City of Atlanta

Department of Watershed Management
Robert J. Hunter Commissioner

Asset Management Case Study
Introduction

Atlanta has owned and operated a drinking water and wastewater system for more than 130 years. Over the years, the City has invested several billion dollars in the infrastructure that supports those systems. The systems have undergone many expansions and improvements since their creation in the late 1800s. Atlanta spent more than $1 billion making improvements to its sewer system during the 1990s. Under consent decrees negotiated in 1998 and 1999 with the United States Environmental Protection Agency (EPA), the City became obligated for completion of an aggressive capital improvement program by 2014. The current Capital Improvement Program (CIP) calls for a $3.9 billion investment on drinking water, combined and sanitary sewer and wastewater treatment improvements.

In January 2002, Shirley Franklin became Atlanta’s 58th mayor. Recognizing the seriousness of the problems facing the City, Franklin dubbed herself “The Sewer Mayor.” She created a task force of nationally recognized water and wastewater experts to determine a plan to help the City meet its obligations as quickly and inexpensively as possible. Headed by Georgia Tech President Wayne Clough, the task force devised the plan that ultimately became the Clean Water Atlanta program.

Mayor Franklin also created the Department of Watershed Management (DWM), placing drinking water, wastewater collection and treatment and storm water under one umbrella for the first time in the City’s history. Her goal is to develop a best-in-class watershed management organization to manage Atlanta’s water programs. The department is led by Commissioner Robert J. Hunter a seasoned environmental management professional. The department’s mission is to:

- Ensure professional stewardship of Atlanta’s drinking water, wastewater and storm water systems
- Deliver excellent customer service
- Invest in development of a motivated, skilled and empowered workforce
- Protect the present and enhance the future of the regions water resources and public health
- Improve the environment while supporting economic development

Atlanta is developing an asset management program to ensure that the investment being made today in its water and wastewater systems will benefit Atlanta and its downstream neighbors for decades into the future. It will also use asset management tools to make sure that its watershed infrastructure is maintained in such a manner that it protects public health and the environment.

The consent decrees mandated that Atlanta implement major components of asset management program requirements for its wastewater collection system. The implementation of those plans is producing results. Sewer overflows have been reduce approximately 40 percent since 1999, and the City expects that statistic to improve as the rehabilitation and replacement program progresses.

Atlanta’s leadership believes that deploying asset management principals throughout DWM will help the City preserve the investment currently being made so that future generations will not be forced to contend with a drinking water and wastewater infrastructure that falls short of acceptable levels of service environmentally, economically or socially. This is a situation that any utility can find itself in if it does not fund and perform appropriate levels of maintenance, rehabilitation and replacement each year. Establishing and performing best appropriate asset management practices also ensures that all decision-makers are informed about the City’s assets, why they exist, what it actually costs to operate them, what their life span is, what their life-cycle cost is expected to be and why they need to be upgraded, repaired or replaced at certain times. Competent asset management is the only way that a utility can sustain the level of service that its customers expect at the best cost.

This case study describes practices that the City of Atlanta is using to improve its wastewater collection system.
Municipality Facts

Atlanta, Georgia

Atlanta is located in one of the largest and fastest growing metropolitan areas in the southeastern United States. Three million new residents have migrated to the area since 1970. The City has approximately 430,000 residents with an estimated daytime population of more than 1 million each weekday. Recent population forecast indicates that parts of the region could grow by as much as 209 percent by 2030. Demands for water services will increase accordingly.

Atlanta’s Drinking Water System

Atlanta’s first municipal waterworks facility began operation in 1875. The facility, which initially cost $226,000, was located in the southeastern quadrant of the City on the South River. It had a capacity of two million gallons per day (MGD).

Today, Atlanta’s water source is the Chattahoochee River. The Chattahoochee River’s headwaters are located near the North Georgia mountain town of Helen. The river flows southwesterly across Georgia to its western border with Alabama, and continues southward to the Gulf of Mexico. During the 1890s, Atlanta moved its water supply source from the South River to the Chattahoochee River and constructed a 20-mgd piping station and the current dual pool reservoir for $809,000. The system went into operation September 29, 1893.

