Fox Metro
Water Reclamation District

COMBINED SEWER OVERFLOW (CSO) LONG TERM CONTROL PLAN (LTCP)

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FOX METRO WATER RECLAMATION DISTRICT
COMBINED SEWER OVERFLOW LONG TERM CONTROL PLAN

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EXECUTIVE SUMMARY

1. PURPOSE

The purpose of this Combined Sewer Overflow Long-Term Control Plan (CSO LTCP) is to meet the requirements of Item No. 10 of Special Condition 14 of the Fox Metro Water Reclamation District's (FMWRD's) NPDES Permit No. IL0020818. Item No. 10 of Special Condition 14 requires the development of *"a Long-Term CSO Control Plan (LTCP) for assuring that the discharges from the CSOs (treated or untreated) ... shall not cause or contribute to violations of applicable water quality standards or cause use impairment in the receiving waters"*. The LTCP is required to be submitted within thirty-six months of the effective date of FMWRD's NPDES Permit (or April 1, 2010).

The development of the LTCP relied heavily on recent facility planning documents, in particular the "Master Plan of Wastewater Transportation and Treatment", prepared by Walter E. Deuchler Associates, Inc., in April of 2005 (hereinafter referred to as the 2005 Master Plan). The 2005 Master Plan addressed existing conditions and future needs of FMWRD's collection system and wastewater treatment plant. It identified alternative methods of transport and treatment to address future growth while protecting the environment and maximizing the effectiveness of the existing wastewater treatment processes. The 2005 Master Plan was submitted to the Illinois Environmental Protection Agency (IEPA) on May 9, 2005 and received Facilities Plan Approval from the IEPA for the solids handling improvements on August 13, 2007 and Phase 1 of the liquid train improvements on September 29, 2008. This LTCP incorporates these previously approved infrastructure improvements and other recommended improvements identified in the 2005 Master Plan.

2. HISTORY

The FMWRD (formerly known as the Aurora Sanitary District) was established in the late 1920's under the Illinois Sanitary District Act of 1917 and had its Facility Planning Area (FPA) established in 1979 under the *Area-wide Water Quality Management Plan for Northeastern Illinois.* Over the past 31 years, the FMWRD has expanded its FPA boundaries to accommodate new development in and around seven municipalities. The FPA is located in the heart of the Fox River Valley with the Fox River flowing through its center from North to South.

The FPA served includes all or portions of the municipalities of Aurora, North Aurora, Batavia, Montgomery, Oswego, Yorkville, and Sugar Grove. Municipalities served by separate sanitary sewer systems, own and maintain their own collection systems (gravity sewers of less than fifteen inches (15") in diameter) and associated minor pump stations. The FMWRD owns and maintains the larger separate sanitary interceptor sewers (gravity sewers of fifteen inches (15") in diameter and larger) and associated pump stations. Municipalities served by combined sewer systems (CSS) own and maintain the entire CSS with the exception of the 1929 original combined sewer interceptor (OCSI) which is owned, operated and maintained by FMWRD. The only CSS within FMWRD's FPA is located within the older, central area of Aurora.

The first sewers were built in the City of Aurora area in the late 1880's and consisted of one piping system designed and constructed to receive both wastewater and land runoff. At that time, untreated sewage and combined sewage was discharged directly into the Fox River. A combined sewer interceptor and trickling filter plant were constructed in 1929 by the FMWRD to eliminate the direct discharge of untreated sewage to the Fox River and reduce the volume of combined sewage being discharged into the Fox River. The existing wastewater treatment facility remains in the same location today as the original trickling filter plant. The City of Aurora discontinued the practice of installing combined sewer systems into the 1940's. Since then, the City of Aurora has installed separate sewer systems, which consist of two independent piping systems: one system for sanitary wastewater (conveying wastewater together with incidental land runoff) and one system for storm water (intended to receive only land runoff).

Over the years, the City of Aurora has partially separated a portion of their original combined sewer system via the removal of publicly owned storm sewer structures (i.e. catch basins and inlets) and construction of new storm sewer systems. The combined sewer system within FMWRD's current FPA is located entirely within the older central area of the City of Aurora. This boundary of the CSS accounts for approximately 130 miles of sewers that serve approximately 7,145 acres (11.2 square miles), a large portion of which has been partially separated by the COA over the years.

Flows from the OSCI are mixed with flows from separate sanitary sewer interceptors prior to entering the headworks at the wastewater treatment plant (WWTP). All flow to the WWTP has historically been permitted under previous determinations by IEPA and the Illinois Pollution Control Board (IPCB) as combined sewage. The IPCB adopted regulations in the early 1980's for performance criteria associated with combined sewer overflows and treatment plant bypasses. Specifically, Section 306.305 of the 35 IL Administrative Code Subtitle C, Chapter I states:

> *"All combined sewer overflows and treatment plant bypasses shall be given sufficient treatment to prevent pollution, or the violation of applicable water quality standards unless an exception has been granted by the* IPCB …."

To comply with the above regulations, the FMWRD (as lead agency) and the City of Aurora performed extensive amounts of investigative and planning work in the early 1980's including: I&I analyses, sanitary sewer evaluation surveys, combined sewer overflow studies and facility planning studies. The summation of this work (Project C17-1407) resulted in a Municipal Compliance Plan and a joint petition to the IPCB for an exception to the CSO regulations. IPCB Order 85-224 granted an exception to the CSO regulations requiring that the FMWRD operate its treatment facility in accordance with the following provisions:

- *All flows received at the treatment plant must be screened and metered.*
- *All flows up to 74 million gallons per day ("MGD") must receive a minimum of primary clarification prior to and during an occurrence of an overflow discharge.*
- *All flows up to 68 MGD must receive full treatment prior to and during any occurrence of an overflow discharge ahead of or following primary treatment units.*

FMWRD owns and operates a single CSO discharge outfall at the WWTP site. This CSO is currently permitted (Outfall No. 002) to discharge to the Fox River any flows to the plant in excess of the treatment levels described in IPCB 85-224. The collection system and treatment system is operated to maximize transport and treatment of wastewater flow in order to minimize CSO discharges.

3. PUBLIC PARTICIPATION

The FMWRD encouraged public participation in the development of the LTCP through the formation of a Citizen's Advisory Committee (CAC). The CAC provided input at critical stages of the plan development, and served as a communicative link to the various local groups that they represent. Public participation and involvement has proven to foster public ownership in the plan. This collaborative effort is discussed further in Section 3.

At the final meeting of the CAC, the CAC unanimously concurred with the staff recommended CSO LTCP as presented and recommended that it be forwarded to the FMWRD Board of Trustees for formal action. Also, upon IEPA's review of this LTCP, the FMWRD's receipt of comments or suggested modifications (if any) from the IEPA and the incorporation of same into the LTCP, a public hearing will be held by the FMWRD regarding the final LTCP.

4. EXISTING CONDITIONS

The existing FMWRD wastewater treatment plant facility is rated for an average flow of 42 mgd, and the treatment train includes screening, grit removal, primary clarification, aeration, secondary clarification, filtration, and disinfection. The plant is capable of treating peak flows up to a design maximum flow of 85 mgd. During wet-weather events, first 85 mgd of wet-weather flow is fully treated (secondary treatment), filtered and disinfected, while excess flow above this amount is discharged over a 40 foot-long weir after screening and grit removal to the Fox River. The frequency and volume of discharge to the river depend on the capacity of the wastewater treatment plant, the hydraulic geometry of the overflow weir, storm intensities and duration.

The development of the LTCP required 1) a thorough understanding of the physical characteristics of the watershed and the combined sewer system, 2) the sewer systems response to a variety of wet-weather conditions, and 3) the impacts of CSOs on the receiving waters. An extensive monitoring program was conducted as part of the LTCP which included: sewer system monitoring and modeling, CSO discharge monitoring and sampling, stream flow monitoring, water quality monitoring and modeling, and biological studies of the Fox River. Section 2 of this report provides more detail of the various components of the monitoring program and development of existing conditions.

5. SENSITIVE AREA DETERMINATION

The USEPA 1994 CSO Control Policy dictates that the highest priority in the development of control alternatives in the LTCP is to dictate the elimination, relocation, or control of CSO discharges into "sensitive areas". Section II.C.3 of that policy defines a sensitive area as a receiving stream meeting any of the following criteria:

- Outstanding National Resource Waters (ONRW), or
- Waters containing threatened or endangered species or their habitat, or
- Shellfish beds, or
- Public drinking water intakes or their designated protection areas, or
- Primary contact recreational areas.

A thorough analysis of each of the above criteria was conducted in Section 4 of this report. The analysis concluded that none of the five criteria for sensitive areas were met and that FMWRD CSO Outfall 002 is not located within a sensitive area.

6. PLANNING APPROACH

The planning period used in the development of this LTCP is 20 years, which reflects the period of the 2005 Master Plan from 2005 to 2025. This planning period is used extensively throughout this report for population projections, hydraulic loading projections, pollutant loading projections, implementation schedule, etc. However, for the purposes of financial planning presented within this document, the 20-year planning period used is from 2009 to 2028.

The CSO control policy outlines two different approaches when considering CSO control: the presumptive approach or the demonstrative approach.

The Presumptive Approach requires reducing the CSOs to meet one of three criteria as described below. By meeting one of these three criteria there is presumed to be an adequate level of control to meet applicable state and local WQS in the receiving stream. The three criteria are listed below:

1. *"No more than an average of four overflow events per year, provided that the permitting authority may allow up to two additional overflow events per year. For the purpose of this criterion, an overflow event is one or more overflows from a combined sewer system as a result of a precipitation event that does not receive the minimum treatment specified."*

2. *"The elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer system during precipitation events on a system-wide annual average basis."*

3. *"The elimination or removal of no less than the mass of the pollutants, identified as causing water quality impairment through the sewer system characterization, monitoring, and modeling effort, for the volumes which would be eliminated or captured for treatment under paragraph 2 above." (EPA, 1994).*

The Demonstrative Approach requires a demonstration that a selected control program, though not meeting the criteria described in the presumption approach described above, is adequate to meet the water quality-based requirements of the CWA. With this approach, there are no specific limits on CSO events, in regard to flow or pollutant loading. To be a successful control program, each of the following must be demonstrated:

1. *The planned control program is adequate to meet the WQS and protect the designated uses, unless WQS or uses cannot be met as a result of natural background conditions or pollution sources other than CSOs,*

2. *The CSO discharges remaining after implementation of the planned control program will not preclude the attainment of WQS or the receiving water's designated uses or contribute to their impairment. Where WQS and designated uses are not met in part because of natural background conditions or pollution sources other than CSOs, a total maximum daily load, including a waste load allocation and a load allocation, or other means should be used to apportion pollutant loads,*

3. *The planned control program will provide the maximum pollution reduction benefits reasonably attainable, and*

4. *The planned control program is designed to allow cost effective retrofitting if additional controls are subsequently determined to be necessary to meet WQS or designated uses.*

The demonstration approach requires that CSO discharges that remain after LTCP implementation will meet the Water Quality Standards (WQS) for that body of water.

This LTCP was developed utilizing the Presumptive Approach outlined above.

7. ALTERNATES EVALUATION AND DEVELOPMENT

Section 7 of this report describes the development of CSO control plan alternatives identified in Section 6 of this report as being retained for further consideration and the factors used to evaluate the alternative plans. Numerous CSO control technologies were considered and the alternatives identified for further consideration included: I&I reduction, storage and treatment. CSO control elements that apply to the FMWRD CSO Outfall 002, as well as those that apply to the entire wastewater collection system, were discussed and developed. The alternative elements were divided into either system wide elements or treatment plant elements and evaluated based upon their ability to comply with regulatory requirements, feasibility and ease of operation and maintenance.

