

Water Quality

INITIATIVE

Creating A *Blueprint* for the future of our
Rivers and *Lake Michigan*

The MMSD 2020
Facilities Plan

Water Quality

INITIATIVE



March 2, 2006



Preserving The Environment •
Improving Water Quality

Dear Watershed Partner:

What else will it take to protect and improve our rivers and Lake Michigan in the most cost effective way? That's what this packet of information is all about and we want your input as we draft a final blueprint for the future of clean water.

After the most intensive water quality research in this region in decades, we've developed 11 alternatives that can help keep pollution out of our waterways. Now, we need you to learn more about the alternatives and tell us which one, or what combination of approaches should be used to develop a final plan.

Science is critical as we move forward. If we do not, as a region, rely on science to tell us where to spend money on improvements, we could end up paying a lot of money and get little benefit.

We will need to spend more money on wastewater treatment, especially as current infrastructure ages, the population grows, and development expands. However, the information from this research shows that a majority of pollution getting into our rivers and Lake Michigan comes from polluted stormwater, the most difficult source of pollution to fix.

The water quality research shows that bacteria are the biggest remaining threat to the health of our waterways. For example: in the Menomonee River Watershed, 15% of fecal coliform bacteria are from sewage overflows. The other 85% comes from polluted stormwater runoff.

As you go through this packet, think about this: Where does it make the most sense to spend money if we use scientific data to drive our decision making? What happens to water quality if you spend every dollar on Deep Tunnels and those tunnels only help improve water quality by the 15% caused by sewer overflows? Does it make more sense to spend some money to reduce the sources responsible for the other 85% of water pollution?

Sincerely,

Kevin L. Shafer, P.E.
Executive Director

All planning projects have goals they try to reach, and in line with our mission statement this project has defined goals. In fact, for this project there are two types of goals:

1. **Regulatory Goals:** defined by the Clean Water Act and enacted by the State, regulatory goals are those that protect the waters of the state through permits and other legal requirements.
2. **Publicly Inspired Goals:** defined by the committees advisory to this project and through input received in the fall of 2004, publicly inspired goals are those that people have defined, over and above regulatory goals.

The following are the publicly inspired goals and objectives for the MMSD 2020 Facilities Plan.

Goal 1 – Improved Water Resources

- *Objective 1:* Habitat protection and restoration
- *Objective 2:* Protected public recreation and access
 - *Objective 3:* Pollution reduction and control
 - *Objective 4:* Protected natural systems
 - *Objective 5:* Protected public safety
- *Objective 6:* Managed commercial navigation
 - *Objective 7:* Improved aesthetics

Goal 2 – Regional Leadership, Education and Collaboration

- *Objective 1:* Improved stakeholder education and public understanding
- *Objective 2:* Improved collaborative relationships
- *Objective 3:* Water quality advocacy

Goal 3 – Strong Governmental Role in Environmental Protection

- *Objective 1:* Improved policy regulations and enforcement
- *Objective 2:* Improved government planning and monitoring

Goal 4 – Effective Planning and Design

- *Objective 1:* Improved infrastructure
- *Objective 2:* Coordinated planning efforts
- *Objective 3:* Supported and promoted water quality research
- *Objective 4:* Integrated funding and implementation plans
- *Objective 5:* Integrated environmental justice principles

