

**CAN A WATERSHED BE MANAGED?  
LEADING THE EFFORTS OF PUBLIC AGENCIES AND LOCAL COMMUNITIES IN  
THE ROUGE RIVER WATERSHED**

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**ABSTRACT**

Like many watersheds, the restoration efforts in the Rouge River Watershed began through court litigation. However, while the court case continues, most of the progress in the watershed is fueled by voluntary, cooperative actions among a large group of local governments and county agencies. Fifty-one municipalities and county and regional agencies in the Rouge River Watershed in metropolitan Detroit are using the "watershed approach" to solve water quality problems from combined sewer overflows (CSOs), storm water, non-point sources and illicit discharges.

The cooperative efforts reflect one of the achievements of the Rouge River National Wet Weather Demonstration Project (Rouge Project) in encouraging individual community responsibility for watershed restoration and protection. The Rouge River project seeks to demonstrate an approach to watershed-wide water quality management that will achieve national water quality goals during and following wet weather events.

This paper focuses on the way in which the Rouge Project is leading the efforts of many municipalities to reach the goals of water quality improvement. The Rouge Watershed presents a unique management challenge because there are no significant point sources which can be controlled by the action of a single agency, or from which to readily establish an effluent trading scheme. Quite the opposite, the Rouge is comprised of dozens of communities, hundreds of major commercial, industrial and institutional properties, and hundreds of thousands of residential homeowners. The environmental management goal of the project is the control of flow and wet weather pollution to achieve flow and quality to meet standards. The institutional management goal is to find ways to effectively work with the numerous and diverse parties within the watershed boundary to meet the environmental goal.

## KEYWORDS

Watershed, storm water, municipal government

## INTRODUCTION

Fifty-one municipalities and county and regional agencies in the Rouge River Watershed in metropolitan Detroit are working cooperatively to solve water quality problems from CSOs, storm water, non-point sources and illicit discharges. Like many watersheds, the restoration efforts in the Rouge began through court litigation on a specific point source issue and CSO. However, while the court oversight continues, most of the progress in the watershed is fueled by voluntary, cooperative actions among the large group of local governments and supported by county agencies.

The cooperative efforts reflect one of the achievements of the Rouge Project in encouraging individual community responsibility for watershed restoration and protection. The Rouge River project seeks to demonstrate an approach to watershed-wide water quality management that will achieve national water quality goals during and following wet weather events. The demonstration approach has allowed communities in the watershed to “get out in front” of evolving federal and state policy on wet weather water quality, and thereby capture local creativity and innovation in meeting goals in these environmental arenas.

The subject of this paper is the way in which the Rouge Project is leading the efforts of many numerous and diverse municipalities, industries and citizens to reach the goals of water quality improvement and protection. This paper describes methods used by the project to motivate and coordinate public and private entities. The Rouge Watershed presents a unique management challenge because there are no significant point sources which can be controlled by the action of a single agency, or from which to readily establish an effluent trading scheme. Quite the opposite, the Rouge is dozens of communities, hundreds of major commercial, industrial and institutional properties, and hundreds of thousands of residential homeowners. The environmental management goal of the project is the control of flow and wet weather pollution to achieve flow and quality to meet water quality standards. The institutional management goal is to find ways to effectively work with the parties within the watershed boundary to meet the environmental goal.

## PROJECT SETTING

The Rouge Project is in its sixth-year of restoring water quality in the Rouge River, located in metropolitan Detroit (**See Figure 1 “Location Map of the Rouge and Seven Subwatersheds and Location of the Rouge Watershed in Michigan”**). The Rouge Project was initiated as a means to address the needs outlined in the Remedial Action Plan of 1989 for the Rouge River Area of Concern. The project also addresses elements of a 1977 water pollution lawsuit brought by the Michigan Department of Environmental Quality (MDEQ) and the United States Environmental Protection Agency

(USEPA) against the City of Detroit, and subsequently, all other 47 communities in the watershed. Since 1992, the Rouge Project has implemented over \$400 million of water pollution control, environmental restoration, and recreation projects. Total expenditures under the project are expected to exceed \$530 million by the year 2003. (Note: These totals do not include related Rouge work by the City of Detroit Department of Water and Sewerage for CSO controls outside of the Rouge Watershed, which is estimated to be in excess of \$200 million.)