Detailed analyses of the various alternatives had been conducted as part of previous studies conducted by the FMWRD (in particular the 2005 Master Plan and the 2005 Wet Weather Facilities Study). These analyses are summarized in Section 7. Final alternatives were selected based upon cost-effectiveness in non-monetary factors such as environmental effects, contributions to water quality objectives, implementation capabilities, energy and resource use, reliability and expandability.

8. RECOMMENDED PLAN

FMWRD is committed to improving the water quality of the Fox River. The elements of the recommended LTCP have been selected to provide significant improvements to the quality of the receiving water while balancing ratepayer affordability. The plan consists of both system wide elements and treatment plant improvements and upgrades. Together these elements constitute the complete LTCP for FMWRD.

- ***System Wide Components*** - System wide elements of the recommended plan include improvements to the collection system in order to reduce peak flow and to reduce the cost of providing additional transportation capacity for a hydraulically overloaded collection system, as well as to reduce the cost for providing additional peak flow treatment capacity at the WWTP. The LTCP recommends the construction of two satellite wastewater storage facilities adjacent to two of the major interceptors: the North Aurora Interceptor and the Waubonsie Interceptor. These two storage facilities described below will reduce the 2025 peak hour flow to the WWTP by 47.9 mgd.

- ***Treatment Plant Components*** - Treatment plant elements of the recommended plan include upgrades to the existing treatment plant processes, construction of excess wet weather treatment facilities and expansion of the wastewater treatment plant. A review of the excess flow control strategy was conducted as part of the 2005 Master Plan and recommendations were developed in order to improve the reliability and performance of the treatment plant.

  The 2005 Master Plan assumed that all future flows to the WWTP would be split and sent to either the existing treatment facilities (to be known as the "North Facility") or to a new southerly addition to the existing facilities (to be known as the "South Facility"). Design considerations for the recommended plant improvements include secondary treatment of a 2025 design average flow (DAF) of 52 mgd, secondary treatment for peak hourly flows of 131 mgd (which is the equivalent of a 3-month storm event) and enhanced primary treatment for a design peak instantaneous flow of 185 mgd, which is the equivalent of a 5-year storm event (assuming approximately 50% reduction of peak inflow). Additional design provisions in the 2005 Master Plan include phosphorus removal and improved nitrification.

  The various treatment plant elements of the recommended LTCP are discussed in more detail in Section 8.

The 2005 Master Plan recommended the expansion of the WWTP to accommodate peak storm water flows as well as growth in the FPA. The expansion is planned to be accomplished in six phases between the years 2005 through 2025. Phases 1 and 2 target the hydraulic issues associated with excessive storm flows, while phases 3 through 6 address both the hydraulic and organic concerns associated with growth in the FPA as well as nutrient removal.

Phase 1 of the treatment plant improvements includes a chemically enhanced primary treatment (CEPT) system and supporting infrastructure such as a new raw sewage pumping station, 60" diameter gravity sewer, 54" force main, and an expansion to the chlorination/de-chlorination facility. Phase 1 also includes construction of the solids handling facilities (TPAD) and the incorporation of a new control system that will improve plant operation and data reporting capability. The control of wet-well levels will be improved by permitting control by an operator at a central location. Phase 1 is presently under construction and scheduled for completion in 2012.

Facility Planning for Phase 2 began in 2008 and includes the first stage of the South Facility. This improvement will provide additional hydraulic capacity as well as the capability of nutrient removal to the existing plant. This work includes raw sewage pumping, grit removal, primary clarifiers, secondary treatment, final clarifiers and solids thickening.

The 1994 CSO Control Policy requires that control plans be expandable such that higher levels of control can be implemented if required in the future. The recommended LTCP provides a great deal of flexibility for future expansion including, but not limited to, the following:

- Additional primary tanks to the proposed CEPT system to increase the primary treatment capacity,
- Additional expansion of the South Facility for future growth and peak flows,
- Incorporation of "High Rate Treatment" improvements into the proposed CEPT system to improve primary treatment capability and increase capacity,
- Expansion to or additional of flow equalization basins in wastewater collection systems
- Emergence of new technologies, and
- Combinations of the above.

The major elements of the recommended LTCP and their anticipated costs were developed in preparation of the 2005 Master Plan and the 2005 Wet Weather Facilities Study. These costs have been updated and are summarized in **Table ES-1**.

Table ES-1
Recommended Control Program Elements and Opinion of Probable Costs

Component	Capital Cost Opinion	Annual O & M
System Wide		
➢ North Aurora Satellite Flow Equalization Basin ➢ Waubonsie Satellite Flow Equalization Basin	$53,400,000	$152,448
FMWRD Wastewater Treatment Plant	$53,600,000	$ 159,772
➢ Chemically Enhanced Primary Treatment to be located at the WWTP site. ➢ Waste Treatment Plant Expansion	$ 150,800,000	$ 24,333,000
Grand Total	**$257,800,000**	**$24,658,897**

It should be noted that a portion of the above work (±$44 million) has been completed or is presently under construction as part of Phase 1, leaving $213,800,000 yet to be completed.

9. BENEFITS OF RECOMMENDED PLAN

The selected CSO control program is expected to provide significant benefits to the citizens of the District and to all who use and enjoy the Fox River. The Presumptive Approach in the 1994 CSO Control Policy requires reducing the CSOs to meet one of three criteria, the first of which is no more than an average of four to six overflow events per year. As shown in **Table ES-2,** there will be no CSO discharges up to a 5-year storm event, resulting in less than 1 CSO discharge per year.

Table ES-2

FUTURE AVERAGE AND WET WEATHER FLOW SCENARIOS

	Average	Wet Weather Event Recurrence and Flow			
		3 MONTH	1 YEAR	5 YEAR	10 YEAR
Flow, mgd	52.67	129.54	158.59	174.35	185.55
CSO Discharge, MG	None	None	None	None	0.46

It should be noted that this LTCP provides proposed improvements for treatment of flows up to a 5-year storm recurrence. The projected design maximum flow for a 5-year storm is approximately 185 mgd. Biological/secondary treatment will be provided for up to 131 mgd (85 mgd at the existing North Facility and 46 mgd at the proposed South Facility), which is slightly greater than a 3-month storm recurrence. The remaining 54 mgd will receive treatment through the proposed chemically enhanced primary treatment (CEPT) facility. The effluent from the CEPT system will flow to a junction box were a portion or all of the flow may receive further treatment through the tertiary filters. All flow up to 185 mgd will be chlorinated and de-chlorinated prior to discharge at the treated FMWRD Outfall 001.

In addition to demonstrating reductions in overflows from current levels, USEPA's CSO Control Policy calls for calculating the percentage of combined sewage that is captured for treatment in the combined sewer system. After implementation of the recommended LTCP, the CSO capture rate is predicted to be 98% when calculated using the 2007 through 2009 storm events. This is far in excess of USEPA's guideline of 85% capture under the presumptive approach.

10. FINANCIAL IMPACTS

As part of developing the LTCP, the ability of the FMWRD to finance the final recommendations was considered and is detailed in Section 9 of this report. A detailed affordability analysis was conducted to identify and assess the impact of CSO control costs on the fiscal health of the FMWRD and the impact that implementation of this plan will have on its sewer patrons. Guidance procedures for assessing financial capability as outlined in USEPA's "Combined Sewer Overflows Guidance for Financial Capability Assessment and Schedule Development" were used in the preparation of the FMWRD's financial capability.

The USEPA guidance document presents a two-phased approach to assessing financial capability. The first phase identifies the combined impact of wastewater and CSO control costs on individual households served by the FMWRD. The second phase examines the debt, socioeconomic, and financial conditions of the FMWRD. The results of the two-phase analysis are combined in a financial matrix to assess the financial burden of the CSO control costs and establish reasonable schedules to implement the CSO controls.

Phase 1 calculates the "Residential Indicator", which measures the financial impact of current and proposed CSO controls on residential sewer patrons. The indicator represents the average cost per household (CPH) within the FMWRD for WWTP costs and CSO controls costs as a percentage of the local median household income (MHI). The CPH is used in conjunction with the MHI to estimate residential impacts. USEPA has determined that residential impacts are low if the CPH is less than 1% of the MHI, medium if the CPH is between 1% and 2% of the MHI, and high if the CPH is greater than 2% of the MHI.

Phase 2 assesses the financial condition of the FMWRD by calculating the "Financial Capability Indicator". This indicator measures the debt burden, bond rating, unemployment rate, property tax collection rates, MHI and other factors to develop a numerical score. USEPA has determined that the financial capability is low if the score is less than 1.5, medium if the score is between 1.5 and 2.5, and strong if the score is greater than 2.5.

Residential Indicators were determined to be 1.89% for the general population and 4.49% for residents at or below poverty level. The Financial Capability Indicator was determined to be 2.5.

The Financial Capability Matrix shown in **Table ES-3** indicates that implementation of the CSO control would be a "Medium Burden" for residents with a median household income level and a "High Burden" for residents with a poverty income level. This translates to over 20,000 residents that will be disproportionately financially impacted by the future CSO programs.

TABLE ES-3
EPA's Residential and Financial Capability Matrix

	Residential Indicator (Cost per Household as % of Median Household Income)		
Financial Capability Indicator	Low (Below 1.0%)	Medium (Between 1.0% and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Medium (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

Per the USEPA guidance document, this translates into an implementation period of between 10 and 15 years. As discussed throughout this report, the LTCP has been developed from the 2005 Master Plan, which identified six separate phases. The time period identified in the 2005 Master Plan was from 2005 to 2025. Most of the elements identified in Phase 1 are under construction with the final contract anticipated to be bid and under construction by the Fall of 2010. The remaining phases are currently on schedule to be completed over the next 15 years. However, this plan will be one of the largest single public works projects in the FMWRD and experience shows that it is neither feasible nor practicable to establish firm time requirements for the various elements that make up a project of this magnitude and complexity

Overall, assuming moderate growth, the FMWRD would have to raise its sewer rates approximately 5% each year for the next 20 years to fully fund this CSO LTCP program, providing that bonds/loans can be secured. This is also assuming that all funding sources would remain consistent. Given the financial challenges of the economic climate in the past two years (2008 and 2009) and continued widespread economic hardship, funding of this program may be difficult.

The development of rate impacts in this LTCP is based upon many assumptions that must be reevaluated frequently. The assumptions were used in a manner appropriate for this planning document and are predicated on existing economic and demographic conditions remaining unchanged in the foreseeable future. However, as the economic and demographic conditions change from year to year, the application of rates to the patrons of the FMWRD must change also. Some of the conditions that must be monitored are water consumption, cost estimates, interest rates, future regulatory requirements and uncertainty of the rate of population growth.

11. CSO Schedule Development

The National CSO policy requires that an implementation schedule be provided in the LTCP. A schedule for implementing the selected control plan was developed using the following priorities:

- Projects that can be implemented quickly should be moved ahead in the schedule.
- Projects that provide the greatest environmental benefit should be a priority.
- Projects that benefit sensitive areas should be a priority.

Other considerations used in developing priorities included construction sequencing requirements, funding source limitations and financial impacts to user rates and patrons. Based on these considerations, a sequencing of projects was developed. An implementation schedule was then developed for each project.