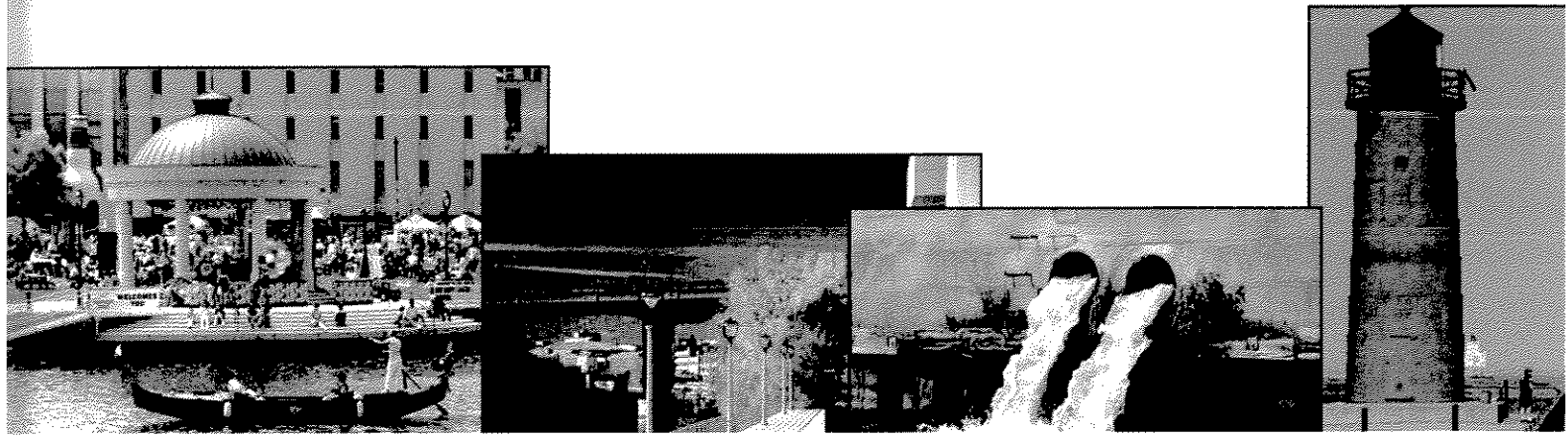
We're using the regulatory and publicly inspired goals to evaluate the alternatives (more on alternatives, beginning on the following pages). In fact, there are several ways we're evaluating alternatives. These include the following:

How Do We Measure Water Quality?

Water Quality Index:
The scores can range from 0 to 10, with 0 being poor and 10 being very good. There are a number of water quality parameters we're looking at, including nutrients like phosphorus and nitrogen that cause algae to grow, suspended solids that cloud water and cause a brown plume at the mouths of our rivers, bacteria like fecal coliform that can cause our beaches to close, and oxygen-demanding substances (or biochemical oxygen demand) that use the oxygen needed by fish and aquatic plants. Other parameters were used to create the index as well.

How Do We Measure Overflows?

SSO= # Overflows:
CSO= # These are the numbers of sewer overflows that are predicted to happen, on average, every year. Overflows are broken down into combined sewer overflows (or CSOs) and sanitary sewer overflows (or SSOs). CSOs are by design mixed with stormwater; SSOs are not, although significant amounts of rainwater do leak into the separate sewerage system. MMSD is allowed by permit to have up to six combined sewer overflows per year. Sanitary sewer overflows are not allowed, except under certain conditions.



How Do We Measure Whether Alternatives Meet the Goals & Objectives?

#

Public Goals Index:

We're using environmental regulations and publicly inspired goals to create a composite score based how well an alternative meets the goals and objectives developed for the project through the public involvement process. The scores range from 0 to 10, with 0 being poor and 10 being very good.

How Do We Measure Cost?

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Cost:

This is an estimate of operation, maintenance, and capital costs in 2006 dollars based on information known at this preliminary phase. Costs are expressed in ranges due to the various uncertainties inherent in planning. Costs will be revised during the selection of a recommended plan, and naturally revised as time goes on and conditions are better known. Please note that some of the costs may be borne by MMSD, and some may be borne by other entities.



What is It?

- The Baseline Alternative includes water quality investments the region is already committed to making. This includes projects by MMSD, cities and villages, and the Department of Natural Resources (DNR). This and all alternatives are based on projected population and land use for the year 2020.



What Is Involved?

- By MMSD: estimated \$900 million in overflow reduction projects.
- By Others: local sewer infrastructure work & stormwater regulation implementation.
- Total regional cost of this alternative is \$1.5-2.0 billion.

What are the Results?

- This is a freestanding option that serves as a basis of comparison for every other alternative.