The Rouge Watershed has a total of 48 cities, villages and townships, including the City of Detroit and spanning three counties. The 436 square mile watershed include headwater areas with near natural settings, while the downstream reaches of the river are bordered by suburban and urban land uses, and the lowest reaches are heavy industrial land use. Approximately 75 percent of the watershed is served by public sewers, and there are an estimated 17,000 septic systems. The river has over 50 miles of public access parks. There is extensive new suburban development toward the headwaters, with the Detroit metropolitan area in 1998 posting its first increase in total population since the 1970s. At the same time, there are major redevelopment projects within the City of Detroit involving over \$6 billion in new public sector and private investment in facilities and infrastructure to be completed over the next three years. Housing starts in the suburbs are at record high numbers and new home construction within the City of Detroit have increased significantly.

While the Rouge Project is a very large EPA-funded demonstration project, it is similar to other watershed projects in its need to enlist and motivate local government financial commitment. Overall, local funding covers about one-half of project cost, totaling over \$200 million to date. New projects being undertaken by communities to address storm water

management needs are being funded at 50 percent federal and 50 percent local share. The success of the Rouge Project in developing and maintaining a strong local commitment to the environmental goals can, therefore, be a lesson useful to other watersheds.

## **PROJECT ORGANIZATION**

The Rouge Project is organized to work with a wide array of stakeholders in the watershed. The Wayne County Department of Environment (DOE) and its Division of Watershed Management are responsible for operation of the project. The DOE Administrative group provides oversight and policy under the advisory direction of a Steering Committee. The Steering Committee was recently modified to add a membership representative of each of seven subwatersheds in the Rouge, plus CSO communities and business interests.

The Watershed Management Division has a large consulting unit known as the Rouge Program Office (RPO). The RPO contract staff work alongside County staff in seven major functional areas:

- Program management services – coordination and reporting to regulatory agencies and the court, management of staff services, national outreach
- Subgrant administration – financial and administrative review of reimbursement requests from subgrantees, development of interagency agreements
- Subwatersheds – support to, and facilitation of, subwatershed advisory groups on voluntary storm water general permit activities
- Geographic Information Systems (GIS) services – database maintenance and mapping
- Monitoring services – continuous water quality monitoring, wet weather and dry weather surveys, special studies
- Public Involvement – sponsorship of events, foster Rouge-friendly neighborhood and business efforts
- Technical evaluation of CSO – evaluate the performance of Phase 1 CSO demonstration facilities.

(An earlier paper for WEF in 1997, “Meeting Objectives for Watershed Planning: A Decision Assessment Framework,” described the approach of “objective management” that has been used in managing the efforts of the internal project staff.)

The DOE is assisted by the Southeast Michigan Council of Governments (SEMCOG), the University of Michigan in Dearborn, Wayne State University, a non-governmental organization known as the Friends of the Rouge (FOTR), and MDEQ. DOE provides subgrants to these organizations so they can perform certain aspects of the Rouge Project.

## **PROJECT ACHIEVEMENTS**

The initial emphasis of the Rouge Project was on designing, building and evaluating CSO controls. Since 1994, project goals have been expanded to embrace a watershed approach to wet weather management including, implement storm water management efforts, including an extensive public education program, illicit connection elimination, local ordinances for flow management, construction of demonstration wetlands and other structural best management practices (BMPs). Project representatives worked on the Urban Wet Weather Federal Advisory Committee in 1996 and 1997 to provide input to EPA’s proposed Phase II Storm Water Rules. At the same time, the project representatives worked with a group of local communities in the Rouge Watershed and

the Michigan DEQ to develop a voluntary general permit program for municipal stormwater discharges in Michigan. Most communities in the watershed—plus four county agencies—applied for and are receiving certificates of coverage under the General Permit.