The LTCP has been developed from the 2005 Master Plan, which identified six separate phases. Phase 1 of the plan is presently being implemented and the remaining phases have been developed at this stage to a conceptual level. Basic capacities of the remaining phases have been established for the facilities, general locations have been selected and appurtenant support facilities identified. Also, the general hydraulic operation of the system has been formulated, interfaces with existing facilities considered and potential construction sequencing reviewed. The preliminary schedule for the LTCP is shown in **Table ES-4**.

Table ES-4
CSO Controls Implementation Schedule

No.		Activity	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	SYSTEM WIDE COMPONENTS																					
	Phase 1	North Aurora Flow Equalization Basin			1																	
		Waubonsie Flow Equalization Basin																				
	Phase 2	North Aurora Flow Equalization Basin							2	2	2	2										
		Waubonsie Flow Equalization Basin					2															
	Phase 3	North Aurora Flow Equalization Basin										3	3	3								
		Waubonsie Flow Equalization Basin										3	3	3								
	Phase 4	North Aurora Flow Equalization Basin													4	4	4					
		Waubonsie Flow Equalization Basin													4	4	4					
	Phase 5	North Aurora Flow Equalization Basin															5	5	5			
		Waubonsie Flow Equalization Basin															5	5	5			
	Phase 6	North Aurora Flow Equalization Basin																				
		Waubonsie Flow Equalization Basin																	6	6	6	
2	WASTEWATER TREATMENT PLANT																					
	Phase 1	**North Facility - Stage 1**																				
		TPAD	1	1	1	1	1															
		Contracts 1&2 (K2 & Chlor.)		1	1	1	1	1														
		Contract 3 - CEPT				1	1	1	1													
	Phase 2	**South Facility - Stage 1**						2	2	2	2	2	2	2								
		North Facility - Stage 2						2	2	2	2	2	2	2								
	Phase 4	**South Facility - Stage 2**												5	5	5	5					
		North Facility - Stage 3												5	5	5	5					
	Phase 6	**South Facility - Stage 3**																6	6	6	6	6
		North Facility - Stage 4																6	6	6	6	6

LEGEND
Procurement
Design
Construction

Time requirements in the implementation schedule have been based on information compiled during the planning process, experience with similar projects and estimates of future and field conditions. There are a number of uncertainties associated with the time requirements included in the implementation plan and schedules. As the implementation process moves forward, it will be necessary to identify and resolve such uncertainties and to adjust time requirements. Additionally, changes in laws, requirements or regulations could occur during implementation of the LTCP necessitating different time requirements than anticipated.

12. Post Construction Monitoring

Post construction monitoring will replicate the collection system flow monitoring, biological monitoring, water quality monitoring and modeling programs conducted in preparation of this LTCP. The required post construction monitoring will verify compliance with water quality standards and protection of designated uses as well as ascertain the effectiveness of the implemented CSO controls. All of the receiving water post construction monitoring activities will be performed in accordance with either the sampling/testing approach that was approved by the IEPA for the Fox River Study Group or the Quality Assurance Project Plan (QAPP) prepared by WEDA and DEI.

This monitoring program will commence as usable components of the Final LTCP are placed in operation. The components of the post construction monitoring program include:

- Rainfall monitoring,
- CSO overflow monitoring,
- CSO overflow and storm sewer sampling,
- Receiving water monitoring for dissolved oxygen,
- Receiving water chemistry monitoring, and
- Biological sampling

13. Water Quality Standards Review

The purpose of the LTCP, per the USEPA 1994 CSO Control policy and guidance, is to develop, evaluate, and select CSO control alternatives that are sufficient to reach compliance with and attainment of the existing water quality standards and designated uses of the receiving waters.

The LTCP was selected as a plan that offers an effective combination of costs, benefits and environmental protection. However, although greatly reduced, CSO discharges may still exist under the LTCP and water quality provisions will need to be adopted that accommodate wet weather discharges from the combined sewer system. FMWRD has chosen a presumptive approach to meet water quality standards by limiting their combined sewer overflows to less than four per year. Impacts using the chosen LTCP were modeled and evaluated. Overall, simulations showed that the recommended LTCP CSO controls will result in an improvement of water quality when compared to water quality resulting from existing conditions for storms of the same return interval. Model simulations indicate that proposed FMWRD discharges under the normal treatment level:

- Do not cause an exceedance of the water quality standard for fecal coliforms during 5-year and smaller storms,
- Would likely not cause exceedances of ammonia water quality standards unless pH and temperature reach high values or ammonia concentrations in the Fox River are high upstream of the FMWRD,
- Would likely cause exceedance of the total phosphorus listing value only when no chemical treatment is applied in the CEPT system and large storms occur during low flows and there are high phosphorus concentrations in the Fox River upstream of the FMWRD, and

- Would not cause exceedances of the total suspended solids and nitrate nitrogen listing values.

The goal of the CSO Control Policy is to limit the number of overflows to four to six per year. The FMWRD is providing full biological treatment for all storms of a corresponding return period (3-months) and a partial treatment including full disinfection for all storms with return periods between 3-months and 5-years. Proposed modifications will result in far greater positive effect on Fox River water quality than the minimum required by the CSO Control Policy.

The findings show that implementation of the LTCP CSO controls can meet water quality standards in accordance with the CSO Control Policy. The findings also show that on average, the LTCP would be protective of the beneficial uses of the receiving waters. Additionally, the findings show that pollution sources other than discharges from the FMWRD's CSO outfall can cause impairment to the receiving waters.

1. Overview and Purpose

1.1. Overview

Combined sewer systems (CSS) are collection systems designed and constructed to receive both wastewater and land runoff that is then conveyed in a single pipe to a treatment facility. In the United States approximately 43 million people in approximately 1,000 communities are served by CSSs. CSSs are located primarily in the Northeast and Great Lakes regions.

The Fox Metro Water Reclamation District (FMWRD) provides wastewater conveyance and treatment to a rapidly growing area of the western suburbs of Chicago, Illinois, that contains all or portions of seven (7) municipalities. FMWRD's Facility Planning Area (FPA) contains separate sanitary sewer systems (conveying wastewater together with incidental land runoff) and a combined sewer system (CSS), which is designed and constructed to receive both wastewater and land runoff. The CSS is located within the City of Aurora (COA), which is the largest municipality served by the FMWRD.

During dry weather, wastewater collected within the COA's CSS is conveyed to the FMWRD wastewater treatment plant for treatment and release to the Fox River. During heavy or extended rainfall periods, wet-weather flows may exceed the capacity of the combined sewer system resulting in the excess flow being discharged directly into the Fox River or its tributary waters. The discharge of excess flow directly to the receiving stream is called a Combined Sewer Overflow (CSO). These overflow events are necessary to prevent sewage backup into homes, businesses, streets and low-lying areas.

During heavy rain events the COA's CSS along with wastewater and infiltration and inflow (I/I) from other municipalities served by FMWRD can exceed the treatment capacity of the plant. When this happens, FMWRD is permitted to discharge excess flow directly to the river in the form of a CSO in accordance with Special Condition 14 of their existing National Pollution Discharge Elimination System (NPDES) Permit (No. IL0020818), a copy of which is included in **Appendix A**. Special Condition 14 requires that *"all combined sewer overflows and treatment plant bypasses … be given sufficient treatment to prevent pollution and the violation of applicable water quality standards."* Sufficient treatment was further stated to consist of treatment as described in Illinois Pollution Control Board (IPCB) order PCB 85-224 dated July 13, 1988 (CSO Exception) and modified on June 21, 1990 (see **Appendix B**). PCB 85-224 and its modification require that the FMWRD (formerly known as the Aurora Sanitary District) operate its treatment facility in accordance with the following provisions:

- *All flows received at the treatment plant must be screened and metered.*
- *All flows up to 74 million gallons per day ("MGD") must receive a minimum of primary clarification prior to and during an occurrence of an overflow discharge.*
- *All flows up to 68 MGD must receive full treatment prior to and during any occurrence of an overflow discharge ahead of or following primary treatment units.*

The current NPDES Permit requires the treatment system to be operated to maximize treatment of wastewater flows prior to a CSO discharge. The present design maximum flow (DMF) of the WWTP is 85 mgd.

Some of the factors that can influence the duration of a CSO event and its impacts are listed below:

- Temporal and spatial rainfall distribution

- Rainfall intensity
- Antecedent moisture conditions
- Design and Operation of control measures in the CSS

These variables are capable of creating a wide-range of possible storm-water run-off and collection conditions that make it difficult to clearly define the relationship between rainfall volume and a CSO event. Therefore sophisticated modeling of the collection system and receiving stream coupled with extensive monitoring is required to assess the impacts.

FMWRD's existing NPDES permit (IL0020818) authorizes the combined sewer overflow (Outfall 002) to discharge to the Fox River under Special Condition 14. The WWTP, CSO Outfall 002 located at the wastewater treatment plant and the 1929 Original Combined Sewer Interceptor (OCSI) along the Fox River is owned, operated and maintained by FMWRD. The COA owns, maintains and operates the CSS under a NPDES permit (IL0048518) that authorizes overflow discharges from sixteen CSOs within the CSS, one of which is a treated CSO located at 400 North Broadway.

There has been a long standing agreement between the FMWRD and the COA with regards to FMWRD's collection and treatment of COA's wastewater including the flows from the COA's CSS. This agreement defines the responsibilities of each party regarding wastewater collection and treatment, special collection system operation and maintenance, facilities ownership, etc. As a part of that agreement, the definition of responsibility between the two parties for the construction and maintenance of CSO discharges from the Combined Sewer System has evolved over time. Ownership, maintenance and operation of the CSOs within the CSS in Aurora are the responsibility of the COA.

1.2. Purpose

The purpose of this Long-Term CSO Control Plan (LTCP) is to meet the requirements of Item No. 10 of Special Condition 14 of FMWRD's NPDES permit (IL0020818). Item No. 10 of Special Condition 14 requires the development of *"a Long-Term CSO Control Plan (LTCP) for assuring that the discharges from the CSOs (treated or untreated) ... shall not cause or contribute to violations of applicable water quality standards or cause use impairment in the receiving waters"*. The LTCP is required to be submitted within thirty-six months of the effective date of FMWRD's NPDES Permit (or April 1, 2010) and is a product of over 30 months of study by the FMWRD and its team of consultants.

The development of the LTCP relied heavily on recent facility planning documents, in particular the "Master Plan of Wastewater Transportation and Treatment", prepared by Walter E. Deuchler Associates, Inc., in April of 2005 (hereinafter referred to as the 2005 Master Plan). The 2005 Master Plan addressed existing conditions and future needs of FMWRD's collection system and wastewater treatment plant. It identified alternative methods of transport and treatment to address future growth while protecting the environment and maximizing the effectiveness of the existing wastewater treatment processes. The 2005 Master Plan was submitted to the Illinois Environmental Protection Agency (IEPA) on May 9, 2005 and received Facilities Plan Approval from the IEPA for the solids handling improvements on August 13, 2007 and Phase 1 of the liquid train improvements on September 29, 2008. This LTCP incorporates these previously approved infrastructure improvements and other recommended improvements identified in the 2005 Master Plan.