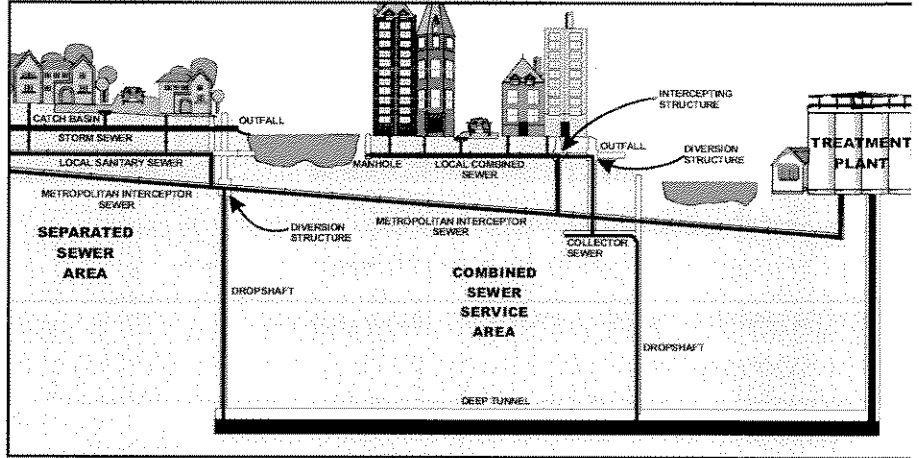
		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—

Source: SEWRPC Water Quality Modeling.
 Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

Overflow Elimination with Sewer Separation

What is It?

- This alternative uses sewer separation and a combination of other infrastructure investments to prevent overflows, based on rainfall and snowmelt data since 1940.



What Is Involved?

- Separate sewers in 89% of the combined sewer service area.
- Increase wastewater treatment plant capacity by 300 million gallons per day. Each of MMSD's treatment plants currently can handle about 300 million gallons per day.
- Increase Deep Tunnel pumping capability by 100 million gallons per day.
- Increase Deep Tunnel storage by 230 million gallons.

What are the Results?

Alternatives	Screening Alternatives	Criteria			
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost
		Sanitary Sewer	Combined Sewer		
	#1: Baseline	1.2	3.6	5.7	—
	#2: Overflow Elimination with Sewer Separation	0	0	4.3	\$4.5-5.8

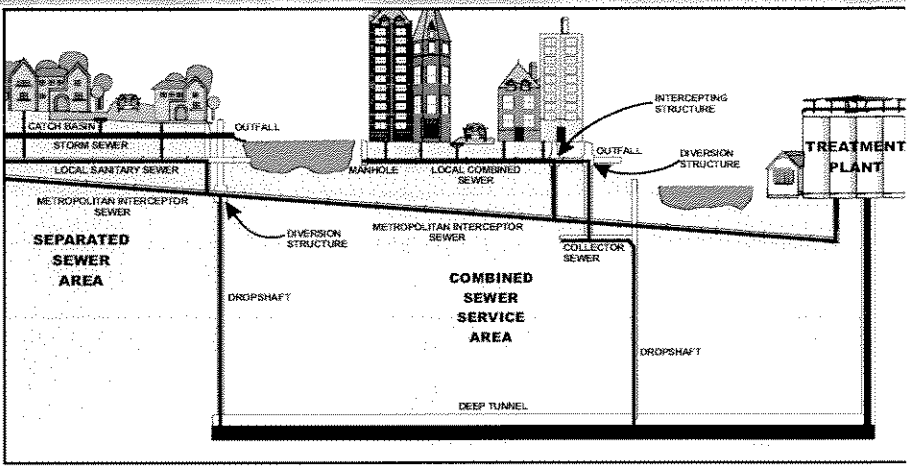
Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

Overflow Elimination Initiative without Sewer Separation

What is It?

- This alternative prevents overflows based on rainfall and snowmelt data since 1940 with major MMSD infrastructure investments.



What Is Involved?

- Increase wastewater treatment plant capacity by 300 million gallons per day. Each of MMSD's treatment plants currently can handle about 300 million gallons per day.
- Increase Deep Tunnel pumping capability by 100 million gallons per day.
- Increase Deep Tunnel storage by 1600 million gallons, three times more than what will be built by 2010.

What are the Results?