The year 1998 was a point when noticeable measurements of environmental progress along the Rouge could first be made. Dissolved oxygen was higher at several sites along the river in the last two years compared to earlier findings in 1994 and 1995. This success can be attributed to CSO controls, illicit connection elimination, and better public, industry and community awareness of pollution prevention. Also, there are more sightings of larger and more diverse species of fish. The CSO basins have collectively captured and sent to treatment an estimated 3 billion gallons of overflow since the first basins went on-line in 1997. With the completion of the Hubbell-Southfield project this Spring, all of the completed basins will be controlling CSOs at a rate of about 4 billion gallons per year. The illicit discharge teams have eliminated 12.5 million gallons per day of dry weather discharges, and the Newburgh Lake project has eliminated the PCB fish advisory and restored a major recreational resource in the Rouge. The school-based education program operated by the FOTR is in nearly 100 schools, and an annual Rouge Water Festival drew over 1,400 students in 1999.

## **MANAGEMENT TECHNIQUES**

Six management techniques have been used in the Rouge Project to foster the commitment of local units of government.

1. Understanding the concerns of local communities
2. Defining smaller areas for collaboration
3. Clearly defining goals
4. Describing problems and environmental needs, rather than prescribing solutions
5. Creating technical, legal and policy work groups to search for local solutions
6. Communicating and sharing results with the public and with elected officials

The application of these six techniques is described below.

### **Understanding the Concerns of Local Communities**

A survey of public opinion was taken in 1993 to better understand the concerns of the residents and businesses of the watershed regarding the Rouge and water quality. The survey showed that most residents and business owners viewed an active public involvement program as a critical element to the project's success. In addition, as part of this active public involvement program, dialogue with and education of the public, is also essential. Nearly half of the individuals surveyed were somewhat familiar with the Rouge River Watershed and its network of rivers and streams running through Southeast Michigan. As a result of the survey, four major areas of concentration were selected for the public involvement program.

- Maintaining a systematic communication process with key stakeholder groups
- Expanding environmental awareness in the K-12 school system
- Utilizing the structure and resources (i.e. people, money, communication networks), of existing community organizations, and
- Using the media to create awareness and raise consciousness about issues salient to the clean up effort.

In addition, recommendations were also developed to integrate public involvement effectively with other elements of the program:

- to define clear goals, objectives, and milestones for the project to stress the positive aspects and successes to date;
- establish repositories of information about the project activities in public places around the watershed and consider linkages with various education and government institutions across the watershed;
- develop evaluation standards for public involvement and non-point source pollution reduction programs; and
- establish relationships with key members of stakeholder groups who can act as advisors to the project.

### **Defining Smaller areas for Collaboration**

The time spent in understanding the concerns of the public and the communities showed the logic of working in smaller geographic areas of “subwatersheds.” The 436 square mile Rouge Watershed area has been divided into seven subwatershed management areas. Each subwatershed group is made up of a number of “peer” communities with similar land use, economic, and development/redevelopment situations. Each subwatershed is 40 to 80 square miles in size. The subwatersheds provide a means for the diverse interests of county government (health, roads, and drains) and the local communities to focus on common objectives for local water quality **(See Table 1 “Comparison of Subwatershed Management Areas”)**.

Subwatershed groups started meeting informally in 1995. Initially, Wayne County and the RPO worked with three pilot subwatersheds – these pilots represented different land use/water quality situations. The area of rapid development, Middle 1, was the least developed and included areas for which there are public mandates to preserve and protect. The Middle 3 is a highly urbanized area developed mostly from the 1920s to the 1950s with parkland along the river, but not many other natural areas; the Upper 2 is a rapidly developing area.

Starting in 1997, the findings from the three pilot areas were brought to the rest of the watershed communities and Storm Water Advisory Groups (SWAGs) were formed throughout. A total of seven subwatershed management areas evolved, and these seven result from a balancing of the original 11 purely hydrologic areas with governmental jurisdictional boundaries. The seven subwatersheds are shown in Figure 1.

## **Clearly Defining Goals**

The Rouge Project has dealt with goal setting on several levels, from the development of a mission statement for the Steering Committee, to annual or bi-annual goals for the project study team, to long-term water quality restoration goals for each subwatershed. The common element behind all of the goal setting is that it is done in a collaborative manner with potentially competing interests considered. An example of the current study team goals is presented below:

- Continue progress on CSO control by completing demonstration projects; evaluate the performance of these controls; then design and build controls to protect public health for the remaining overflows.
- Expand efforts for storm water management and illicit connection elimination, and integrate this work with community programs under Michigan's Voluntary Storm Water General Permit.
- Continue habitat restoration and headwaters protection, flood control, property protection and recreational enhancements.
- Build a sustainable institutional structure for watershed management beyond the term of the current demonstration grant funding.

