

EXECUTIVE SUMMARY

**WATERS of Jefferson County
July 1, 2001 – June 30, 2002**

**Watershed Approach To Environmentally
Responsible Stewardship**

EXECUTIVE SUMMARY

The *WATERS¹ of Jefferson County Report* combines the annual Municipal Separate Storm Sewer System (MS4) Report, the Combined Sewer Operational Plan (CSOP), and the Sanitary Sewer Overflow Abatement and Elimination Plan (SSOAEP) into a unified submittal for the reporting period of July 1, 2001 to June 30, 2002.

With the initial *WATERS of Jefferson County – Year Zero Report* in December of 1999, the Louisville and Jefferson County Metropolitan Sewer District (MSD) has been in the process of transitioning from a programmatically-driven approach to

one that is more water quality-driven. In the past, the MS4, CSO and SSO programs were reported and managed separately within MSD. To attain the goal of a water quality-based program, MSD has had to redefine goals and reorganize departments. Over the past reporting period the Wet Weather & Water Quality (WWWQ) Team was created, with the responsibility of combining the MS4, CSO, SSO and water quality programs into one comprehensive program. The creation of the WWWQ Team allows for a more effective integration of MSD's regulatory responsibilities across departmental boundaries.

Figure 1e. Watersheds of Jefferson County



RESOURCE MANAGEMENT PROCESS

Along with the creation of the WWWQ Team has been the development of a new Resource Management Process (RMP). This process sets the foundation for water quality-based decision making, which is the ultimate goal of the newly formed WWWQ Team. The RMP is a cyclic process and will be utilized to integrate programs, as well as manage resources, on a watershed basis. This process will allow MSD to prioritize the Capital Improvement Program (CIP) using criteria that reach beyond just regulatory require-

¹ Watershed Approach To Environmentally Responsible Stewardship

ments, taking into account environmental benefit, habitat, biodiversity and community livability goals.

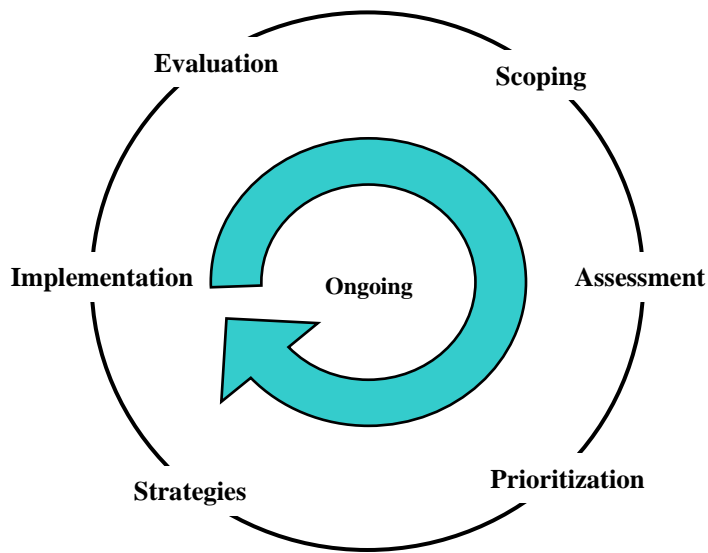
The six phases of the RMP are described in the following paragraphs.

Scoping Phase - The first step in the RMP is to establish direction for the current round of planning. This is accomplished by scanning and summarizing existing information about watershed conditions and stakeholder concerns to establish big picture goals and priorities for the WWWQ Program and the watershed. Community and stakeholder involvement occurs at this phase, as well as throughout the entire RMP. The scoping phase answers the questions – Where is the program now for this watershed? Where does the program need to go to improve and protect this watershed? These answers will set the course for the remaining phases of the management cycle.

Assessment Phase - The second phase of the RMP involves detailed assessment to follow up on the big picture goals and priorities identified through Scoping. In this phase a watershed is characterized to quantify the causes and sources of the most important problems identified by Scoping. The Assessment Phase answers the questions – How good or bad is the situation? Which sources in the watershed pose the biggest threat to meeting our goals? Water quality targets will be set for each goal, providing a basis for determining the degree of impact or threat. Also, for watersheds where substantial conversion of land use is possible, the assessment should evaluate the potential for future impacts or threats. MSD’s analytical tools (e.g. Geographic Information Systems (GIS), monitoring programs, and watershed models) will be integral to this watershed assessment by helping to quantify sources and determine maximum allowable flows and pollutant loads.