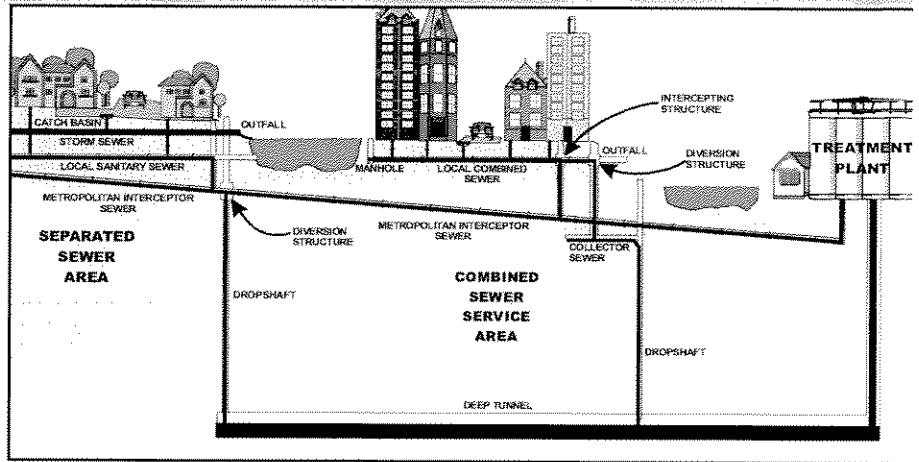
Alternatives	Screening Alternatives	Criteria			
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost
		Sanitary Sewer	Combined Sewer		
	#1: Baseline	1.2	3.6	5.7	_____
	#3: Overflow Elimination without Sewer Separation	0	0	5.1	\$4.9-6.4

Source: SEWRPC Water Quality Modeling.
 Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

Eliminate Separate Sewer Overflows Only

What is It?

- This alternative prevents separate sewer overflows based on rainfall and snowmelt data since 1940 with major MMSD infrastructure investments.



What Is Involved?

- Increase wastewater treatment plant capacity by 300 million gallons per day. Each of MMSD's treatment plants currently can handle about 300 million gallons per day.
- Increase Deep Tunnel pumping capability by 100 million gallons per day.
- Increase Deep Tunnel storage by 160 million gallons.

What are the Results?

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	#4: Eliminate Separate Sewer Overflows Only	0	3.5	5.3	\$1.2-1.6	

Source: SEWRPC Water Quality Modeling.

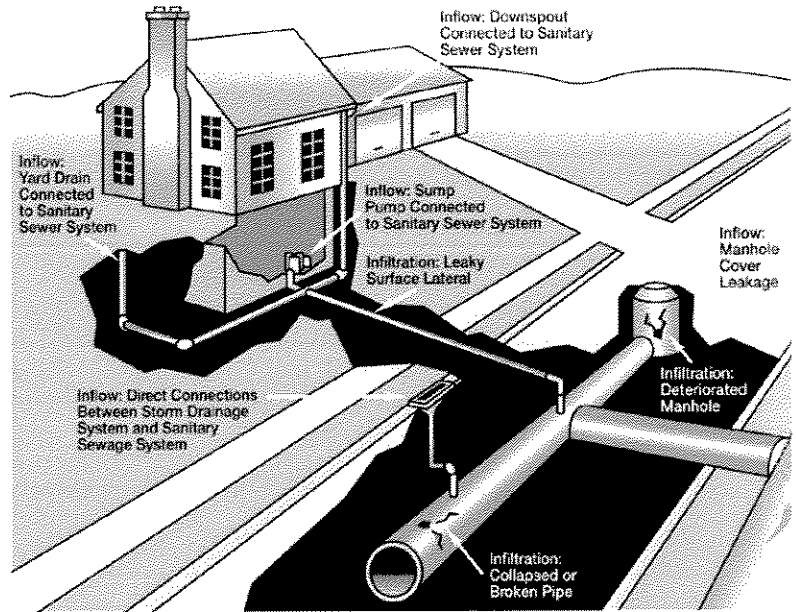
Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

What is It?

- Eliminate separate sewer overflows by reducing the volume of water that leaks into the separate sewer system.

What Is Involved?

- Removal of inflow and infiltration using all possible methods – both public and private sewers and sewer laterals.
- Rehabilitation required in 90% of separate sewer area.



What are the Results?