The system functions regionally serving all Atlanta residents and Fulton County residents South of the Chattahoochee River. It also serves six wholesale customers over a 650-square-mile service area. The City’s wholesale customers are Coweta, Clayton and Fayette counties, and the cities of Fairburn, Hapeville and Union City. On average, more than one million customers are served each day by the system.

Drinking water is treated at three water treatment facilities: The Chattahoochee Water Treatment Plant, the Hemphill Water Treatment Plant and the North Area Water Treatment Plant, which is jointly owned with Fulton County. The drinking water facilities meet an average daily demand of 120 million gallons and have a collective capacity of 246.4 (MGD).

Water is distributed throughout the service area through a 2,700-mile distribution system. Some of the piping in the system dates back to 1875. The system also includes more than 21,000 fire hydrants and 155,000 meters.
The drinking water and wastewater systems are operated as self-sustaining enterprises. Water/sewer rates charged to customers based on gallons consumed provide the revenue necessary for management, operations, maintenance and expansion of the systems. The drinking water system’s capital improvement program is valued at more than $800 million and includes substantial investment in the drinking water treatment works and the distribution system.

**Atlanta’s Wastewater System**

Atlanta’s wastewater collection and treatment systems began taking form during the late 1800s. After much debate, the City started constructing a combined sewer system around 1882. Today, the combined sewers represent approximately 15 percent of the City’s system. The combined sewers are located near the center of the downtown area and are some of Atlanta’s oldest and largest pipes. By 1917, Atlanta had built three wastewater treatment facilities, started constructing sanitary sewers and had installed another 323 miles of combined sewers. The combined sewer system had seven overflow points. Interceptors were constructed to divert dry weather wastewater flows to the treatment facilities.

Today, Atlanta’s wastewater collection system has grown to include more than 2,200 miles of piping. The pipe network includes reinforced and unreinforced concrete, cast iron, ductile iron, clay, brick and reinforced and unreinforced concrete arches. Pipe diameters range from six inches up to more than 120 inches. About 15 percent of the collection system remains combined; the remaining 85 percent consists of separate sanitary sewer piping. Like the water system, the wastewater system functions regionally, collecting and treating wastewater from six wholesale customers: Clayton, DeKalb and Fulton counties, and the cities of College Park, East Point and Hapeville.

Atlanta residents generate 55 percent of the wastewater treated at the City’s wastewater treatment facilities each day. The wastewater systems serve more than 1.2 million people daily and have a collective maximum monthly treatment capacity of 220 (MGD).

Wastewater is treated at four wastewater treatment facilities: the Intrenchment Creek Wastewater Reclamation Center (WRC), the R. M. Clayton WRC, the South River WRC and the Utoy Creek WRC.

Six combined sewer overflow (CSO) facilities, Clear Creek, Confederate Avenue, Boulevard, McDaniel, Greensferry, North Avenue and Tanyard Creek, provide preliminary treatment, chlorination and de-chlorination for wet weather flows from the combined sewer system.
Atlanta’s Storm Sewer System
With the exception of the storm sewer component built into the combined sewer system, much of Atlanta’s storm sewer network has been designed and constructed by land owners as they improved their private property over time. A large portion of the system has been installed to drain roadways and other structures across the service area. A detailed inventory of the storm water piping is under way.

Federal Consent Decrees
In 1995, Atlanta was sued by the Upper Chattahoochee Riverkeeper for failure to comply with the Clean Water Act. The lawsuit ultimately led to two federal consent decrees that mandate CSO compliance with the Clean Water Act in 2007 and SSO compliance by 2014. Both documents may be viewed at: http://www.cleanwateratlanta.org.

The Combined Sewer Overflow (CSO) Remediation Program
After entering into the first consent decree in 1998, Atlanta implemented a public education and involvement program for citizens and developed a CSO Remediation Plan designed to bring the City’s combined sewers into complete compliance with the Clean Water Act.

