

# STORM WATER MANAGEMENT IN MACON

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## INTRODUCTION

Stated simply, storm water management in the general sense is a program to keep people from the water and the water from the people. More recently, we can also add that we must protect the environment while doing so.

Typically, for most municipalities, storm water management has taken a budgetary back seat to other necessary items such as water, sewer, and waste disposal. In fact, most municipal governments do not think of storm water management until certain property damage or a disaster has occurred due to flooding.

Only because (during the 1980's) the federal government has mandated that programs must be developed to address storm water management and water quality problems, has any serious attention been given to it by so many local governments. The dilemma that is now faced by local governments is that they are struggling with a way to put together the necessary funding to meet the permit application requirements of federal law.

This paper will discuss how the City of Macon, Georgia has dealt with many of these issues in their attempt to reduce costs in these tough economic times, while meeting the requirements of federal and state law. It will also discuss a strategy for a reasonable storm water management program that will meet the requirements of an N.P.D.E.S. permit without placing unrealistic demand on a municipal government's operating budget.

## BACKGROUND

Assessment of Macon's existing storm water management program begins with the federal and state requirement to submit Parts 1 and 2 of a municipal storm water permit application. Part 1 was submitted to the State in May of 1992 and Part 2 is to be submitted in May of 1993.

The Part 1 application requirement covered an applicant's general information, existing legal authority, source identification, discharge characterization, existing storm water management program, and proposed Part 2 sampling plan. The U.S. EPA's published average application cost estimate falls in the neighborhood of \$50,000 to \$75,000.

The Part 2 application requirement covered the applicant's program description, listing of outfalls not reported under Part 1, wet weather sampling, proposed storm water management program, assessment and fiscal analysis.

## APPLICATION PREPARATION

The City of Macon is approximately 50 square miles in size and is physically located within Bibb County Georgia (a small part of the City of Macon lies inside of Jones County approximately 1/3 square mile). Bibb County covers approximately 250 square miles. The City of Macon is developed in most areas at fairly high density levels. The unincorporated area of Bibb County is generally developed at low densities with some high density areas. This includes such areas as North Macon and Lake Wildwood. With the exception of Lake Wildwood, all of the high density residential areas in Bibb County are located adjacent to Macon. Bibb County has a limited amount of commercial and industrial development concentrated in the North Macon area and near the Middle Georgia Regional Airport. The City of Macon has a large number of commercial and industrial enterprises, and employs a large number of people from outside Bibb County. The City of Macon qualifies as a medium municipality under the federal regulations with a population greater than 100,000 people.

At the request of the State Environmental Protection Division, the City of Macon and Bibb County were required to submit a joint storm water permit application. As a result, the two City/County Engineering Departments and the unified City/County Planning and Zoning Agency endeavored to work together in this effort. It is the intention of both the City of Macon and Bibb County to develop a storm water management program that will be consistent as possible across jurisdictional boundaries. Because all of the major storm water issues have not been resolved as of the publication of this paper, this paper is being written solely from the City of Macon's perspective.

Under the Part 1 Storm Water Permit Application, 250 storm water outfalls were located for Macon/Bibb County. Maps were prepared delineating the required existing

**Table 1. Application Costs, in \$1000.**

Agency (Georgia)	Part 1	Part 2	Total
Atlanta	\$200	\$250	\$450
Clayton County	\$110	\$181	\$291
DeKalb County	\$200	\$275	\$475
Richmond Co.	\$ 85	\$350	\$435
Savannah	\$ 15	*	*
Macon	\$ 35	\$ 50	\$ 85
U.S. EPA	*	*	\$ 75

information, and the dry weather field screening was completed. Macon's existing storm water management program was described, and a part 2 sampling plan was proposed. The actual cost to complete Part 1 was less than \$10,000 (Includes testing and test kit, reference materials, printing, reproduction and supplies. Staffing, prior work, and planning, not included.).

The State Environmental Protection Division subsequently approved the Part 1 application and the proposed Part 2 sampling plan.