## **Describing Problems and Needs Rather Than Prescribing Solutions**

The Rouge Project's emphasis on describing problems and letting communities define their own solutions is best exemplified by the subgrant program. Ninety percent of the Rouge grant dollars to date have been given to local communities as subgrants. When only the most recent grants since 1996 are considered, over 95 percent of the funding is being given as subgrants to communities. The Rouge Project refers to these subgrants as "community projects," and they are an example of how the project allows communities to seek their own solutions to water quality problems within the overall needs and goals set for the watershed.

Individual community projects are generally provided grant funding of 50 percent grants, and 50 percent local match. An effort was made to find categories of work that would be meaningful to communities while furthering watershed-wide goals. Categories were selected to include: storm water management, GIS, recreation and habitat, and wetlands creation and restoration. Including CSO control, there are over 120 such projects, ranging from \$5,000 to over \$20,000,000 each.

Categories were selected based on discussions with communities and feedback through subwatershed advisory groups. An earlier round of projects focusing almost purely on stormwater BMP efforts were not as successful as the current community projects. However, after listening to the needs of the local communities, it was determined that a number of new efforts were needed: first, GIS, to develop

management tools; second, recreation projects to provide visible upfront benefits; and third, wetlands creation and restoration to deal with a critical issue of habitat protection in rapidly developing areas.

Criteria were developed for ranking projects. In each call for projects, requests for 50 percent grants exceeded the anticipated budget upper limit by a factor of two. This was seen as a measure of success in that the projects were providing real value to communities (who would match local resources to grant resources) while helping to achieve the overall goal of river restoration (**See Table 2 “Typical Criteria for Project Selection”**).

The implementation of funding categories for GIS, recreation, and wetlands represented a departure from earlier project funding, which was almost strictly based on sources of pollution – CSO, stormwater, abandoned dumps. The categories of GIS, recreation and wetlands began directing dollars to resources. Recreation, in particular opened up a group of projects extending from the main Rouge concrete channel to the Henry Ford Museum and Greenfield Village oxbow restoration. These projects complemented other recreational projects that included the Inkster Valley Golf Course and Wetlands, Newburgh Lake Restoration, and the renewal of canoeing sponsored by Wayne County Parks along the Middle Rouge.

Rouge Project demonstration grant dollars are now being directed to each of the subwatersheds for decision-making within the subwatershed on spending priorities. The stakeholders are represented by a Subwatershed Advisory Group, and these groups have been instrumental in facilitating innovative approaches to public education for stormwater protection, contracting among communities in the subwatershed for illicit connection elimination services, mutual aid, and other examples of local problem-solving for watershed management issues.

The approach for grants to subwatersheds evolved from two factors. First, the State of Michigan was launching its new Stormwater General Permit. The General Permit is a forerunner of anticipated EPA Federal Phase 2 Regulations for communities under 100,000. However, a difference is that the Michigan General Permit seeks a watershed management plan from permittees and the plan is developed on the basis of land areas tributary to river hydrology, rather than purely political jurisdiction. A second factor was that the project had been promoting individual community projects for three years. To some degree, communities felt they were competing for projects, rather than leveraging and coordinating with neighboring community efforts. The goal of the community projects was to get everyone involved in one effort or another. Having done that, subwatershed grants provided a new way to lead place-based efforts.

### **Creating Technical, Legal and Policy Work Group**

The Rouge Project supports community and subwatershed efforts not only with grant funding but also with a “technical extension service.” The technical extension effort includes, at a minimum, some basic project management services for initial scope

development, budgeting, and progress reporting for each community project. Beyond that, communities can seek technical assistance for assignments up to 2 to 3 days of effort, such as GIS tasks, presentations, training, and project reviews.

Wayne County's Rouge Program Office handles technical services for communities and leads certain efforts that benefit the whole watershed, such as GIS and monitoring, and grant administration. The technical extension service work supports communities with administrative help with their grants, as well as technical support. Technical support, at a minimum, includes thorough scope of work discussions to hammer out methods and deliverables. A "project coordinator" is assigned to review project progress and payment requests, to review deliverables and assist in technical and administrative close-out. This assistance has enabled the Rouge Project to successfully provide relatively small federal grants while successfully meeting local match and grant regulations. A \$10,000 grant could impose burdensome requirements to communities not set up for federal accounting standards. However, with project management and administrative support from the RPO, several communities have successfully used such small grants (**See Table 3 "Profile of Subgrants"**).