The elements of the LTCP that are discussed in this document include:

- System Characterization, Monitoring and Modeling, which includes compilation of background information, field monitoring and development of models to evaluate the CSO control options and water quality impacts,

- Public Participation, which discusses the public participation process used to engage the citizens within FMWRD service area in the decision making to select the long term CSO controls,
- Consideration of Sensitive Areas, evaluates whether FMWRD CSO outfall is located within a sensitive area,
- Evaluation of Alternatives, meet or exceed the requirements of the Federal CSO Control Policy (April 19, 1994),
- Cost/Performance Consideration, which requires that appropriate cost/performance curves be developed to demonstrate the relationships among a comprehensive set of reasonable control alternatives that correspond to the specified range of control levels. This should include analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to increased cost,
- Operational Plan, which requires that after the NPDES permitting authority and permittee agree on necessary CSO controls to be implemented under the LTCP, the permittee will revise their operation and maintenance program to include the mutually agreeable long term CSO controls,
- Maximizing Treatment at the Treatment Plant - one goal of the CSO Control Policy is to increase the amount of wet weather flow that receives treatment,
- Implementation Schedule, which requires the development of a construction and financing schedule for the implementation of the LTCP. Schedules for implementation of CSO controls may be phased based on the relative importance of adverse impacts upon WQS and designated uses, identified priority projects and on financial capability,

- Post-Construction Compliance Monitoring Program, which requires that implementation of a post-construction water quality monitoring program be initiated to verify compliance with water quality standards and the protection of designated uses as well as ascertain the effectiveness of CSO controls.

The objectives of this LTCP are intended to support the water quality standards of the State of Illinois. This report will assess the capability of the above described elements to meet or exceed those standards, and describe any recommended improvements necessary to do so. This study, in conjunction with the 2005 Master Plan, will be used for the future preparation of Facility Plan up-dates for submittal to the Illinois Environmental Protection Agency (IEPA) and the Chicago Metropolitan Agency for Planning (CMAP).

1.3 References

Information developed in this plan has been gathered from several sources of information including the following:

- Illinois Integrated Water Quality Report and Section 303(d) List (Final Draft), prepared by Illinois Environmental Protection Agency Bureau of Water, dated August, 2008.

- Quality Assurance Project Plan for the Combined Sewer Overflow Long Term Control Project, prepared by Walter E. Deuchler Associates, Inc. and Deuchler Environmental, Inc., March 21, 2008, as amended.

- Master Plan of Wastewater Transportation and Treatment, prepared by Walter E. Deuchler Associates, Inc., April 2005.

- Wet Weather Facilities Study, prepared by Walter E. Deuchler Associates, Inc., April 2005.

- Fox River Watershed Investigation - Stratton Dam to the Illinois River: Water Quality Issues and Data Report to the Fox River Study Group, Inc., Prepared by the Illinois State Water Survey, March 2004.
- 1994 Combined Sewer Overflow (CSO) Control Policy, prepared by U.S. Environmental Protection Agency.
- Combined Sewer Overflows Guidance for Long-Term Control Plan, prepared by U.S. Environmental Protection Agency.
- Combined Sewer Overflows Guidance for Financial Capability Assessment and Schedule Development, prepared by U.S. Environmental Protection Agency.

1.4 Abbreviations

The following is a list of abbreviations used throughout this report:

ASD	Aurora Sanitary District
AWQMN	Ambient Water Quality Monitoring Network
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BOD_5	5-day: Biochemical Oxygen Demand
CAC	Citizens Advisory Committee
$CBOD_5$	5-day: Carbonaceous Biochemical Oxygen Demand
CEPT	Chemically Enhanced Primary Treatment
CMAP	Chicago Metropolitan Agency for Planning
COA	City of Aurora
COD	Chemical Oxidation Demand

ComEd	Commonwealth Edison
CPH	Cost per Household
CSI	Combined Sewer Interceptor
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
CWA	Clean Water Act
DAF	Design Average Flow
DPHF	Design Peak Hour Flow
DPIF	Design Peak Instantaneous Flow
DEI	Deuchler Environmental Incorporated
DO	Dissolved Oxygen
EMC	Event Mean Concentration
EPA	United States Environmental Protection Agency
FEB	Flow Equalization Basin
FMWRD	Fox Metro Water Reclamation District
FPA	Facility Planning Area
FRSG	Fox River Study Group
HRT	Hydraulic Residence Time
IDNR	Illinois Department of Natural Resources
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency

I / I or I & I	Infiltration & Inflow
ILSAM	Illinois Stream-Flow Assessment Model
ISWS	Illinois State Water Survey
IPCB	Illinois Pollution Control Board
LDC	Legacy Data Center - USEPA
LID-R	Low-Impact Development Retrofit
LTCP	Long Term Control Plan
MBI	Macroinvertebrate Biotic Index
MG	Million Gallons
MGD or mgd	Million Gallons per Day
MHI	Median Household Income
mg/l or mg/L	Milligrams per liter
MS4	Municipal Separate Storm Sewer System
NA	North Aurora
NMC	Nine Minimum Controls
NPDES	National Pollution Discharge Elimination System
NWL	Normal Water Level
O & M	Operation & Maintenance
OVF	Sewer Overflow Structure
P	Phosphorus
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan

R.O.W.	Right-of-Way
SSS	Separate Sewer System
STORET	Storage and Retrieval - USEPA
NH_3-N	Ammonia Nitrogen
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WASP	Water Quality Analysis Simulation Program
WEDA	Walter E. Deuchler Associates, Inc.
WQS	Water Quality Standards
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

2. Existing Conditions

2.1 FMWRD Planning Area Description

2.1.1 *Regional Location*

The Facility Planning Area is located in the heart of the Fox River Valley and encompasses 131 square miles or 83,840 acres. All wastewater collected throughout the FPA is conveyed to a single regional wastewater treatment plant located on the west bank of the Fox River just south of the Village of Montgomery in Kendall County, Illinois. The Fox Metro Water Reclamation District (FMWRD) is located about thirty-eight miles west/southwest of downtown Chicago in the far western suburbs of the Chicago metropolitan region (see **Figure 2-1**).

Figure 2-1
Location Map

Currently, the area served by FMWRD encompasses portions of four counties (DuPage, Kane, Kendall and Will), nine townships (Aurora, Batavia, Blackberry, Sugar Grove, Naperville, Wheatland, Winfield, Oswego, and Bristol), and seven municipalities (Aurora, Batavia, Montgomery, North Aurora, Oswego, Yorkville, and Sugar Grove). **Table 2-1** below lists the areas served in each County.

Table 2-1
FMWRD Planning Area

County	Area within FMWRD, sq. mi.	% of County
Kane	67.3	12.84%
Kendall	44.5	13.77%
DuPage	16.1	4.83%
Will	2.7	0.32%
Total	**130.5**	**100%**

2.1.2 *History of Facility Planning Area*

FMWRD's (formerly known as the Aurora Sanitary District) FPA was established in 1979 by the Area-wide Water Quality Management Plan for Northeastern Illinois. The boundaries of the FPA have been expanded over the past 30 years to accommodate new development which has been annexed to the existing municipalities served by the District.

The first sewers were built in the FPA area in the late 1880's and consisted of one piping system designed and constructed to receive both wastewater and land runoff. At that time, untreated sewage and combined sewage was discharged directly into the Fox River. A combined sewer interceptor and trickling filter plant were constructed in 1929 to eliminate the direct discharge of untreated sewage to the Fox River and reduce the volume of combined sewage being discharged into the Fox River. The existing wastewater treatment facility remains in the same location today as the original trickling filter plant. The City of Aurora discontinued the practice of installing combined sewer systems into the 1940's. Since then, the City of Aurora has installed separate sewer systems, which consist of two independent piping systems: one system for sanitary wastewater (conveying wastewater together with incidental land runoff) and one system for storm water (intended to receive only land runoff).

Over the years, the City of Aurora has partially separated a portion of their original combined sewer system via the removal of publicly owned storm sewer structures (i.e. catch basins and inlets) and construction of new storm sewer systems. The combined sewer system within FMWRD's current FPA is located entirely within the older central area of the City of Aurora. This boundary of the CSS accounts for approximately 130 miles of sewers that serve approximately 7,145 acres (11.2 square miles), a large portion of which has been partially separated by the COA over the years.

2.1.3 ***Climate***

The climate of the FPA is continental with relatively warm summers and cold winters and frequent short fluctations of temperature, humidity, cloud cover, and wind direction. According to the National Climatic Data Center in Aurora, Illinois, the average total annual precipitation is 38.39 inches with an average of 30.8 inches of snowfall, the average annual high temperature is 59° F, the average annual low temperature is 36.8° F and the mean annual temperature is 48° F.

The effectiveness of CSO controls is required to be evaluated on a "system-wide, annual average basis". Therefore it is necessary to collect and assemble rainfall data within the planning area. Once identified, the average precipiation conditions are used as a data component of modeling the sewer and receiving waters. The hydraulic modeling is used to predict CSO occurences, their impact on receiving streams and the effectiveness of CSO controls.

FMWRD, the COA and WEDA all maintain rain gauges at their facilities. Five years of precipitation data within the CSS area of the City of Aurora has been summarized in **Table 2-2**.

Table 2-2
Five Year Annual Average Rainfall Conditions

Statistic	2004	2005	2006	2007	2008	2009	Composite Average 2004-2009
Days in Time Period	366	365	365	365	366	365	365
Annual Rainfall (inches)	35.47	22.65	35.34	38.53	42.92	46.82	36.96
No. of Events > 0.05 inches [1]	68	68	86	86	87	97	82
Average Storm Duration (Hours)	3.9	6.7	5.47	4.45	4.17	4.8	5.12
Average Intensity (in./hr.)	0.12	0.07	0.08	0.1	0.1	0.09	0.09
Maximum Intensity (in./hr.)	1.1	0.60	0.84	0.85	0.59	1.04	.83

Note: A threshold of 0.05 inches was selected since rainfall less than that amount produces minimal runoff

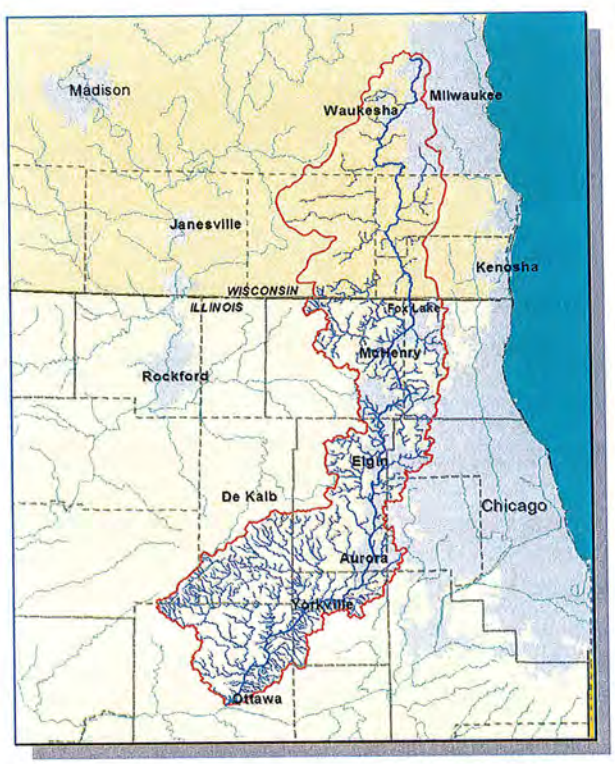
It should be noted that these may not be "typical years". In 2005 there was a severe drought which lasted for approximately six months while 2007 and 2008 experienced flood conditions in August and September respectively. Weather for 2009 was cooler than normal and rainfalls amounts were higher than normal conditions. According to the Illinois State Climatologist Office, 2008 was the wettest year on record and 2009 was the second wettest year on record in the Northeast Illinois area dating back to 1895. All four wettest years in the State of Illinois have been in the last 20 years of record.