The plan was authorized by the U.S. Environmental Protection Agency (EPA) and the state Environmental Protection Division (EPD). The plan requires the City to complete the following key tasks by 2007:

1. Separation of the Greensferry and McDaniel sewer basins and a part of the Stockade sub-basin known as the Custer CSO basin. This part of the CSO remediation plan will increase Atlanta’s separate sanitary sewer network to 90 percent (1,980 miles) from 85 percent of the entire system. The plan also will eliminate two CSO facilities.
2. Construction of a deep-rock tunnel storage and treatment system that will capture and store combined flows for the northwestern and northeastern quadrants of the combined sewer network. Build additional storage for the combined facilities located in the southeastern quadrant of the combined sewer network. All flows from the combined sewer overflow system will be treated before discharge to the Chattahoochee and South Rivers.
3. Reduction of the number of permitted, wet weather overflows from the combined sewer system from 360 per year to an average of four per year at each of the remaining four CSO facilities. The overflows will be screened, disinfected and dechlorinated before discharge to receiving streams and will meet water quality standards.

The construction required by the CSO plan is under way at a cost of $809 million.
The First Amended Consent Decree
In 1999, Atlanta entered into the First Amended Consent Decree (FACD) with the EPA. The FACD requires Atlanta to implement many of the programs associated with EPA’s widely discussed wastewater collection system management initiative for capacity, management, operation and maintenance known as known as (CMOM).

The requirements described in Part B of Atlanta’s FACD entitled “Management, Operation and Maintenance Programs,” direct the City to develop and implement the following:

1. Collection System Contingency and Emergency Response Plan
2. Short-term Collection and Transmission Systems Operation Plan and Pump Station Evaluations
3. Collection System Grease Management Program
4. Sewer Mapping Program
5. Collection and Transmission Systems Maintenance Plan
6. Collection and Transmission Systems Training Program
7. Collection and Transmission System Safety Program
8. Short-term Adequate Collection, Transmission, and Treatment Capacity

Part C of the FACD entitled “Evaluation and Rehabilitation of Defendant’s Wastewater Collection and Transmission Systems” requires Atlanta to implement the following:

1. System-wide Flow and Rainfall Monitoring Plan
2. System-wide Hydraulic Modeling Plan
3. System-wide Prioritization Plan
4. Sewer System Evaluation Survey (SSES) Plan
5. Macro System Evaluation
6. Sewer Group Peak Flow Evaluations
7. Schedule for Completion of Remedial Actions (rehab, repair and replacement)
   Sewer Group 1    July 1, 2009
   Sewer Group 2    July 1, 2011
   Sewer Group 3    July 1, 2011
   Sewer Group 4    July 1, 2013
   Sewer Group 5    July 1, 2013
   Sewer Group 6    July 1, 2014

How has Atlanta’s Asset Management Philosophy Developed?

Collectively, the 15 FACD plans assist Atlanta in implementing core Asset Management practices for its wastewater collection system. Let’s consider some key questions that must be answered when operating in an asset management based environment. *What do I own and where is it?* The sewer mapping plan addresses this question. *What condition is it in and what is its remaining life?* The sewer system evaluation survey plan provides the answers to this question. *What is my required level of service?* The short-term adequate collection, transmission and treatment capacity plan; the system-wide flow and rainfall monitoring plan; the system-wide hydraulic modeling plan and sewer system evaluation survey plan all assist Atlanta in understanding available capacity and demand levels for its wastewater collection, transmission and treatment systems. The information that is produced through execution of the plans affords management the opportunity to make sure that the system can meet its levels of service in a manner that is acceptable to the system’s customers. More importantly, the development and implementation of the plans allow system managers to be proactive rather than reactive.
Atlanta’s wastewater collection system improvement program is probably the most comprehensive in America today. The plans require the Department of Watershed Management to implement a wide spectrum of management and operational activities to improve and sustain a high quality of service delivery to its customers through its collection system. Atlanta’s FACD plans and programs can be viewed at the “Clean Water Atlanta” website; http://www.cleanwateratlanta.org/. See Appendix - A for website links to the documents.