Another successful technique within the area of the technical assistance service has been the development of model ordinances and technical guidelines for subjects such as septic system maintenance, stormwater runoff control, community outfall inventories, and illicit connection identification and elimination. Such models and guidelines allow individual governmental jurisdictions a starting point from which to adapt for their own situation. These efforts have been supported with the participation of advisory groups of local technical, legal or policy advisors from the communities. Examples of technical and legal work groups that have been established include:

- CSO Evaluation Work Group
- GIS Technical Advisory Group
- Legal and Policy Committee for General Permit

### **Communities and Sharing Results with Public and Elected Officials**

The project uses several methods of communicating and sharing results:

- Rouge Project Web site
- Rouge Hotline
- Watershed Restoration Newsletter
- Mailing lists/Contact Database
- Elected Officials Breakfasts
- Rouge 2000 (Annual one-day conference)

These efforts provide the means to communicate and organize information and provide a holistic view of project results. All sampling data is collected and organized annually and published on a CD. In the years 1996 to 1998, over 800,000 records of data were added each year. Monitoring data is now becoming available on the project web site,

and a map server will also be implemented this year. Current use of the web site is over 45,000 hits per month. All progress reports are posted on the web site, and community project results in the form of “project profiles” are posted on the site. **(See Figures 2 and 3 “Examples of Project Profile”)**

A basic objective of the Rouge River National Wet Weather Demonstration Project has been to demonstrate alternative methods to a “command and control” top down regulatory approach to water quality improvement. The alternative methods sought by the Rouge Project leverage is a “bottom-up” approach putting place-based needs in the forefront and using the local initiatives to make progress on water quality restoration. This approach has led to a number of institutional changes in the watershed that will help to sustain the project after major grant funding is completed.

Table 4 identifies a number of the institutional changes underway in the Rouge. **(See Table 4 “Institutional Advances in Watershed Management in the Rouge”)**

## **CONCLUSION**

The Rouge Project approach demonstrates that—yes—a watershed can be “managed.” When water quality objectives can only be reached through the control of CSO, storm water and non-point sources—then watershed management must involve the active participation of local units of government.

Project staff feel an overwhelming success with the project. Water quality is improving, and the demonstration techniques have resulted not only in concrete and steel structures, but in real institutional changes that integrate the work of storm water and watershed improvement into the basic institutions of government.