Prioritization Phase - The purpose of the third phase of the RMP is to target management priorities. This phase answers questions such as – Where should management efforts be focused? and What types of management will be most cost-effective? Big picture goals and priorities defined in the Scoping Phase are refined to establish specific management objectives to achieve the targets developed in the Assessment Phase.

Figure 2e: The Resource Management Process



For example, a goal of a particular watershed may be to “Protect Human Health and Support Recreation”. This goal would have the following objectives – to meet human health criteria to support primary contact recreation, and to support safe levels of fish consumption. Each objective would have an indicator and a target. The indicator is a measurable factor that can be used to determine if the target is achieved.

Strategies Phase - The fourth phase of the RMP is the Strategies Phase. The intent of this phase is to identify, evaluate and select appropriate management alternatives that address the defined priorities. Within this phase, alternatives are considered for their effectiveness at achieving or protecting management targets, as well as for available funding, feasibility, staff resources and public support. The outcome of this phase is generally management plans and projects.

Solutions in some targeted subwatersheds will likely be complex and will require multiple efforts. A list of best candidate management options will be screened; then, assessment tools, such as MSD’s Water Quality Tool, and a fiscal impact tool, will be used to test the effectiveness and feasibility of different management approaches. In this phase, projects are prioritized for implementation based on their cost-effectiveness and other important criteria (e.g. public support, technical and financial feasibility). A management plan will be prepared to describe recommended management actions, MSD’s and participating partners’ roles and responsibilities, and funding and timetables for implementation. This includes incorporation of actions into the MSD CIP or Long-Term Control Plan updates.

Implementation Phase - The fifth phase of the RMP is the Implementation Phase. The intent of this phase is to develop implementable activities defined from the previous phases of the RMP. This is the “Do It” phase and consists of plans, projects and schedules.

Implementation may begin at any point in the management cycle when issues have straightforward, relatively easy solutions. When issues require more complex analysis and multiple solutions, implementation begins after the management plan has been developed during the Strategies Phase. The Implementation Phase includes completing applications for NPDES and other permits, public notices of and hearings for permits, and issuance of permits. It is also the time for public notices of possible action on local government ordinance changes. CIP funding for design and installation of best management practices and other approaches to specific water quality or quantity problems will also take place during this phase. A critical part of implementation is securing funding and resources for carrying out management actions and special studies, if needed.

Evaluation Phase - Providing for adaptation of management plans is essential to long-term success. By their very nature, plans are based on assumptions and predications regarding the effectiveness of management actions. The intent of the sixth phase of the RMP, the Evaluation Phase, is to determine the effectiveness of the program and the projects undertaken. This phase answers the question – How well did we do?

Upon implementation, MSD will be able to track the actual performance of the management actions. The results of the Evaluation Phase will provide MSD and its partners with a basis for continuing on the current course or making modifications to the plan. As such, the information will be very important to the next iteration of the management cycle for that watershed.

On the program level, once the RMP is fully implemented, the integrated water quality-based approach will produce a resource management plan. It will document the scoping, assessment and prioritization process. The plan is an implementation tool and/or strategy. It will be a living document (i.e. periodically updated) that will capture the new vision and outline a process for supporting a water quality-focused organization. The plan's content will establish the integrated management organization, define the process for handling current program activities, and for moving forward with the regulatory community. This plan will provide the framework for balancing and integrating the goals of each wet weather program under common objectives.

The RMP will be organized and implemented on a watershed level. It is neither feasible nor practical to implement the process throughout the County all at once. The water quality-based RMP will sequence plan development for groupings of watersheds. Each watershed plan will integrate the goals of the MS4, CSO and SSO programs to achieve realistic water quality improvements determined to be most cost-effective for that watershed. The plan would do this by implementing clear performance requirements that have been selected by the stakeholders as the most beneficial to the watershed and the community. The selected benefit would be the one that provided the most environmental benefit, without regard to MS4, CSO and SSO program requirements. This "trading" approach that crosses regulatory programs allows for greater flexibility to target resources for greatest environmental benefit.