2.1.4 *Watershed*

The Fox River is the principal water body within the CSS area of the City of Aurora.

From its headwaters near Waukesha, the Fox River drains 938 square miles in southeastern Wisconsin prior to entering Illinois. Between the Illinois/Wisconsin border and its junction with the Illinois River near Ottawa, the river runs for 115 miles and drains an additional 1,720 square miles. Although it is only three percent (3%) of the total area in Illinois, the watershed is home to about 450,000 people; a number that is likely to increase over the next 20 years. The FMWRD FPA encompasses approximately 4.8% of the total watershed. The Fox River is a multi-purpose resource that contributes critical habitat for wildlife, serves as a valuable resource for recreation, receives and assimilates pollutants from point and non-point sources and provides source water for public water supplies. Over 214,000 people receive their drinking water from the Fox River. **Figure 2-2** below shows the location and extent of the Fox River Watershed.

Figure 2-2
Fox River Watershed



The Fox River is home to at least 40 animals and 102 plants listed as endangered or threatened species. There are many potential sources of pollution which include wastewater treatment plants, industrial facilities, agricultural runoff, storm water runoff and combined sewer overflows.

The USEPA emphasizes the importance of using the watershed approach in the development of a LTCP. The major advantage of using a watershed approach in LTCP development is that it allows for site-specific determination of the relative impacts of CSOs and Non-CSO sources of pollution on water quality (USEPA, 1995). Of particular importance to CSO control planning and management is the NPDES Watershed Strategy (USEPA, 1994). This strategy outlines national objectives and implementation activities to integrate the NPDES program into the broader watershed protection approach.

2.1.5 Hydrology and Water Quality

Drainage in this service area is primarily provided by the Fox River. The United States Geologic Survey (USGS) 7.5 minute Topographic Quadrangle Map classifies the Fox River as a first order tributary to the Illinois River. The Montgomery gage station (05551540), HUC 07120007, is used to provide information on stage and flow for the Fox River near the FMWRD wastewater treatment plant (WWTP). The Fox River gage station is located in Montgomery, upstream of FMWRD, with a drainage area of 1,732 square miles and a gage datum of 603.52 NGVD29. The annual average statistics for gage height and discharge are presented in **Table 2-3**.

Table 2-3
Montgomery Gauge - Annual Statistics

Year	Gauge height, (ft)	Discharge, (cfs)
2003	NA	745.0
2004	NA	1,435
2005	11.385	908.4
2006	11.448	1,064
2007	11.919	2,018
2008	12.079	2,560

Additional information on the Montgomery gage can be found at http://waterdata.usgs.gov.

According to the Illinois State Water Survey (ISWS) Contract Report 545 (1993), the 7-day, 10-year low flow rate for the Fox River at the FMWRD is 152 cubic feet per second (cfs) or 98.2 MGD. A 7-day low flow for a stream is the average flow measured during the 7 consecutive days of lowest flow during any given year. The 7-day 10-year low flow (Q7,10) is a statistical estimate of the lowest average flow that would be experienced during a consecutive 7-day period with an average recurrence interval of ten years. Because it is estimated to recur on average only once in 10 years it is usually an indicator of low flow conditions during drought.

The USEPA is charged with creating a framework for the States to administer the Clean Water Act – (33 USC 1251 et seq.). Every two years, the IEPA submits to USEPA an assessment of the quality of the waters of the State. This document is referred to as the 305(b) report. The State is also required to create a list of impaired waters referred to as the 303(d) list, which designates waters for further study and improvement. As part of this further study, water quality based effluent limitations are determined by a process referred to as Total Maximum Daily Load (TMDL).

TMDL is a calculation of the maximum amount of a pollutant that a water-body can receive and still meet water quality standards. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources. The calculation includes a margin of safety to ensure that the water-body can be used for the purposes the State has designated. The calculation also accounts for seasonal variation in water quality. Water quality sampling, biological and habitat monitoring, and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met.

The Fox River Watershed is on the State's 2008 list of impaired waters (303(d) list). The stream reach that FMWRD discharges to is designated as IL DT-38. The potential causes of impairment are pH, phosphorous, sedimentation/siltation, dissolved oxygen and total suspended solids (for aquatic life), mercury and PCBs (fish consumption), and fecal coliform (primary contact recreation). The Fox River Watershed 303(d) listing may be found at: http://www.epa.state.il.us/water/tmdl/303d-list.html.

The Fox River Watershed between the Chain of Lakes at the north end to its outfall into the Illinois River at the south end, is being monitored and modeled by a select group of stakeholders (including FMWRD and the COA) named the Fox River Study Group (FRSG). The FRSG's mission is to monitor and model this portion of the Fox River watershed in an effort to evaluate the water quality conditions of the river so that total maximum daily loads (TMDLs) can be developed and used to determine best management practices which focus on both point and non-point sources of pollutants. Eventually the models developed by this group will be used to determine appropriate load limitations and permit requirements for both point and non-point dischargers to the Fox River.

2.1.6 *Regulatory Environment*

Clean Water Act: As previously stated, the 1972 "Clean Water Act" requires states to adopt water quality standards to protect the nation's waters. These standards define how much of a pollutant can be in a surface and/or ground water while still allowing it to meet its designated uses, such as for drinking water, fishing, protection of aquatic life, swimming, irrigation or industrial purposes. For each pollutant that causes a water body to fail to meet state water quality standards, the Clean Water Act requires the states to conduct a TMDL (Total Maximum Daily Load) study.

Stream water quality is affected by permitted and regulated discharges from public and industrial wastewater treatment systems as well as by accidental spills and storm water runoff. Storm water runoff can carry pollutants from roads, parking lots, lawns, constructions sites and agricultural areas. Such pollutants include sediment, bacteria, petroleum products from vehicles and nitrogen and other commercial fertilizer residue. CSO discharges are subject to the provisions of section 301 (a) of the Clean Water Act (CWA) and the implementing regulations of the NPDES Program.

CSO Control Policy: This is a comprehensive national strategy that provides the technological basis for state water permitting authorities, NPDES permit holders, EPA, and the public to contribute to and engage in a coordinated planning effort that will achieve cost-effective CSO controls to meet appropriate water quality objectives.

CSO discharges often contain high levels of suspended solids, pathogenic microorganisms, toxic pollutants, floatable, nutrients, oxygen-demanding organic compounds, oil and grease, and other pollutants. Therefore, the CSO discharge water may not meet the Water Quality Standards (WQS), and may pose risks to human health, threaten aquatic life and its habitat, and impair the use and enjoyment of the receiving stream.

In 1989 the EPA issued the "National Combined Sewer Overflow (CSO) Control Strategy" which had the following objectives:

- Ensure that if CSOs occur, they are only the result of wet weather,
- Bring all wet weather CSO discharge points into compliance with technology-based and water quality-based requirements of the Clean Water Act (CWA), and
- Minimize water quality, aquatic biota, and human health impacts from CSOs.

In 1994, EPA issued a national policy statement entitled "Combined Sewer Overflow (CSO) Control policy." The policy established a consistent national approach for controlling discharges from CSOs to the Nation's waters. The main purpose of the CSO Control Policy was to elaborate on the aforementioned "National CSO Control Strategy", and to expedite compliance with the requirements of the Clean Water Act (CWA). Major elements of the policy ensured that CSO controls were cost-effective and met the objectives of the CWA. This policy helped coordinate the planning, selection, design and implementation of CSO management practices and controls to meet the requirements of the CWA and to involve the public fully during the decision-making process.

The EPA objectives for permittee's with CSSs and have CSOs include the following:

- Accurately characterize the CSS and CSO discharges,
- Implementation of minimum technology-based controls, and
- Develop a Long Term Control Plan (LTCP) which evaluates alternatives for attaining compliance with the CWA, including compliance with water quality standards and protection of designated uses.

The CSO Policy became a requirement with the passage of the Wet Weather Water

Quality Act in December 2000. This CSO Control Policy has been implemented through the NPDES Permit Program.

As part of the CSO Control Policy a set of minimum requirements for reducing CSO impacts was developed by USEPA. These controls are commonly referred to as the "Nine Minimum Controls" (NMC) which are summarized as follows:

1. Proper operation and regular maintenance programs for the sewer system and the CSOs,
2. Maximum use of the collection system for storage,
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized,
4. Maximization of flow to the publicly owned treatment works (POTW) for treatment,
5. Prohibition of CSOs during dry weather,
6. Control of solid and floatable materials in CSOs,
7. Pollution prevention,
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts, and
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

The NMC are controls that can reduce CSOs and their effects on receiving water quality, but do not require significant engineering studies or major construction and can be implemented in a short period of time (less than approximately two years). NMCs are the first steps a municipality is expected to take in reducing their CSOs. FMWRD adopted and implemented a "Nine Minimum Controls" (NMC) program in

1996 which included, among other things, maximizing the use of existing screening and grit removal facilities and scheduling major interceptor flow monitoring and repairs. The NMCs are only a first step however and CSO control policy also requires that a Long Term Control Plan (LTCP) be developed by the permitee to further reduce CSOs. A previously stated, Item No. 10 of Special Condition 14 of the current FMWRD NDPES permit requires the development of a LTCP for their CSO. This report was prepared to meet this NPDES permit requirement.

Prior to USEPA's 1994 CSO Control policy, the Illinois Pollution Control Board (IPCB) adopted regulations in the early 1980's for performance criteria associated with combined sewer overflows and treatment plant bypasses. Specifically, Section 306.305 of the 35 IL Administrative Code Subtitle C, Chapter I states:

> *"All combined sewer overflows and treatment plant bypasses shall be given sufficient treatment to prevent pollution, or the violation of applicable water quality standards unless an exception has been granted by the* IPCB .... *Sufficient treatment shall consist of the following:*
>
> a) *All dry weather flows, and the first flush of storm flows as determined by the* IEPA, *shall meet the applicable effluent standards; and*
>
> b) *Additional flows, as determined by the* IEPA *but not less than ten times the average dry weather flow for the design year, shall receive a minimum of primary treatment and disinfection with adequate retention time; and*
>
> c) *Flows in excess of those described in subsection (b) shall be treated, in whole or in part, to the extent necessary to prevent accumulations of sludge deposits, floating debris and solids ... and to prevent depression of oxygen levels; or*
>
> d) *Compliance with a treatment program authorized by the* IPCB *in an exception ...."*

To comply with the above regulations, the FMWRD (as lead agency) and the City of Aurora performed extensive amounts of investigative and planning work in the early 1980's including: I&I analyses, sanitary sewer evaluation surveys, combined sewer overflow studies and facility planning studies. The summation of this work (Project C17-1407) resulted in a Municipal Compliance Plan and a joint petition to the IPCB for an exception to the CSO regulations. As previously stated in Section 1.1, IPCB Order 85-224 granted an exception to the CSO regulations requiring that the FMWRD operate its treatment facility in accordance with the following provisions:

- *All flows received at the treatment plant must be screened and metered.*
- *All flows up to 74 million gallons per day ("MGD") must receive a minimum of primary clarification prior to and during an occurrence of an overflow discharge.*
- *All flows up to 68 MGD must receive full treatment prior to and during any occurrence of an overflow discharge ahead of or following primary treatment units.*

2.2 Collection System

The Fox Metro Water Reclamation District has provided regionalized facilities for the conveyance and treatment of wastewater for area municipalities and unincorporated areas in Kane, DuPage, Kendall and Will Counties. As of April 2009, there are about 79,000 service connections to FMWRD including residential, commercial and industrial patrons.