**Information Technology (IT) and Geographical Information Systems (GIS)**

IT is key to asset management. Advanced asset management practices require agencies to collect, store and manipulate large amounts of data. In many instances, key information does not exist in a digital format and must be manually converted. That means that someone must review the paper records and associate the pertinent information with the appropriate asset. The information then must be placed into a database or spreadsheet. Once the data is stored in digital format, it can be easily moved to the appropriate systems for use in the asset management program. Similar tasks must be performed to collect equipment information; such as manufacturer’s name, model number, the year the equipment was placed in service, etc.

Gathering asset data and assembling it in digital form is probably one of the most labor intensive aspects of the asset management process. It can also be very expensive. Once the information is gathered and organized digitally, it can be used productively in our various IT systems. The Department of Watershed Management is using college students, who work as interns or co-ops on a temporary basis, to perform data conversion tasks. Atlanta’s program requires that the students be juniors or higher. The program is cost-effective and benefits the students, the City and its ratepayers.

Examples of IT systems include, but are not limited to, Computerized Customer Information/Billing System (CCIBS), Supervisory Controlled and Data Acquisition Systems (SCADA) Systems, Computerized Maintenance Management Systems (CMMS), Internet and Intranet Systems (wired and wireless), Workstations and Mobile Computer Technology. DWM currently uses all of the above in its daily business activities. As an agency moves forward with asset management, it must continuously monitor and adjust its utilization of IT.

Atlanta had developed an excellent digital map and GIS plan for its collection system before the FACD was signed. The digital map has been used extensively to manage the collection system improvement program. Information from the SSES will be used to generate the second generation of the digital map in complete GIS format. The SSES plan requires that the entire collection system be inspected, a process that provides first-hand condition information that is used to determine if a sewer needs to be repaired, rehabilitated or replaced. Rehabilitation and replacement work is performed as part of the current capital improvement plan (CIP). The GIS data file is structured such that the files can be used to geographically depict the results of queries from the computerized maintenance management systems. GIS, clearly, is a necessary component of any good asset management program.

**Atlanta’s Asset Management Challenge**

The paragraphs above describe asset management activities and systems that are actually in place in Atlanta and are being used to improve the overall services that the City provides to its wastewater customers. The Department of Watershed Management’s challenge is to expand the success that has been realized in asset management related components of Atlanta’s wastewater improvement program to all of Atlanta’s watershed infrastructure. This means developing and implementing total asset management plans for the wastewater, drinking water, wastewater and storm water systems.
Is Investment In An Asset Management Program Worth It?

Yes! The consent decrees required the development of plans and implementation schedules that closely parallel current Best Practice approaches for asset management. The SSES plan requires that all sewers in Atlanta’s collection system be cleaned and inspected. Atlanta’s collection and transmission system staff’s input was relied upon to direct the initial cleaning and inspection work to the areas of the collection system that had the most operational problems. The contract for this work is structured such that the point repair work can be performed immediately by the SSES contractor, when appropriate and approved by the City’s engineer. That eliminates extended delay for the inspection work and problems that can impact collection system customers due to stoppages and blockages. The SSES program currently has been responsible for cleaning and inspecting approximately forty nine percent of Atlanta’s sewers to date.

The reduction in overflows from the collection system by approximately 40 percent is one result of the program, under which pipeline defects that could lead to overflows are identified and eliminated. The City expects to continue the success that has been realized to date as the program continues. Developing and implementing the SSES Plan has brought value to Atlanta’s bottom line environmentally, socially and economically.

Performing the work required by the plan is reducing, preventing and eliminating overflows from the system, thus reducing a serious environmental threat. Reducing, preventing and eliminating overflows reduces the impact those events have on people and their property, thereby providing a social benefit. Additionally, reducing overflows from the system reduces economic risk to the City (a reduction in fines, claims, cost of clean-up, etc.).

The data generated by the SSES is used to plan future inspection, operational procedures, repair, rehabilitation and replacement work; such as establishing the next inspection interval for the pipe and manholes, etc.