Criteria

		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost
		Sanitary Sewer	Combined Sewer		
Alternatives	Screening Alternatives	#1: Baseline		5.7	—
		#5: Fix Leaky Sewers		5.1	\$6.7-8.8

Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

Stormwater Best Management Practices

What is It?

- Implement widespread best management practices (BMPs) to help reduce the amount of polluted stormwater that gets into our rivers and lakes. This alternative includes a variety of BMPs for urban, suburban, and rural communities.



What Is Involved?

- Best management practices to control polluted stormwater in rural areas.
- Rain barrels, downspout disconnections, roof storage, green roofs, and more.
- Pet litter, waterfowl control, litter, and road salt reduction programs.

What are the Results?

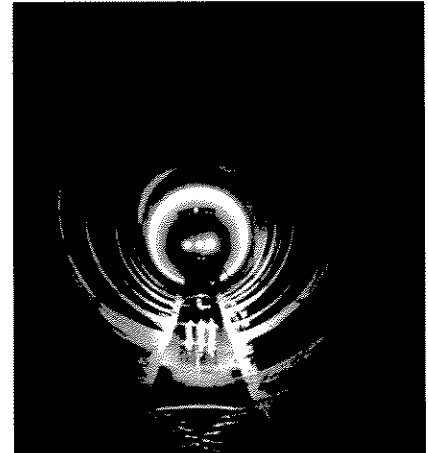
		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
		#6: Stormwater Best Management Practices	0.9	2.9	7.7	\$1.1-1.5

Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

What is It?

- This alternative requires MMSD and others to meet all state and federal overflow and stormwater regulations. It includes full implementation of state mandated polluted storm water regulations.



What Is Involved?

- Reduce polluted storm water runoff by cities and villages.
- Establish low-impact farming practices.
- Implementation of downspout disconnections, rain gardens, rooftop storage, and other stormwater best management practices in the combined sewer area.
- Implement necessary sewer facilities to meet SSO and CSO regulations.

What are the Results?

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	Regulatory Alternatives	#7: Regulatory Approach (Everyone)	0.2	2.1	6.1	\$1.0-1.5

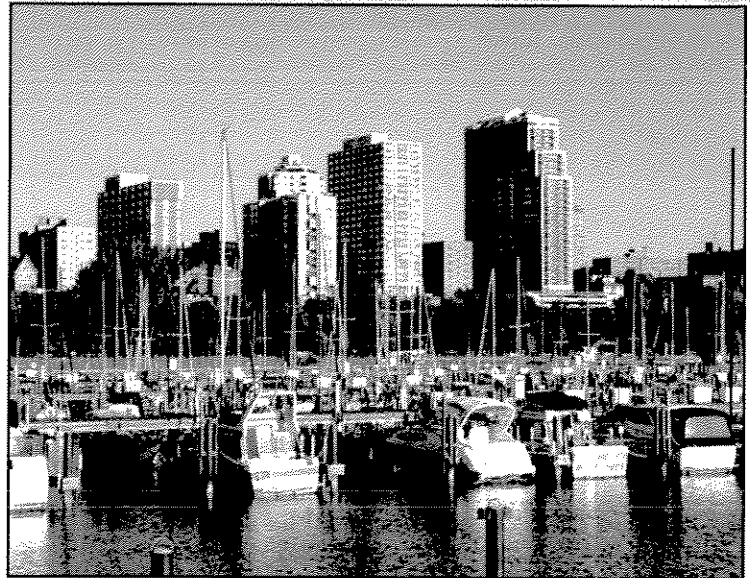
Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

Regulatory Approach (MMSD and Communities)

What is It?

- Requires MMSD and communities to meet all state and federal sewer and stormwater regulations- excluding agricultural areas.



What Is Involved?

- Requires full implementation of state mandated polluted stormwater regulations for all non-agricultural areas.
- Implement necessary sewer facilities to meet SSO and CSO regulations.
- Implement limited best management practices in non-agricultural areas.

What are the Results?

Alternatives		Criteria			
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost
		Sanitary Sewer	Combined Sewer		
Screening Alternatives	#1: Baseline	1.2	3.6	5.7	_____
Regulatory Alternatives	#8: Regulatory Approach (MMSD and Communities)	0.2	2.1	6.2	\$0.6-0.8

Source: SEWRPC Water Quality Modeling.