The FPA served includes all or portions of the municipalities of Aurora, North Aurora, Batavia, Montgomery, Oswego, Yorkville, and Sugar Grove. Municipalities served by separate sanitary sewer systems, own and maintain their own collection systems (gravity sewers of less than fifteen inches (15") in diameter) and associated minor pump stations. The FMWRD owns and maintains the larger separate sanitary interceptor sewers (gravity sewers of fifteen inches (15") in diameter and larger) and associated pump stations. Municipalities served by combined sewer systems own and maintain the entire CSS with the exception of the original 1929 original combined sewer interceptor (OCSI) which is owned, operated and maintained by FMWRD.

2.2.1 *Combined Sewer System*

The only CSS within FMWRD's FPA is located within the older, central area of Aurora. There are sixteen combined sewer outfalls and their related sewers account for 130 miles of sewer line servicing approximately 7,145 acres. These sixteen overflows are permitted under the COA's NPDES permit (IL0048518) and will be addressed in the COA's LTCP as required in their NPDES permit. A brief description of each overflow location follows below.

CSO 001 (Rathbone) – A 96-inch combined trunk sewer enters the structure from the west where it meets the 69-inch OCSI. Flows enter the OCSI via two 15-inch pipes in the side of the OCSI. When the capacity of these pipes is exceeded, the OCSI acts as a weir and excess flows are discharged from the 96-inch combined trunk sewer over the OCSI to the Fox River.

CSO 002 (East Illinois) – This overflow was altered during the construction of a CSO Treatment Facility at 400 N. Broadway Avenue in Aurora. Flow enters a control structure and meets a weir. Flow is diverted by the weir into an 8-inch pipe flowing into the OSCI. With enough surcharging, flow will overflow the first weir and hit a second weir. The flow is diverted by the second weir into the East Bank Interceptor that flows to the CSO Treatment Facility. If the flow in the East Bank Interceptor exceeds its capacity and levels exceed the height of the second weir, an overflow occurs to the Fox River.

CSO 003A (Pierce Street) - This overflow was also altered during the construction of the CSO Treatment Facility and has two control structures. Flow enters the first control structure, meets a weir and is diverted by the weir into the OSCI. When surcharging occurs, the weir is breached and flows to another weir where it is diverted into the East Bank Interceptor. If the flow in the East Bank Interceptor surcharges high enough, the second weir is breached and an overflow occurs to the Fox River.

<u>CSO 004 (Hazel Avenue)</u> – The diversion structure is a siphon chamber with a weir. When the capacity of the siphon is exceeded, the flow will breach the weir and pass through a manually cleaned bar screen prior to discharging into the Fox River.

<u>CSO 005 (Third Street)</u> – Flow is diverted to an 8-inch sewer that conveys flow into the OSCI. If the flow exceeds the capacity of the 8-inch sewer, the level will increase above the weir and overflow to the Fox River.

<u>CSO 008 (East Benton)</u> – Flow hits a weir and is diverted into the OSCI. When the levels and flow exceed the capacity of the OSCI, the weir is breached and overflow occurs to the Fox River.

<u>CSO 010 (First Street)</u> – The overflow pipe is set approximately one foot above the invert of the structure. Normal dry weather flows are conveyed through the structure via a 16-inch sewer. If the level in the structure exceeds one foot, an overflow occurs to the Fox River.

<u>CSO 015 (West Benton)</u> – The flow meets a weir and is diverted into the Holbrook siphon chamber, which siphons flow to the OSCI. If flows exceed the capacity of the siphon and the level rises above the weir, an overflow to the Fox River would occur. The overflow structure was recently replaced in 2008.

<u>CSO 016 (Clark Street)</u> – If flows entering the wet well to the Clark Street pump station exceed its pumping capacity, an overflow to the Fox River would occur.

<u>CSO 017 (Stolp Avenue)</u> – Flows drop down approximately five feet through a 6-inch drop connection at the overflow structure. If flows exceed the capacity of this drop connection, it then overflows through a Tide Flex valve and into the Fox River.

CSO 018 (West Galena) – This overflow structure is similar to CSO 010. The overflow pipe is simply a pipe with an invert above the invert of the sewer that conveys normal dry weather flow. If the sewer surcharges enough, an overflow to the Fox River occurs.

CSO 021 (West Park Avenue) - This overflow structure is also similar to CSO 010. The overflow pipe is simply a pipe with an invert above the invert of the sewer that conveys normal dry weather flow. If the sewer surcharges enough, an overflow to the Fox River occurs.

CSO 022 (Superior Avenue) – This overflow was also altered during the construction of the CSO Treatment Facility and has two control structures. Flow enters the first control structure, meets a weir. If the combined sewer surcharges above the weir, it enters a gravity sewer that conveys the flow to another structure with a weir. Flow is diverted from this structure to the CSO Treatment Facility. If the sewer surcharges enough in this second structure, the weir is breached and flow is discharged into the Fox River.

CSO 023 (West Illinois) – This overflow structure is similar to CSO 010. The overflow pipe is simply a pipe with an invert above the invert of the sewer that conveys normal dry weather flow. If the sewer surcharges enough, an overflow to the Fox River occurs.

CSO 025 (Dearborn-Trask) – This is the only overflow that into Indian Creek, a tributary of the Fox River. It essentially has three controlling structures. The first controlling structure is a weir at the intersection of Dearborn and Farnsworth, where the flow can enter either of two 12-inch gravity sewers. If the flow exceeds the capacity of both of these sewers, the weir is breached and the wastewater overflows into a storm sewer. This storm sewer conveys the flows to the CSO 025 discharge pipe and into Indian Creek. The second control structure is a relief pipe located at the intersection of Indian and Trask approximately 2 feet above the invert of the combined sewer. If the combined sewer surcharges above 2 feet, it will overflow through the relief pipe into another storm sewer conveying the flows to the CSO 025 discharge structure and into Indian Creek. The third and final control structure is located at the CSO 025 discharge structure. All flow that does not overflow at the first two control structures combines in a manhole just west of the CSO 025 discharge structure. From this manhole, there is an 18-inch pipe flowing to the Indian Creek Interceptor and an 18-inch pipe connecting the manhole with the CSO 025 discharge structure. There is a weir at the end of this pipe so that when the 18-inch sewer surcharges too much, the weir will overflow into the CSO 025 discharge structure into Indian Creek.

<u>CSO 027 (CSO Facility)</u> – This is the outfall from the CSO Treatment Facility located at 400 N. Broadway in Aurora, Illinois. This facility is designed to capture wet weather flows from three overflow structures (OVF No. 2, OVF No. 3, and OVF No. 22). An overflow can occur two ways. Flow from the East Bank Interceptor and the control structure for CSO 022 enters the facility and into a grit tank, before overflowing into a wet well. If the pumping capacity of the facility is exceeded, untreated combined sewage is discharged directly to the Fox River. All flows entering the facility are captured and stored in tanks before slowly being released back into the OCSI for conveyance to the FMWRD WWTP for full treatment. However, if the storage capacity is exceeded (±1.9 million gallons) the additional flow is then treated with enhanced primary treatment, chlorination and dechlorination prior to discharge into the Fox River.

Figure 2-3 shows the entire CSS area tributary to the OCSI. The OCSI extends from Mettel Road in North Aurora southerly to FMWRD's treatment facility just south of the Village of Montgomery. The OCSI was constructed in the late 1920's and early

1930's and varies in size from 15-inches in the upper reaches to 69-inches in diameter at its entrance to the WWTP. The materials used for constructing the OCSI varied from segmented clay tiles reinforced with concrete for the larger diameter sewers to clay and cast iron pipes for the smaller diameter sewers.

A diagram of the major trunk sewers and pumping stations in the FMWRD FPA is shown on **Figure 2-4**. The exhibit shows that all of the interceptors, except the Oswego Interceptor, converge into a common plant influent flow prior to entering the plant.