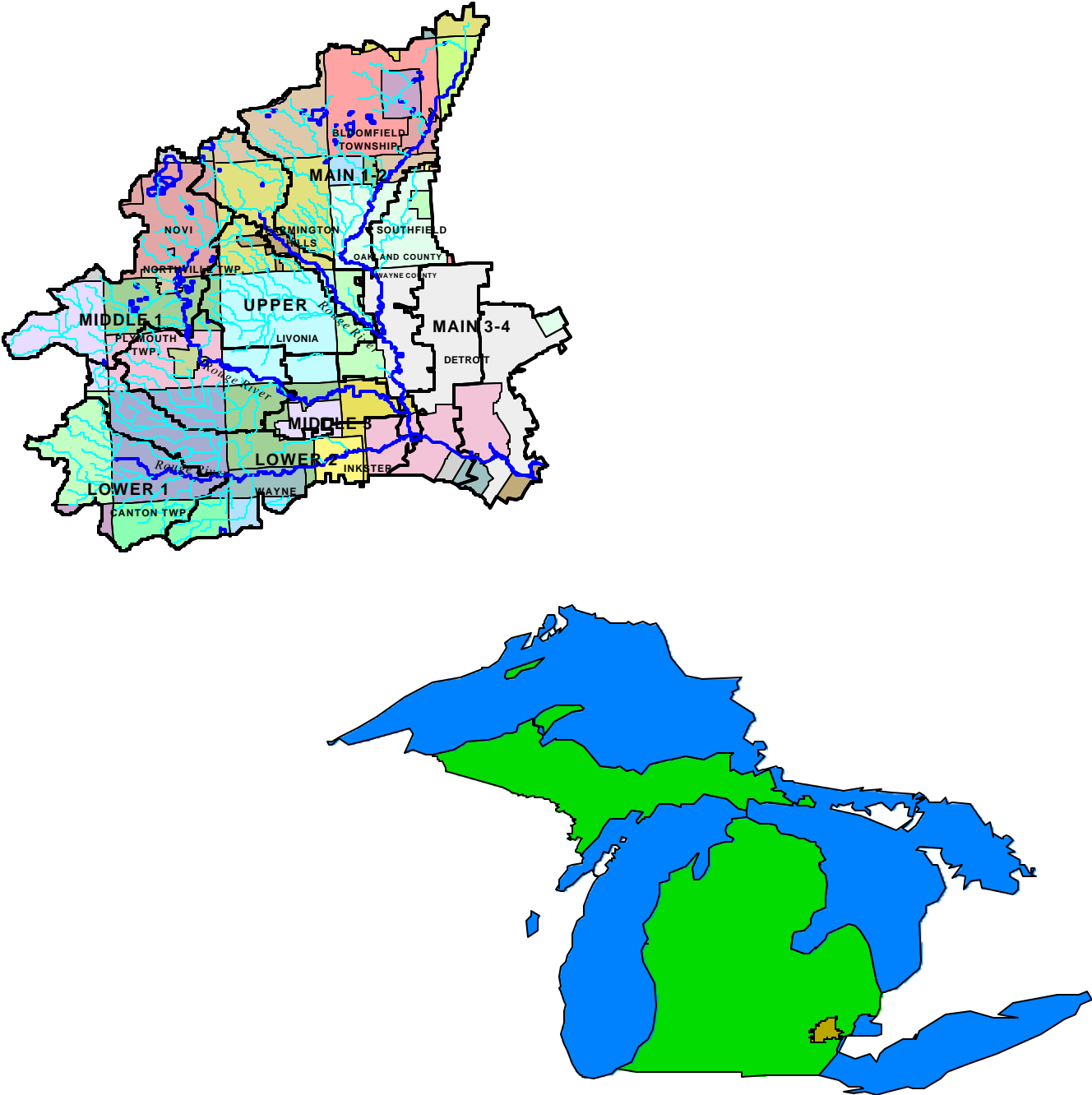
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**FIGURE 1 “LOCATION MAP OF THE ROUGE and SEVEN SUBWATERSHEDS and LOCATION OF ROUGE WATERSHED IN MICHIGAN”**



**TABLE 1 “COMPARISON OF SUBWATERSHED MANAGEMENT AREAS”**

Subwatershed Name	Size*		Representative Water Quality Interests
Main 1 and 2	Acres	65,879	Property protection from flooding, sewer extensions
	Population	240,000	
	Municipalities	20	
Upper	Acres	40,768	Regional detention, erosion control
	Population	170,000	
	Municipalities	9	
Middle 1	Acres	51,596	Headwater protection
	Population	95,000	
	Municipalities	14	
Lower 1	Acres	39,785	Headwater protection and rapid development
	Population	65,000	
	Municipalities	6	
Middle 3	Acres	20,728	Fully developed, improve recreation
	Population	140,000	
	Municipalities	7	
Lower 2	Acres	21,312	Rapidly developing, on-site sewage disposal
	Population	120,000	
	Municipalities	8	
Main 3 and 4	Acres	58,477	Redevelopment, recreation improvements
	Population	600,000	
	Municipalities	9	

\*Several municipalities are counted more than once because they are situated in more than one watershed.