In an effort to implement this new management process, the format of the *WATERS of Jefferson County Report – July 1, 2001 to June 30, 2002*, was revised. The new format reflects the RMP as depicted in *Figure 2e* on *Page 2e*. The WWWQ Program and the watershed sections within this report have been formatted to correspond with each phase of the RMP.

HIGHLIGHTS OF THE WWWQ PROGRAM

SCOPING

Where are We Now? and Where are We Going?

As part of the Scoping Phase of the RMP, MSD has asked the questions of "Where are We Now?" and "Where are We Going?" As stated before, the primary objective is to transition the CSO, SSO and MS4 Programs into an integrated, water quality-based wet weather program. This not only entails the creation of the WWWQ Team, but also a new approach of doing business.

The issues of wet weather and water quality are not confined to the WWWQ Team, but organization-wide. Integration of WWWQ programs with Industrial Compliance and Monitoring (ICAM), Development Area Team, Customer Service, Finance, Operations, Maintenance and other departments within MSD is essential for MSD to move to water quality-based decision making. Thus, the WWWQ Team is working closely with other departments and divisions to meet the challenges of this program.

ASSESSMENT

Monitoring and Modeling

Monitoring and modeling activities are tools used to assess the characteristics of the watershed. Monitoring and modeling activities are elements of the Assessment Phase of the RMP.

Many of the modeling and monitoring efforts undertaken by MSD reach across program lines. The colored symbols appearing before each monitoring and modeling activity represents the program(s) associated with that effort. This aide will be utilized throughout the *WATERS Report*.

Monitoring Activities

MSD has established a comprehensive monitoring program. Details of MSD's monitoring program activities are described in the WWWQ Program section of the *WATERS Report*. Listed below are highlights of MSD's monitoring program.

MS4 LTCP SSO Ambient Monitoring - MSD has monitored Jefferson County streams for approximately 14 years. After 10 years of monitoring, an analysis of the data was performed. The analysis indicated that the elimination of small package wastewater treatment plants, in conjunction with sewerage, resulted in significant pollutant load reductions to streams during low flow conditions.

Figure 3e. Stream Monitoring Location



In an effort to better characterize stream impacts, the monitoring program was revised to include high temporal (every 15 minutes) and spatial resolution (27 monitoring locations within a 375 square mile County) monitoring for fewer parameters and increased wet weather sampling. By developing such a network, MSD has a more comprehensive program and a better understanding of water quality impacts within Jefferson County streams. The network consists of 27 stream locations, each with a minimonitor (pH, conductivity, temperature, dissolved oxygen, percent dissolved oxygen) and stream flow gauge. Between May 1st and October 31st of each year, samples are

collected five times per month at each location. The data is analyzed for fecal coliform to detect recreational contact violations. This data will be supplemented with wet weather sampling for fecal coliform, solids, nutrients and metals. Macro invertebrates and fish are sampled bi-annually for each stream site, while algae are sampled annually. Habitat evaluations are conducted for each stream monitoring location. These are done every two years, weather permitting.

LTCP NMC CSO / SIU Sampling - The purpose of the project is to assess the potential risk of water quality impairments associated with combined and separate sewer overflows, which have Significant Industrial Users (SIUs) and General Discharge Permittees discharging to the collection system upstream of these overflow points. This effort will focus on potential risk of impacts to both the Beargrass Creek and Ohio River watersheds because a combination of CSOs and SSOs discharge to the water bodies within these watersheds.

The focus of the FY02 and FY03 CSO/SIU sampling efforts take place in the Beargrass Creek watershed. For information on the specific CSO/SIU sampling effort within Beargrass Creek refer to the Beargrass Creek section of the *WATERS Report*.

Modeling Activities

Details of MSD's modeling activities are described in the WWWW Program section of the *WATERS Report*. Listed below is a highlight of MSD's modeling activities.