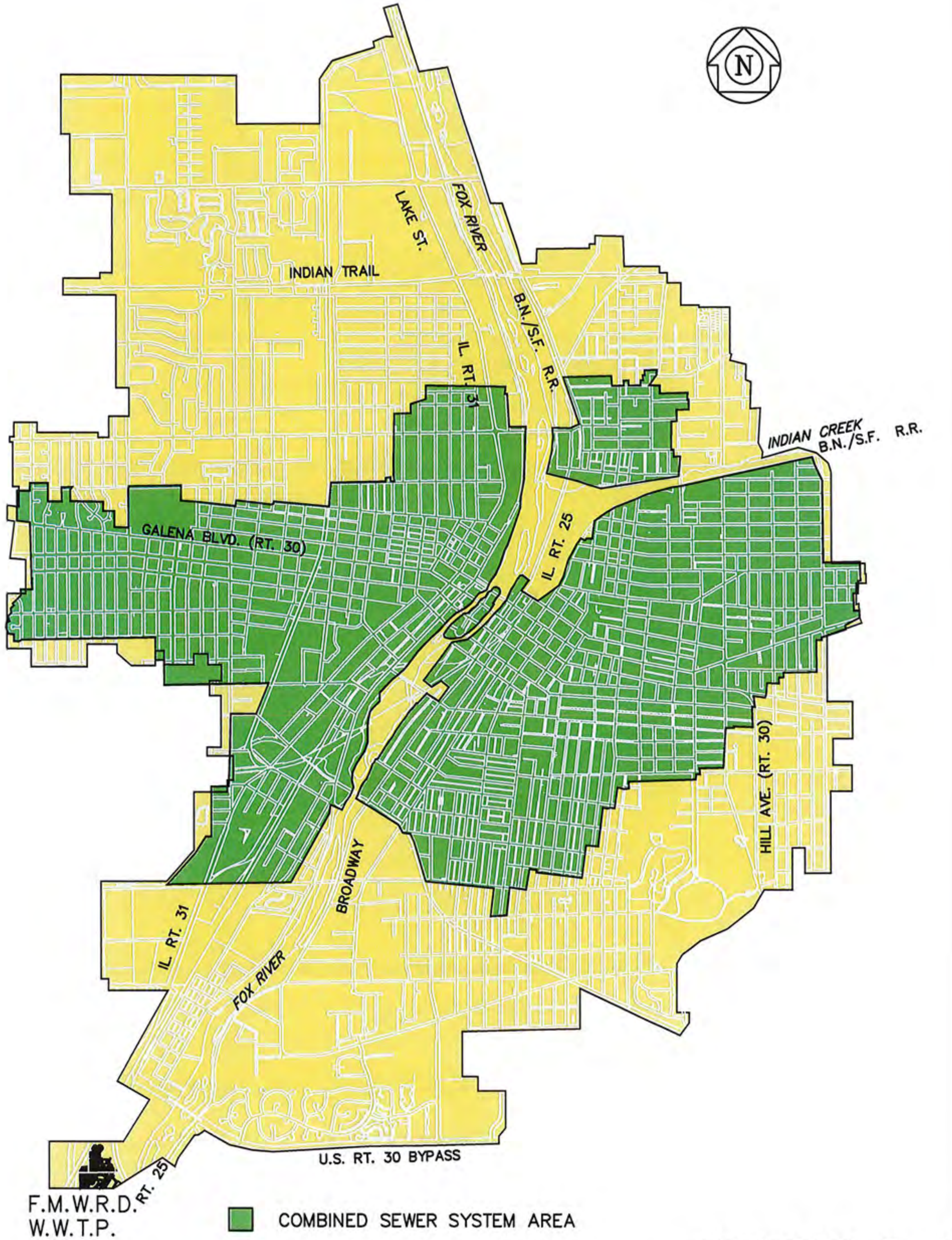


FIGURE 2-3

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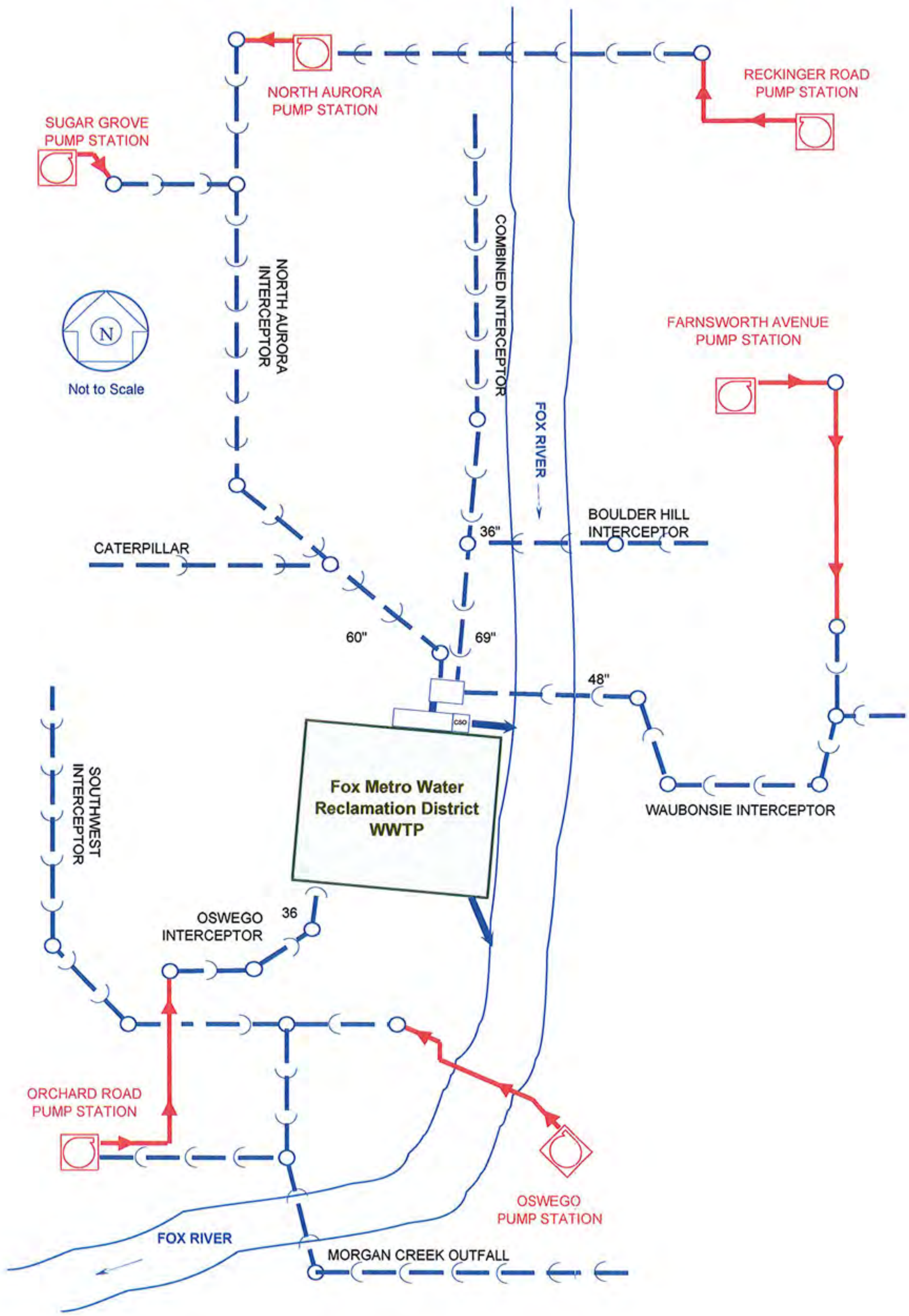
REVISIONS F:\ASD\06060-06\FIG 1-1				COMBINED INTERCEPTOR TRIBUTARY AREA FOX METRO WATER RECLAMATION DISTRICT
DESIGNED GL DRAWN JES	APPROVED GL DATE 5/21/09	BOOK - SCALE 1"=4000'	JOB NUMBER 111/06060-06	

SHEET

OF

FMWRD FACILITY PLANNING AREA
MAJOR TRUNK SEWERS & PUMPING STATIONS



WALTER E. DEUCHLER ASSOCIATES, INC. *Consulting Engineers - Aurora Illinois*	REVISIONS SCALE - NONE	FMWRD FPA MAJOR TRUNK SEWERS & PUMPING STATIONS FIGURE 2-4

2.2.2 *Separate Sewer System*

2.2.2.1 *Sanitary Sewer*

While the combined sewer system, as previously defined, has a significant impact to the river, most of FMWRD's Facility Planning Area (FPA) is serviced by a separate sanitary system (SSS). **Table 2-4** compares the combined sewer interceptor service area with the separate sewer system service area as defined by the four main interceptors which flow into FMWRD. Since these separate sanitary sewers systems do not discharge to the Fox River, they were not studied further as part of the CSO LTCP.

Table 2-4

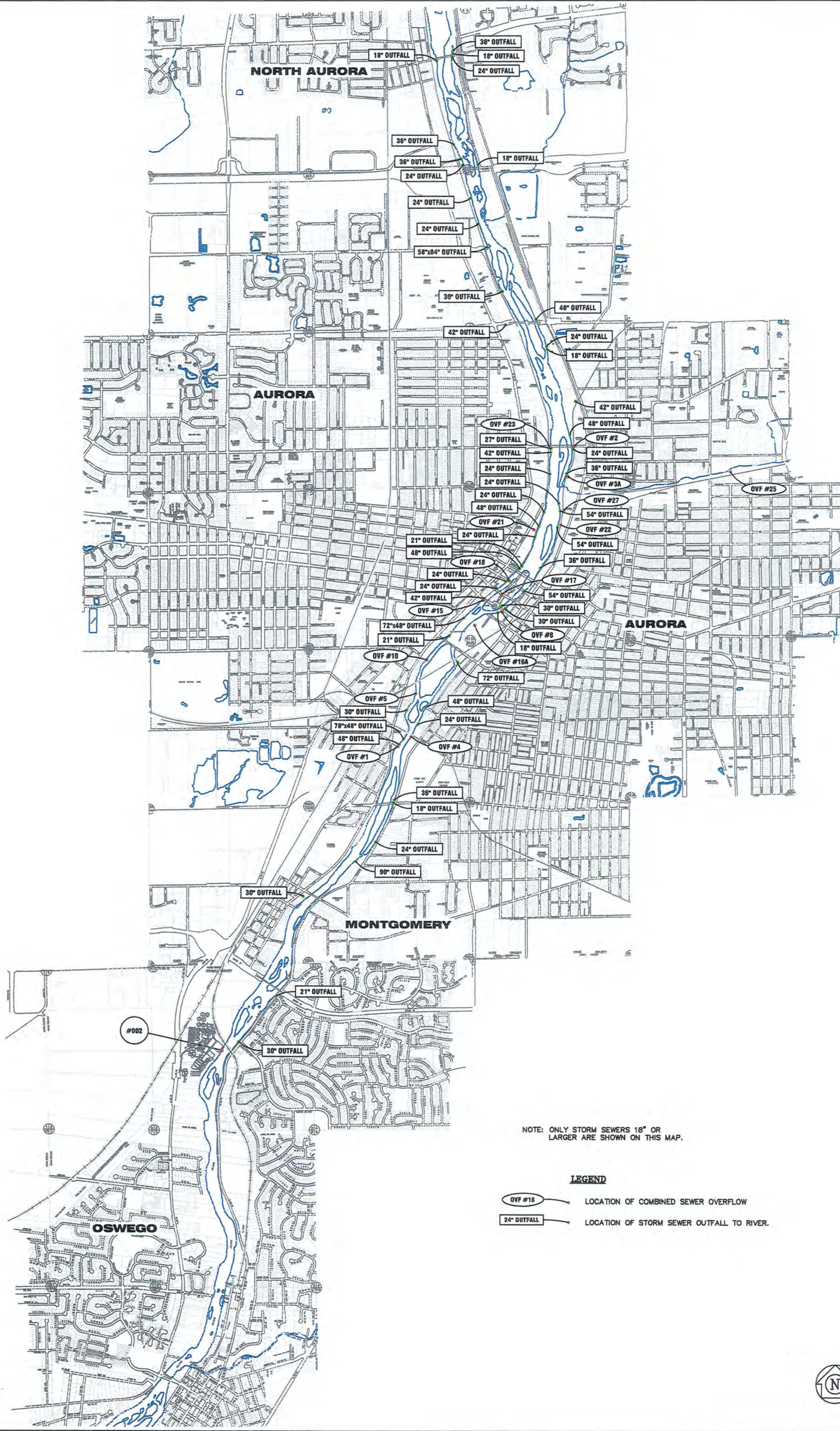
FMWRD – Interceptor Drainage Area Summary

Interceptors Tributary to FMWRD WWTP	Combined Sewers Acres	Separated Sewers Acres	Total Acres
Combined Interceptor	7,145	0	7,145
North Aurora Interceptor	0	31,612	31,612
Waubonsie Interceptor	0	19,848	19,848
Boulder Hill Interceptor	0	1,030	1,030
Oswego Interceptor	0	20,592	20,592
Totals	**7,145**	**73,082**	**80,227**

2.2.2.2 *Storm Sewer*

The municipalities within the FMWRD Facility Planning Area (FPA), with the exception of a portion of Aurora discussed above, are served by separate storm sewer systems. There are a number of storm sewers from various communities which discharge into the Fox River on a regular basis. Some of these are almost eight feet in diameter and can contribute a significant amount of BOD, total suspended solids, nutrients and other pollutants to the river. Since their impact can be significant, several storm sewers were monitored as part of this study. The CSOs and storm sewers within the study area are shown on **Figure 2-5**.

The management of storm water collection and their required outfalls to the river are the responsibility of the municipalities and the counties. Local governments are responsible for requiring storm water controls to be incorporated into development plans within their jurisdiction for residential, commercial and industrial properties. The municipalities and townships located within FMWRD's FPA are permitted under the municipal separate storm sewer systems (MS4) program which is under the jurisdiction of IEPA.



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REVISIONS

DATE 2/15/08 | DESIGNED | DRAWN SAL | APPROVED | BOOK | SCALE NONE | CAD DWG. ASD\06060-06\FIG 2-5 | JOB NO. 111/06060/06

FIGURE 2-5
CSO LONG TERM CONTROL PLAN
CSO/STORM SEWER OUTFALLS

SHEET

OF

2.2.3 *Wastewater Treatment Facility*

Flows from the OSCI are mixed with flows from the separate sanitary sewer interceptors prior to entering the rough-screening facility (Building B-1) at the WWTP. All flow to the WWTP has historically been permitted under previous determinations by IEPA and IPCB as combined sewage. FMWRD owns and operates a single CSO discharge outfall at the WWTP site. This CSO is currently permitted (Outfall No. 002) to discharge to the Fox River any flows to the plant in excess of the treatment levels described in IPCB 85-224. The collection system and treatment system shall be operated to maximize transport and treatment of wastewater flow in order to minimize CSO discharges.

