
- Determine Existing Stormwater Problems
- Perform Drainage Structure Inventory
- Perform Hydrologic Analysis
- Perform Hydraulic Analysis
- Identify, Screen, and Rank Existing and Future Problem Areas
- Develop and Evaluate Remedial Options
- Identify Recommended Projects for the Watershed

Establish Watershed Priority for Study

The first step in the planning process was to establish the order in which each of the 38 watersheds identified in Athens-Clarke County will be studied. Some watersheds

are highly developed and have severe flooding problems. Others are mostly undeveloped and have problems that are minor in nature or that do not threaten lives or property. In an attempt to make the order of study as unbiased as possible, a watershed ranking system was developed. An example of how the ranking procedure will be implemented is presented in Table 1. As shown in this table, Big Creek would be studied first, followed in order by Town Creek, Dry Creek, and Long Creek.

Determine Existing Stormwater Problems

The next step in the study process was to determine which stormwater problems exist in the watershed under study. Much of this information was gathered during the ranking process from the Public Works Department files. Input was also sought from the public and other sources.

Perform Drainage Structure Inventory

The next step in the procedure was to inventory the existing stormwater management structures in the watershed. Each major structure was located and photographed, and pertinent data was collected concerning the structure and water quality. The structure location, the photograph, and other data eventually will be linked to the County's Geographical Information System (GIS). This will provide the Public Works Department with a database of the stormwater management facilities permitting a rapid response to problems.

Perform Hydrologic Analysis

The purpose of the hydrologic analysis is to determine how much water runs off of a given area during a storm. This information is then used in the hydraulic analysis to assess the performance of the existing and proposed stormwater management systems. The hydrologic analysis considers the size of the watershed or subarea of a watershed being analyzed, the soil types in the area, land use patterns, the response of the watershed to rainfall, and the intensity and duration of the design storm. The hydrologic analysis of each watershed is being carried out considering both existing and future land use patterns. In this way, both existing and anticipated stormwater management problems can be addressed.

Perform Hydraulic Analysis

The hydraulic analysis determines how the stormwater management facilities and natural channels convey the runoff through the watershed. The analysis has considered both natural channels such as creeks and rivers and manmade systems such as storm sewers. The results are used to determine the location and magnitude of existing

Table 1. Hypothetical Watershed Prioritization.

Ranking Criteria	Big Creek	Long Creek	Town Creek	Dry Creek
1. Number of problem areas	8	3	12	6
2. Magnitude of problems	5	3	0	2
3. Number of residential structures impacted	30	1	22	6
4. Number of commercial structures impacted	5	0	6	2
5. Number of industrial structures impacted	1	0	0	1
6. Number of other structures impacted	6	8	9	4
7. Health and safety impacts	5	0	0	2
Total score (Sum of Items 1 through 7)	65	17	51	26

Table 2. Hypothetical Project Ranking.

Ranking Criteria	Project 1	Project 2	Project 3	Project 4
Magnitude of Problem - Weight = 60%				
1. Number of problem areas	8	3	12	6
2. Magnitude of problems	5	3	0	2
3. Number of residential structures impacted	30	1	22	6
4. Number of commercial structures impacted	5	0	6	2
5. Number of industrial structures impacted	1	0	0	1
6. Number of other structures impacted	6	8	9	4
7. Health and safety impacts	5	0	0	2
8. Future flows vs. Existing capacity	5	2	2	3
Total score (Sum of Items 1 through 8)	65	17	51	26
A. Weighted Score = Total Score x 0.60	39.00	10.20	30.60	15.60
Time for Implementation - Weight = 10%				
9. Time required for implementation	4	2	2	0
B. Weighted Score = Item 9 x 0.10	0.40	0.20	0.20	0.00
Miscellaneous Factors - Weight = 30%				
10. Environmental issues	2	5	0	1
11. Permitting issues	1	3	0	0
12. Aesthetic impacts	3	2	3	3
13. Potential for multiple use	4	0	0	1
14. Potential for other funding	5	0	2	0
Total score (Sum of Items 10 through 14)	15	10	5	5
C. Weighted Score = Total Score x 0.30	4.50	3.00	1.50	1.50
Total Project Score (Sum of Items A, B, and C)	43.90	13.40	32.30	17.10
Project Priority (1 = Highest)	1	4	2	3
Estimated Cost	\$1,250,000	\$750,000	\$300,000	\$650,000

and anticipated problems and to design and evaluate the performance of various remedial measures.

Identify, Screen, and Rank Existing and Future Problem Areas

The results of the hydrologic and hydraulic analyses are being used to locate and quantify both existing and future problem areas within the watershed. Once the problems have been identified, they are screened to eliminate minor problems that can be addressed by routine maintenance and those that can be solved without a detailed analysis of the entire watershed. The remainder of the problem areas are then ranked to determine the order in which solutions will be developed. Table 2 presents an example of how the system is used to rank a set of hypothetical projects.

Develop and Evaluate Remedial Options

Once the problem areas in a watershed have been identified and ranked, various remedial alternatives are developed and evaluated. The solutions consider both structural measures, such as detention ponds or channel improvement, and nonstructural measures, such as changes to land use or zoning ordinances. Each alternative is evaluated considering its performance, cost-effectiveness, and other factors such as permitting, funding options, environmental impacts, etc.

Identify Recommended Projects for the Watershed

Following completion of the alternative evaluation process, a list of recommended projects for the watershed under consideration is prepared.

Conclusion

Upon completion of the overall planning process, the Stormwater Improvement Master Plan will be used as a guide for the phasing and implementation of needed stormwater remediation projects. The Stormwater Management Program created through this effort will serve as the foundation for the ongoing development of a comprehensive Water Management Program for Athens-Clarke County. Some of the issues and challenges anticipated in the implementation of the program include:

- Funding
- Liability
- Irreversible Consequences
- Communication and Education
- NPDES Phase 2 Regulations