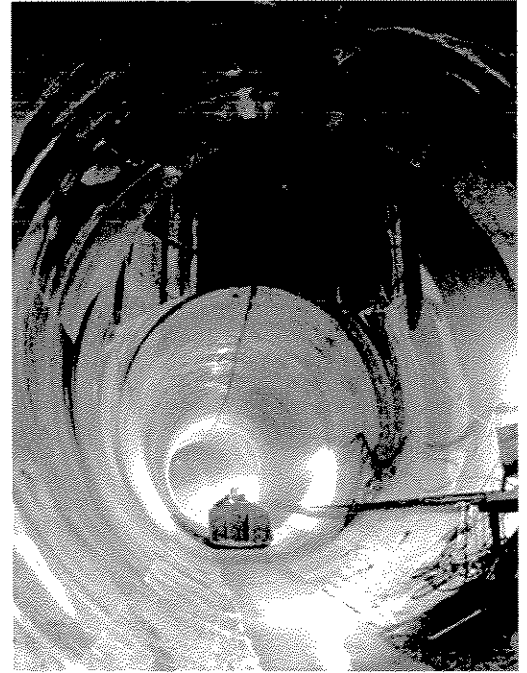
Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

What is It?

- This alternative proposes reducing overflows by operating MMSD facilities differently.

What Is Involved?

- Change operating strategy to account for no difference in combined sewer and separate sewer overflows (this might require a change in State and Federal regulations).
- Implement all State regulations for agricultural and non-agricultural runoff.
- Implement limited best management practices in non-agricultural areas.



What are the Results?

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	Regulatory Alternatives	#9: Change Operating & Regulatory Approach	1	1.1	6.1	\$1.1-1.5

Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

What is It?

- This alternative proposes a variety of facility improvements and best management practices (BMPs) for agricultural and non-agricultural areas.



What Is Involved?

- Best management practices to reduce polluted stormwater in agricultural areas.
- Implement necessary sewer facilities to meet SSO and CSO regulations.
- Best management practice solutions for combined and separate sewer area.
- Disinfect polluted stormwater runoff at critical locations.

What are the Results?

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	Watershed Alternatives	#10: Watershed Approach: Facility Improvements with Best Management Practices	0.9	2.9	8.4	\$1.5-2.1

Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

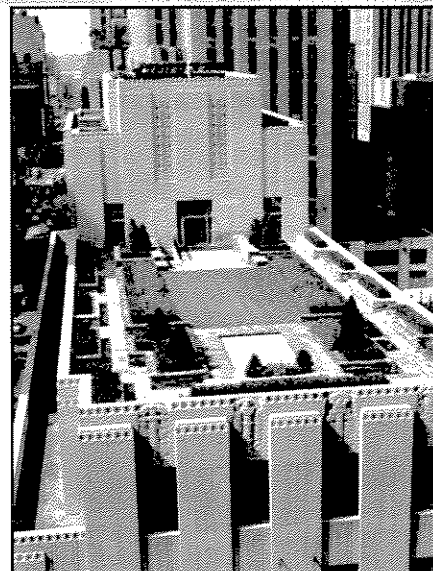
Watershed Approach: Habitat Improvement

What is It?

- This alternative maximizes restoration and protection of natural areas, such as wetlands and prairies. It also includes a variety of facility improvements and best management practices for agricultural and non-agricultural areas.

What Is Involved?

- Improve habitat through wetland restoration, establish prairies.
- Best management practices to reduce polluted stormwater in agricultural areas.
- Best management practice solutions for combined and separate sewer area.
- Disinfects polluted stormwater runoff at critical locations.



What are the Results?

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	Watershed Alternatives	#11: Watershed Approach: Habitat Improvement	0.9	2.9	9.1	\$1.7-2.3

Source: SEWRPC Water Quality Modeling.

Cost ranges are estimates in 2007 present worth dollars. Estimates do not include financing costs.