MS4 LTCP SSO Water Quality Tool – Until 2001, MSD developed projects for the control and mitigation of CSOs, SSOs and storm water independent of each other. Success was measured on the basis of cost per unit reduction in average annual overflow volume (AAOV) or number of best management practices (BMPs) implemented. However, MSD did not have the tools to quantify the reduction in pollutant loadings resulting from this approach, or to evaluate if alternative approaches would result in overall greater environmental benefit. To facilitate this effort, MSD is developing a water quality-based evaluation tool.

Restoring urbanized streams is difficult because of the complex nature of impacts, the cost associated with many of the alternatives, and the difficulty predicting the environmental benefit of various solutions. Intensive monitoring and modeling to delineate impacts and evaluate environmental cost/benefit of alternatives is essential. Having a pre-

Figure 4e: Big Rock at Middle Fork of Beargrass Creek



dictive tool that links management strategies with water quality standards, biocriteria, and habitat quality.

The “Water Quality Tool” links a continuous simulation watershed model (HSPF) and a continuous simulation sewer model (XP-SWMM) to predict the water quality benefits of different management scenarios. This three-year effort included intensive sampling and monitoring, and will be completed in 2003. Additional modeling refinements are planned and will include integration of biological and habitat data.

STRATEGIES

Plans and Projects

As stated before, plans and projects are developed during the Strategies Phase, and implemented during the Implementation Phase of the RMP. The majority of the information presented within the *WATERS Report* are detailed accounts of plans and projects currently being undertaken by MSD. This information can be found in both the WWWQ Program and watershed sections of the *WATERS Report*. Listed below are selected highlights from MSD’s Implementation Phase.

Plans

LTCP WWWQ Long Term Control Plan - A requirement of the CSO Policy and the Morris Forman WTP NPDES Permit is the CSO Long Term Control Plan (LTCP). The LTCP for Region 1, Beargrass Creek, was originally issued in draft as part of the 1996 Combined Sewer Operational Plan. The LTCP for the Ohio River Area, Regions 2 and 3, was originally issued in draft as part of the 1997 Combined Sewer Operational Plan. During fiscal years 2000 and 2001, MSD completed studies to define the feasibility of utilizing Real Time Control (RTC) as a major component of the CSO Abatement Program. The results of the studies have shown RTC to be a highly cost-effective approach to reducing overflow volumes in each of the three regions.

With MSD’s adoption of the RTC philosophy, the need developed to update the CSO LTCP to reflect the newly proposed projects. The ultimate goal of the LTCP is water quality improvement. The LTCP should address each wet weather induced pollution source if the goal is to be achieved. Region 1, the Beargrass Creek Watershed, is impacted by CSOs, SSOs and storm water runoff.

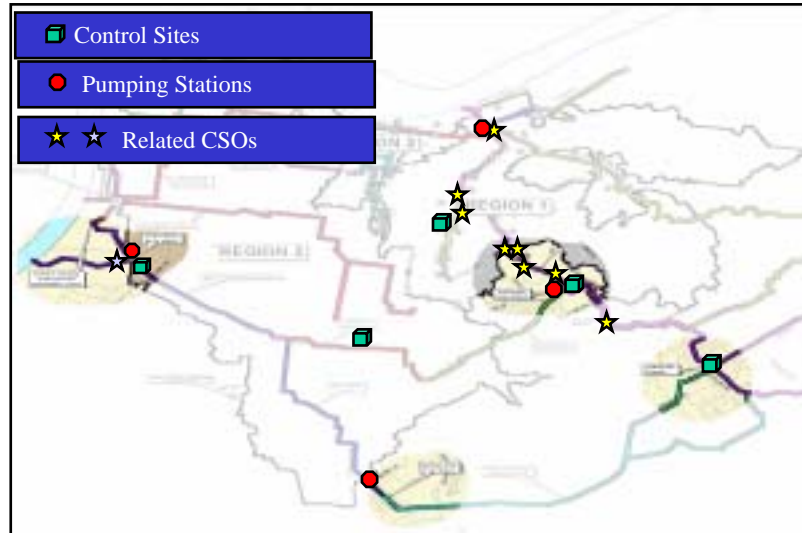
Projects

LTCP Real Time Control - The initial phase of the RTC project consists of remotely controlling five sites by means of a centralized decision making system. The objectives pursued are a better use of the existing in-line storage capacity, a decrease of CSO volumes in the Beargrass Creek and Ohio River Watersheds, and an increase of the wastewater volume conveyed to the Morris Forman Wastewater Treatment Plant (MFWTP). The RTC approach is both global and predictive, which means that the decision making system will use available information monitored on the sewer network, and predicted by the Radar Rainfall Data System, to determine the best flow management strategy.