As a rule, utilities need to be able to answer the following questions to properly manage their assets:

What assets does this organization own?
What does each asset of the organization consist of?
What is the current condition of the assets of this organization?
At what rate are the assets being used up each year?
What is the current value of the assets?
What levels of service do customers expect from the assets?
What is the social, financial and economic impact of the asset should it fail?
What is the probability of the asset failing?
What should be done to reduce/eliminate the possibility of failure?
What level of maintenance is needed to decrease the probability of failure?
When should assets be repaired, rehabilitated or replaced and at what time interval?
What is the best life-cycle cost scenario for assets (evaluate as many options as is practical)?
What is the cost to operate, maintain, repair, rehabilitate and replace assets annually?
What is the best financial approach for funding the program and what will the financial impact be on customers?
How will various funding scenarios affect customers/levels of service?

By asking those questions in an asset management framework and on a consistent schedule and by preparing a summary of the answers (i.e., an Asset Management Plan), a utility can better educate its decision-makers and customers on the total cost of delivering the levels of service that are expected from the utility. The process will either yield support for the actions recommended in the plan, or the plan can be amended with total understanding of the expected outcome.
What has Atlanta learned?

The consent decree requirements drive capital investment decisions for the wastewater system. The plans that are required under the Clean Water Atlanta program guide the City through a logical progression of data collection and evaluation that, in turn, allows DWM to make informed rehabilitation and replacement decisions. The success that has been experienced to date in this program assures that the processes will result in Atlanta having a first-class water and wastewater collection, transmission and treatment infrastructure by 2014. The City’s current focus is on developing a complete Asset Management Program for all watershed infrastructure.

What is next?

The Department of Watershed Management believes that the best way to protect the investment that Atlanta has made in its watershed infrastructure in recent years and will make by 2014 is by applying best appropriate asset management practices throughout its organization. Much of the existing Capital Improvement Program involves catching up on deferred rehabilitation and replacement work from prior years. It also includes capital projects that are necessary to meet certain regulatory requirements. Our challenge is to improve our overall management of Atlanta’s watershed infrastructure such that we provide service that is acceptable socially, environmentally and economically. This approach is known as the triple bottom line. It means that we base our overall service delivery strategy on meeting levels of service that are accepted by customers and stakeholders socially, environmentally and economically.

In business the term bottom line refers to the line that is drawn across the bottom of a financial statement. A financial statement includes all of the income and expenses incurred by a business for a specified period of time (day, week, month, quarter, etc.). Below the bottom line lies the value that indicates profit or loss for the period. It simply defines how well or how badly the business is doing at a specific point in time. Knowing what the bottom line really is helps managers determine actions that may be taken to make adjustments to business processes so that the mission and goals of the organization are achieved. The goal of most businesses is to make a profit. Our business is centered around managing our watershed and protecting human health. Our principal product line includes: drinking water, wastewater treatment and storm water management. In this business we must continually measure our bottom line environmentally, socially and economically. We are deploying asset management principles throughout our organization to sustain delivery of highly valued services to our customers at the lowest possible cost.

As stated earlier, our current CIP program is driven by the requirements of the consent decrees and several other regulatory demands. Fortunately the planning and analyses required under the programs closely parallel advanced asset management protocol. Our advanced asset management program establishes a path for multiple paradigm shifts throughout the Department of Watershed Management’s organization. As the paradigm shifts occur we will focus more on making management, operational and maintenance decisions based on more complete information. This means that we will make decisions based on the following factors at a minimum:

- The Department’s Mission
- Staff and Stakeholder Input
- Established and Accepted Levels of Service
- Data Housed In Asset Registers
- Condition of Assets And Their Residual Life
- Multiple Renewal/Replacement Strategies
- Capital Needs and Capability
- Future Needs
- Annual Review and Update of the Advance Asset Management Plan
- Life Cycle Costs
- Regulatory Requirements
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APPENDIX—A

The internet links listed below have been provided to assist you with accessing Atlanta’s consent decree plans. Some of the documents are large and may require a few minutes to download.

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