		Criteria				
		Annual Sewer Overflows		Achieve WQ & Public Goals	Cost	
		Sanitary Sewer	Combined Sewer			
Alternatives	Screening Alternatives	#1: Baseline	1.2	3.6	5.7	—
	#2: Overflow Elimination with Sewer Separation	0	0	4.3	\$4.5-5.8	
	#3: Overflow Elimination without Sewer Separation	0	0	5.1	\$4.9-6.4	
	#4: Eliminate Separate Sewer Overflows Only	0	3.5	5.3	\$1.2-1.6	
	#5: Fix Leaky Sewers	0	3.5	5.1	\$6.7-8.8	
	#6: Stormwater Best Management Practices	0.9	2.9	7.7	\$1.1-1.5	
	Regulatory Alternatives	#7: Regulatory Approach (Everyone)	0.2	2.1	6.1	\$1.0-1.5
	#8: Regulatory Approach (MMSD and Communities)	0.2	2.1	6.2	\$0.6-0.8	
	#9: Change Operating & Regulatory Approach	1	1.1	6.1	\$1.1-1.5	
	Watershed Alternatives	#10: Watershed Approach: Facility Improvements with Best Management Practices	0.9	2.9	8.4	\$1.5-2.1
	#11: Watershed Approach: Habitat Improvement	0.9	2.9	9.1	\$1.7-2.3	

Legend: 0 to 10, with 0 being poor and 10 being very good

- Please note, estimates in grey are not final
- Cost ranges are estimates in 2007 present worth dollars. Costs include capital and 20-years of operating costs. Estimates do not include financing costs

Glossary of Terms and Acronyms Used

201 Plan – A traditional facilities plan for a wastewater treatment facility, as required by federal law. Section 201 of the 1972 Federal Clean Water Act delegated facilities planning to utilities, like the Milwaukee Metropolitan Sewerage District.

208 Plan - A traditional regional water quality management plan as required by federal law. Section 208 of the 1972 Federal Clean Water Act delegated regional water quality planning to designated planning agencies. In Wisconsin, the Wisconsin Department of Natural Resources designated the Southeastern Wisconsin Regional Planning Commission as the area wide water quality planning agency for the seven-county area in southeastern Wisconsin, including the Milwaukee metropolitan area.

2010 Facilities Plan - The Milwaukee Metropolitan Sewerage District's 2010 Facilities Plan was approved by the Wisconsin Department of Natural Resources in 1998. The projects are on schedule for completion by 2010. The 2010 Plan is a 201 Plan.

2020 Facilities Plan - The Milwaukee Metropolitan Sewerage District's 2020 Facilities Plan will be the District's facilities planning document through the year 2020. The 2020 Plan is a 201 Plan. It, along with the Southeastern Wisconsin Regional Planning Commission's Regional Water Quality Management Plan Update, is referred to as the Water Quality Initiative.

Ag – Agriculture.

Alternative (also called Preliminary Alternatives) – A collection of FPOP technologies that form a comprehensive watershed action. An alternative is developed in response to associated themes or ideas identified by the Technical Advisory Team (TAT), Citizens Advisory Council (CAC), Facilities Planning Policy Committee, and Watershed Officials Forum.

BMPs - Best Management Practices.

BOD - Biochemical Oxygen Demand.

CMOM - Capacity, Management, Operation and Maintenance.

CSO - Combined Sewer Overflow (or Overflows).

CSSA - Combined Sewer Service Area.

CST - Conveyance, Storage, and Treatment.

CWA – 1972 Federal Clean Water Act.

DO - Dissolved Oxygen.

EJ - Environmental Justice. Requires federal agencies, or agencies using federal funds, to identify any adverse and disproportionate impacts of their programs, policies, and activities on the health or environment of minority and low-income populations.

EPA - United States Environmental Protection Agency.

Facilities - Structural assets that are part of the systems under consideration for the 2020 FP/RWQMPPU such as the MMSD conveyance, treatment and storage system.

FP - Facilities Plan.

FPOPs - (Facilities, Policies, Operational Improvements and Programs) - General acronym describing all possible actions or technologies that can be compiled for an alternative and be used to achieve water resource goals and objectives.

GIS - Geographic Information System (or Systems).