More specifically, the present project is a first phase implementation, since remote control and operation is deployed over a selected number of control points. The five facilities involved in this project are:

- *Southeastern Diversion Structure* – Two gates will be controlled at this site. These gates will allow the diversion of flow from the Beargrass Interceptor (BGI), in Region 1, to the Southeastern Interceptor (SEI) in Region 3. For more project specific information on the Southeastern Diversion Structure project refer to the Beargrass Creek section of this report.

Figure 5e. First Phase of the Real Time Control Project



- *Nightingale Pump Station* – One gate along the BGI will be controlled at this site. This gate will allow the diversion of flow from the BGI and BGI Relief Sewer, in Region 1, to the Upper Dry Run Trunk system in Region 3. For more project specific information on the Nightingale Pump Station project refer to the Beargrass Creek section of this report.
- *Southwestern Pump Station* – This project will consist of control of one gate in the Sluice Gate Chamber. Utilization of this gate will generate in-line storage capacity within the Southwestern Outfall. Under manual, degraded or emergency control, all three gates can be manipulated. For more project specific information on the Southwestern Pump Station project refer to the Ohio River section of this report.
- *Upper Dry Run Trunk Storage Facility* – The gates at the outlet of these basins will be controlled based upon downstream conditions at the Southwestern Pump Station. These gates will allow the storm water flows to be strategically stored for CSO control and released into the Upper Dry Run Trunk system, in Region 3, once downstream capacity is available. For more project specific information on the Upper Dry Run Trunk Storage Facility refer to the Ohio River section of this report.

- *Sneads Branch In-Line Storage* – An inflatable gate captures flow discharged from 11 CSOs. Pumps will send re-captured overflows back into the BGI for treatment at the MFWTP. For more project specific information on the Sneads Branch In-Line Storage project refer to the Beargrass Creek section of this report.

EVALUATION

Performance

The final component of the RMP is the Evaluation Phase. The intent of this phase is to determine the effectiveness of the programs projects undertaken. It is important to note that MSD is in the early phases of the RMP and does not currently have a program in place to evaluate the effectiveness of completed projects. Post construction monitoring efforts and other evaluation techniques will be utilized in the future to define the effectiveness of implemented plans and programs.

MS4 EPSC Enforcement – One program that has been underway for almost two years is the Erosion Prevention and Sediment Control effort. The EPSC Ordinance became effective on January 1, 2001, and as a result of the Ordinance, MSD has been directed to be the enforcement agency for Jefferson County. During the reporting period, there have been 708 Field Correction Notices issued, 214 Enforcement Request Reports, 127 Notice of Violations, 117 Stop Work Orders, and 2 fines.

The numbers presented in the previous paragraph are similar to what was reported in the *WATERS of Jefferson County Report – July 1, 2000 to June 30 2001*. There has been a slight decrease in the number of violations since the last reporting period. The improvement can be attributed to a better understanding by inspectors, contractors and engineers regarding the requirements of the EPSC Ordinance. There has been a considerable increase in the number of EPSC BMPs that are correctly installed. Over the next reporting period, emphasis will be placed on maintenance of BMPs and phasing of projects.

PROGRAM COSTS

The following table summarizes the costs for MSD's MS4, CSO and SSO Programs.

Table 1e. Program Costs

Program	July 2001 to June 2002	July 2002 to June 2003
CSO Program	\$9,314,400	\$8,424,500
SSO Program	\$5,218,000	\$5,424,500
MS4 Program	\$1,181,700	\$1,444,500
Total*	\$15,714,100	\$15,293,500

* Note: These costs include professional services, capital projects and MSD staff time.

EXHIBIT #1

Watershed Information and Water Quality Summary

Exhibit #1 may be downloaded at:

<http://www.msdlouky.org/insidemsd/waters/2002/exhibit1.pdf>  (2.9Mb)