Under the Part 2 Storm Water Permit Application one additional outfall was identified inside the City limits. Laboratory services were contracted by the City for wet weather testing. As test results come in, the proposed storm water management program (including the assessment and fiscal analysis) is being developed. Upon completion, it is estimated that the actual costs for the preparation of Part 2 will be less than \$20,000 (again manpower costs are not included). Table 1 lists some selected permit application costs as taken from the National Association of Flood and Storm Water Management Agencies June 15, 1992 Survey Report.

The key to the City's actual costs being lower than expected was our coordination with the State Environmental Protection Division. Local representatives met early on in the process with the EPD to agree upon an acceptable approach, and to insure that the City did not head in the wrong direction. Fortunately, The City of Macon was able to complete the application process with in-house personnel.

### CENTRAL ISSUES

Traditionally, the City of Macon's existing storm water management program only addressed water quantity and not quality. The City annually sets aside funding for street cleaning, and emergency repair of drainage systems. The City also has ordinances covering erosion and sediment control and flood plain management. Also litter and nuisance laws exist within Macon.

The City's permit application to the State mentioned that Macon has the legal authority to put in place the necessary requirements in an ordinance to control storm water pollution. Though not now in place, the City staff

is making efforts to develop this type of ordinance. With the help of the City's legal offices and community leaders, the engineering department hopes to gather input from developer's, real estate brokers, and other engineering and consulting professionals concerned with storm water and drainage issues.

Macon's proposed storm water management program, assessment, and fiscal analysis are now being drafted by the engineering department. Presenting a City managed storm water permits program that will implement best management practices, fund a monitoring, sampling and testing plan, and an inspections and enforcement program, poses the greatest challenge to the City in the area of obtaining a storm water permit.

### STUDY RESULTS

As stated earlier, the City of Macon is almost completely developed with residential, commercial, and industrial districts. Of the 170 outfall sampling locations within the City of Macon, 55 locations had dry weather flows and are therefore subject to testing. Grab samples were obtained from these 55 sites, and subjected to colorimetric testing for total chlorine, total copper, total phenol, and detergents. A narrative of appearance of the samples covering color, odor, turbidity, and oil sheen, was obtained.

During the Part 2 wet weather sampling effort, the City gathered samples from representative residential, commercial, and industrial storm water discharges. These samples were analyzed for those parameters shown in Table 2.

**Table 2. Storm water Parameters for Lab Analysis**

BOD	organics	dissolved suspended solids
COD	total metals	dissolved phosphorous
TSS	Fecal coliform	Fecal Streptococcus
pH	Total phosphorus	Total Kjeldahl Nitrogen
cyanide	Nitrate & nitrit	Total ammonia
phenols	Oil and Grease	organic nitrogen

With reference to the Macon-Bibb County Area-wide 208 Basin Study (September 1978) information relative to existing quantitative data on volume and quality of storm water was noted. That study contained sampling data from the upper Ocmulgee River drainage basin, the lower Ocmulgee River drainage basin, and the Rocky Creek drainage basin. The sampling data was used in the USEPA Storm Water Model to estimate non point loads for existing and future land uses. The results of the model showed violations of fecal coliform and suspended solids standards. Georgia standards provide for a maximum level of 4,000 MPN/100 MLS fecal coliform, and 100 mg/l for

suspended solids. Actual data (in that report) under high flow conditions verifies concentrations of fecal coliform and suspended solids higher than 4,000 MPN/100 MLS and 100 mg/l, due to conditions upstream of Bibb County.

The Nationwide Urban Runoff Program (NURP) study, organized by the EPA and the U.S. Geological Survey between 1979 and 1983 published some data that lists national averages for nutrient and heavy metal pollutant concentration values. These data are shown in Table 3.

**Table 3. Concentration Values Used in Estimating Pollutant Loadings in Storm water Runoff (mg/l)**

	NationalNURP Study Average
Lead	0.009
Zinc	0.202
Copper	0.043
Cadmium	0.002
Chromium	0.009
BOD	12.00
Total P	0.420
Total N	2.760
TSS	180.0

Noting the information above, Table 4 lists selected parameters from our test results in comparison with the NURP Study.