GPD - Gallons per Day.

Goal - A desired condition, usually defined in broad terms interpreted differently from a variety of perspectives.

I/I - Infiltration and Inflow (into the sanitary sewer system). Infiltration is water that is not sanitary waste that enters a sanitary sewer system from the ground through defective pipes, pipe joints, connections or manhole walls. Inflow is water that is not sanitary waste that is discharged to a sanitary sewer system from sources such as downspouts, area drains, foundation drains, manhole covers, catch basins and surface runoff of stormwater.

LID - Low Impact Development.

MG - Million Gallons.

MGD - Million Gallons per Day.

Mg/l - Milligrams per liter (or parts per million).

MIS - Metropolitan Interceptor Sewer.

MMSD or District - Milwaukee Metropolitan Sewerage District.

MOU - Memorandum of Understanding. In this case, an agreement made between the Wisconsin Department of Natural Resources, the Southeastern Wisconsin Regional Planning Commission and the District on how these planning projects will be coordinated and developed.

NPDES - National Pollutant Discharge Elimination System.

NPS - Non-point source, most often used to describe a type of pollution from a dispersed source

NR 151 - NR 151 Subchapter is part of 8 Department of Natural Resources rules that address runoff pollution (also known as nonpoint source pollution), the major cause of polluted waters in Wisconsin and the United States. *Source: WDNR website.*

NR 216 - NR 216 is part of Department of Natural Resources rules that regulate municipal stormwater discharges.

Objective – A more specific desired future condition, and usually relates to a goal.

Operational Improvements - Methods or manners to improve the efficiency or effectiveness of procedures or system functions.

Policies - A condition established by authority.

POTW - Publicly Owned Treatment Works.

Programs - Systems of services, opportunities and projects, or actions taken to implement a policy.

Public – Individuals or representatives from organizations or interest groups that have a strong interest in the District's work and policies (derived from USEPA).

RWQMPU – The Regional Water Quality Management Plan Update. SEWRPC's response to the Congressional mandate that the waters of the United States be made "fishable and swimmable" to the extent practical. The regional water quality management plan, as well as the update currently under preparation, provides recommendations for the control of water pollution from such point sources as sewage treatment plants, points of separate and combined sewer overflow, and industrial waste outfalls. It also recommends controlling such nonpoint sources as urban and rural stormwater runoff.

Screening Alternative(s) – The "bookend" or "what if..." conditions built on the future situation; used to frame the discussion on preliminary alternatives and alternatives.

SEWRPC - Southeastern Wisconsin Regional Planning Commission.

SSO - Sanitary Sewer Overflow (or Overflows).

Technical Measures – The presentation of standards, modeling, quantitative, or analytical data (data) to describe measures and evaluate the effectiveness of preliminary alternatives and alternatives.

Technology – Potential tools or actions that could be implemented to improve water quality, addressing both point and non-point sources of water pollution. They can be divided into four categories: Facilities, Policies, Operational Improvements and Programs (FPOPs). This is also the science and means of specific processes that pertain to fields of knowledge.

TSS - Total Suspended Solids.

UV Ultraviolet - A disinfection treatment technology.

UWS - United Water Services.

VRSSI - Volume Reserved for Separate Sewage Inflow.

Water Quality Standards – Water quality standards are a state regulation approved by the EPA that include designated uses, criteria, and antidegradation standards. The WQSs provide numeric and narrative criteria that can be used to evaluate conditions, determine progress, and assess compliance with state requirements.

Water Resource – Water from which the public and nature derives a benefit or depends upon.

Watershed - A watershed is the area of land where all of the water that drains off of it goes to the same place; watersheds come in all shapes and sizes. They cross county, state, and national boundaries. (US Environmental Protection Agency)

Watercourse System – All water resource components of a watershed, with the exception of the sewage conveyance and treatment systems.

WDNR - DNR Wisconsin Department of Natural Resources.

WQ - Water Quality.

WQI - Water Quality Initiative. A phrase, developed by MMSD, most often to describe the combined planning effort that produces the District's 2020 Facilities Plan and the Southeastern Wisconsin Regional Planning Commission's Regional Water Quality Management Plan Update.