**TABLE 2 “TYPICAL CRITERIA FOR PROJECT SELECTION”**

Criteria	Intent
Demonstration value	Provide not only a local solution, but create a technology transfer inside or outside the watershed.
Project goals	Consistency with watershed protection and restoration goals
General Permit	Encourage of the MDEQ General Permit
Cost-effectiveness	Balance between cost and value gained
Cooperation with other municipalities and agencies	Foster sharing of ideas and local resources


**TABLE 3 “PROFILE OF SUBGRANTS”**

Range of Subgrant (Grant plus local shares)	Number of Subgrant Projects
Over \$10,000,000	12
\$5,000,000 to \$9,900,000	4
\$1,000,000 to \$4,900,000	12
\$500,000 to \$990,000	24
\$100,000 to \$490,000	74
\$50,000 to \$90,000	44
\$10,000 to \$49,000	24
\$5,000 to \$9,000	4


**TABLE 4 “INSTITUTIONAL ADVANCES IN WATERSHED MANAGEMENT IN THE ROUGE”**

Institutional Changes In Rouge	Result
New Steering Committee	Subwatershed-representation, charge to committee includes NPDES permit issues, local costs, dispute resolution, identify watershed-wide coordination needs, advice to Wayne County on grant expenditures
Subwatershed Advisory Groups	Seven groups of communities formed around peers of similar land use, economic, development issues
New environmental ordinances	On-site sewage disposal, storm water management, wetlands revolving fund
GIS	SEMCOG regional forum, community advisory groups sharing data and applications
Monitoring Program	Evolution to long-term ecosystem health monitoring
Technology Transfer	Rouge web site with technical products and data has 45,000 hits per month
School-based education on watersheds	Friends of the Rouge program now over 100 schools

FIGURE 2 "EXAMPLE PROJECT PROFILE"



THE ROUGE RIVER PROJECT  
A WORLD CLASS EFFORT



BRINGING OUR RIVER BACK TO LIFE

# Redford CSO

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*A publication of the Wayne County Rouge River National Wet Weather Demonstration Project*

## Objective

The Redford CSO project seeks to control CSO discharges and to protect water quality for public health.

## Owner

Township of Redford, Michigan



Redford CSO Basin

## Demonstration Aspects

- Design for the 1 year/1 hour storm event as opposed to the presumptive 10 year/ 1 hour event.
- 2 compartments with total volume of 1.9 million gallons preceded by a swirl concentrator. One compartment could be used as first flush tank. When first flush tank is full any additional flow is diverted to the second 0.9 million gallon compartment. Both compartments can dewater in 18 to 24 hours.
- Different modes of operation after influent pumping:
  1. All flow-through basins.
  2. Influent flow rate equally divided between swirl and one basin and the other half through the other basin.
  3. All flow (up to set point maximum) through basins and peak flow rates through swirl and then out the shunt channel.
- The basin is located in a portion of the 7<sup>th</sup> hole in the southwest corner of Glenhurst Golf Course.
- Tipping bucket flushing system.
- An extensive monitoring program to demonstrate

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FIGURE 3 "EXAMPLE PROJECT PROFILE" (Continued)



THE ROUGE RIVER PROJECT  
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BRINGING OUR RIVER BACK TO LIFE

## Seven Mile CSO Retention Basin

*A publication of the Wayne County Rouge River National Wet Weather Demonstration Project*  
**Information Date: October 2000**

### Objective

The Seven Mile CSO project seeks to control CSO discharges and to meet applicable requirements including water quality standards.



### Owner

City of Detroit, Michigan

### Location

The facility is located east of Shiawassee Ave., north of Seven Mile Rd., and west of the Rouge River. The receiving water is the Main Rouge River.

### Dates

Planning Start Date	October 1992
Design Start Date	February 1993
Construction Start Date	February 1996
Operation Start Date	<i>30-day acceptance test began in December 1998</i>

### Construction Cost

\$13,900,000, Basin only through December, 1998

### Demonstration Aspects

- Design for the 1 year, 1 hour storm event with 30 minutes as opposed to the presumptive approach of 30 minutes of detention for the 10-year/ 1 hour event.
- Two compartments with total volume of 2.2 million gallons. The basin compartments will normally be operated in parallel, but for small storms one compartment may be used. One compartment may also be used for first flush and the other as a flow through basin. Basin to be dewatered over 9 hours.
- Allowance for parking over the roof deck to be used by the current property owner for future development.
- Decanting to the Rouge River from each of the two basin compartments subject to the approval of the MDEQ.
- Tipping bucket flushing system and additional wall mounted hose bibs if necessary.
- An extensive monitoring program to demonstrate basin performance.
- Project Highlights

### Project Highlights

- Serves an area of 463 acres
- Eliminates 1 CSO outfall. One CSO outfall to be added to basin by October 1999.
- Gravity flow through the facility