**Table 4. Comparison of Macon study results to NURP Data**

	Residential	Commercial	Industrial	NURP
BOD	411.00 mg/l	290.00 mg/l	23.00 mg/l	12.00 mg/l
TSS	90.00 mg/l	65.00 mg/l	185.00 mg/l	180.00 mg/l
Total N	1.00 mg/l	5.35 mg/l	2.30 mg/l	2.76 mg/l
Total P	0.08 mg/l	0.18 mg/l	0.21 mg/l	0.42 mg/l
Copper	0.01 mg/l	0.00 mg/l	0.02 mg/l	0.04 mg/l
Lead	0.01 mg/l	0.01 mg/l	0.08 mg/l	0.01 mg/l

In looking at the drainage area for the test residential (91 acres), commercial (560 acres), and industrial (200 acres) outfall locations, one can get a quick estimate of the annual pollutant contribution by multiplying the volume of runoff over a particular time period, by the pollutant concentration in the runoff. Use of the Simple Method (previously approved for use by the State EPD) developed by the Washington Metropolitan Council of Governments, is the approach of choice to make this type of calculation.

Because the amount of data collected by the City was small in comparison to the NURP study data, the City felt

that its data would not be statistically valid. For this reason, the NURP data was used in the calculations to make this estimate. The annual pollutant loadings (preliminary) for selected parameters is illustrated in Table 5.

**Table 5. Preliminary Estimate of Annual Pollutant Loadings (Pounds per year)**

Parameter	Residential	Commercial	Industrial
BOD	3206	41126	15451
TSS	48118	616896	246758
Total N	722	9253	3701
Total P	112	1439	576
Copper	11	148	59
Lead	2	31	12

#### LONG RANGE APPROACH

Preliminary results for the amount of storm water pollution for the Macon area appear to have the potential for being significant when one considers the entire City. We know that when it rains, the storm water that runs off developed land (increases in impervious areas), such as roads, parking lots, rooftops, lawns, and farm fields, carries a host of contaminants. The problem now presents itself in how to best develop a management program that best satisfies federal and state requirements. Other issues are budget and staffing needs.

The City of Macon proposes to introduce a program that will establish the following general standards:

1. Dedicate a fixed minimum amount annually for funding. Since the City currently budgets \$225,000 (on average) annually, we hope to double this. The City is studying the idea for establishing a priority list of problem areas in hopes of being able to tackle the biggest problems first. As an amount is set, this will be further broken down into categories as monitoring and sampling, testing, location of illicit dischargers, etc.
2. Enact an Ordinance which will give the City the authority to establish a permits and enforcement program. One of the items that the City hopes to require is Storm Water Management Plans for development sites 2 acres or larger.
3. As a minimum, priority will be placed on using the natural landscape for runoff prevention and natural filtering systems. Appropriate safeguards will be employed to prevent and /or control erosion and sediment pollution.
4. Require that storm water be free of oil, scum, floating debris, or materials that produce turbidity color or odor.

5. Require that storm water be free of toxic substances which are harmful to humans, animals or aquatic life.
6. Stream beds must not be altered in any way which reduces their waste assimilative capacity.
7. Require storage and controlled release when the peak rate of runoff is increased by more than one percent for a ten-year frequency storm. The storage volume required is that necessary to handle the runoff of the twenty-five year rainfall for any and all durations in excess of the pre-development runoff rate.
8. Developments within Flood Hazard Districts may not diminish the flood-carrying capacity of the associated waterway. Embankments constructed within the Flood Fringe Districts must utilize fill material obtained from land totally within the FFD unless a variance is granted.

### CONCLUSION

In view of this strategy, a lot of issues remain to be addressed. Obviously, with the City's staffing and budget limitations, a lot is to be desired. For instance, much will depend on the integrity of developers and land disturbers (and their storm water management plans), as no monitoring or reporting requirements will be required by them. Hopefully, operation and maintenance of BMP's (best management practices technologies) will continue. Our proposed budget (we hope) will demonstrate a good faith effort on the City's part (in light of the economic climate). We hope the state understands this. We also are recommending no retrofit of existing systems. However, by controlling new development (2 acres or greater) and elimination of illicit discharges and illegal connections, we hope to stem the rate of increase in storm water pollution.

As this approach has not been accepted by the State, we have yet to know the final outcome. Hopefully it will be positive.

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