A process flow schematic of the existing FMWRD wastewater treatment plant is shown on **Figure 2-6**. The facility is rated for an average flow of 42 MGD, and the treatment train includes screening, grit removal, primary clarification, aeration, secondary clarification, filtration, and disinfection. The plant is capable of treating flows up to a design maximum flow of 85 MGD.

During wet-weather events, the influent flows through the screening equipment (three "climber" type screens with a capacity of 87 MGD each). As shown on **Figure 2-6**, the first 85 MGD of wet-weather flow is fully treated (secondary treatment), filtered and disinfected, while excess flow above this amount is discharged over a 40 foot-long weir after screening and grit removal to the Fox River. The frequency and volume of discharge to the river depend on the capacity of the wastewater treatment plant, the hydraulic geometry of the overflow weir, storm intensities and duration. Detailed descriptions of current plant operations may be found in the 2005 Master Plan.

2007 Plant Flow Schematic
Liquid Train

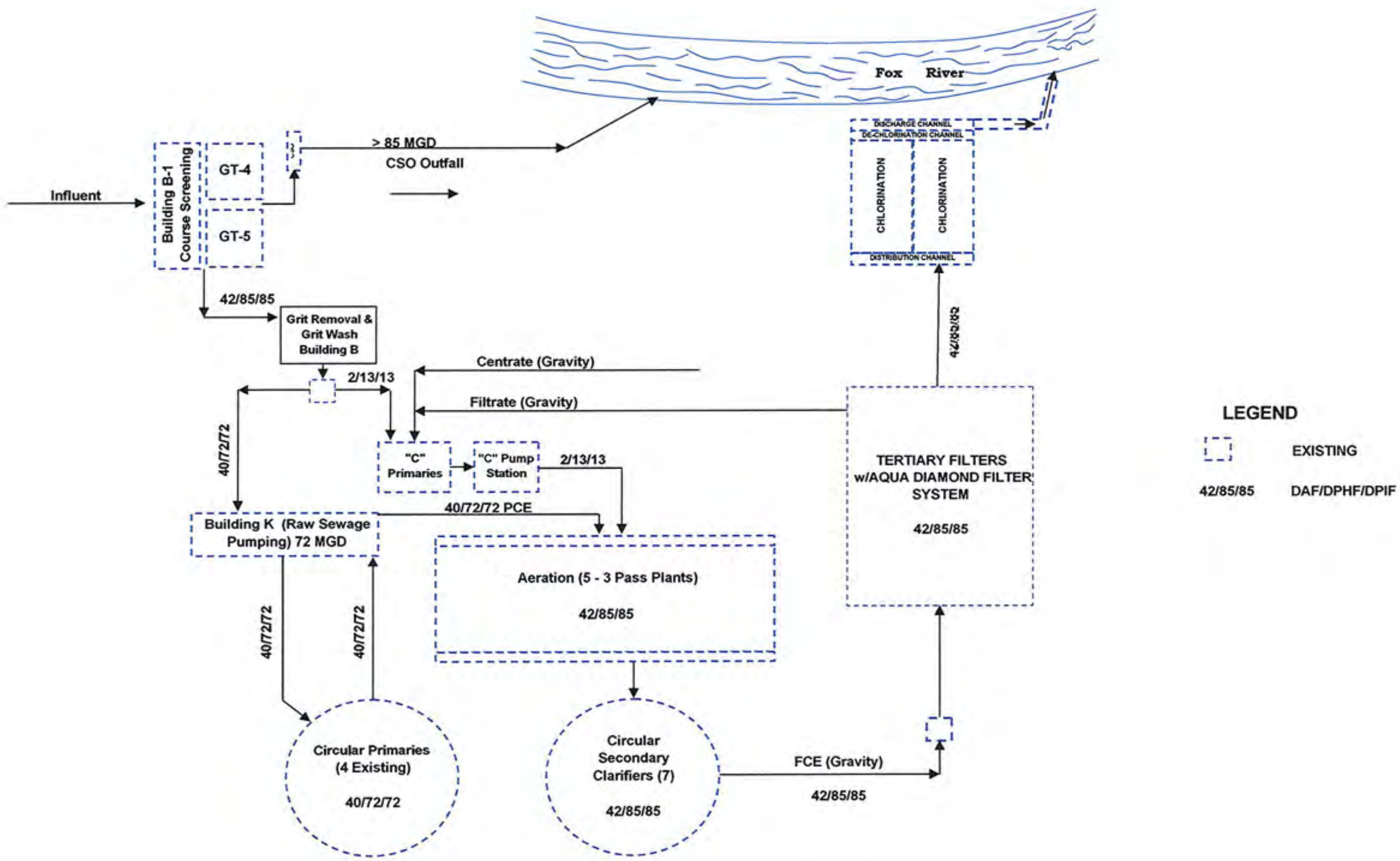

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FIGURE 2-6

FMWRD - LONG TERM CONTROL PLAN
2007 EXISTING PLANT

SHEET 1 OF 1

DATE	6/15/2009	DRAWN	GSL		SCALE	None	JOB NO.	111-06060-00	File Path	G:/ 111-06060-00 / 2025 Plant Improvements

2.2.4 *Wet Weather Flow*

The 2005 Master Plan contained a detailed infiltration and inflow (I&I) analysis that was prepared to more accurately predict total flows for the 20-year planning period. The results of the I&I analysis are summarized below.

Basis of Analysis - The purpose of the Infiltration and Inflow (I&I) Analysis was to evaluate and quantify excessive I&I in each of the five (5) tributaries to the treatment works as defined in **Table 2-4**. The data collected included flow measurements at the plant, rainfall, and the physical condition and capacities of the sewer system.

In general, the main goals of the I&I analysis were to:

- Confirm that the designers and managers have reliable data available to conclusively quantify non-excessive or excessive I&I.
- Generate sufficient flow data of each trunk main to allow sound engineering decisions to be made regarding excessive or non-excessive flow.
- Develop a realistic approach for reducing excessive I&I.

An evaluation of the costs associated with rehabilitating, storing or transporting and treating various conditions of I&I was an integral part of the 2005 Master Plan and was further detailed in the 2005 Wet Weather Facilities Study (see **Appendix C**). Certain assumptions had to be made regarding what quantity of I&I will remain influent to the wastewater treatment plant, if the collection system is rehabilitated. These assumptions are based on past experience with I&I reduction projects in the FMWRD service area as well as the realization that other sources of inflow emerge while performing the rehabilitation in the subject area. Past experience has revealed that approximately 50% reduction of inflow and 0% reduction of infiltration is achievable within the collection system.

A common error in estimating the effectiveness of rehabilitation is to assume net system wide effects will be equal to the sum of the I&I values initially allocated to specific rehabilitated components. Consideration has to be given to the "fluid" nature of the I&I sources, particularly if rehabilitation is limited to specific components in the total system. Rehabilitation in one area can result in raising the groundwater level, increasing the leakage in shallower sewers, and creating new leakage in previously adequate sewers because of increased hydraulic head. This is particularly true where rehabilitation efforts have been limited to (public) sewers while ignoring privately owned service laterals. Understanding the effectiveness of the sewer rehabilitation I&I control program is essential to making the right decisions regarding rehabilitation versus increasing conveyance and treatment plant capacity.

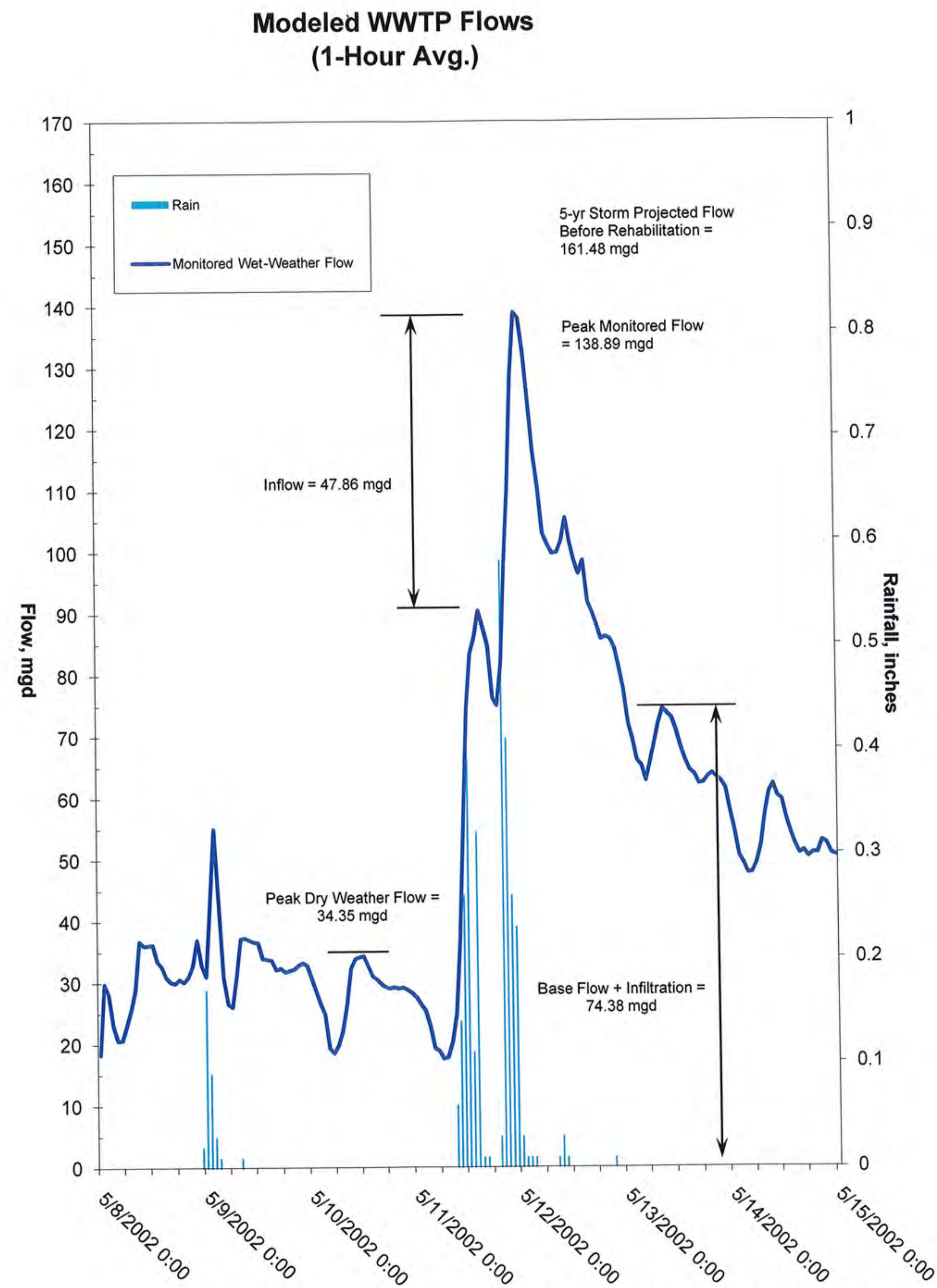
Originating from the CSO compliance studies performed in the 1980's, the FMWRD adopted a policy for providing a level of protection equivalent to a 5-year storm event on all collection system and treatment plant facilities in the FMWRD FPA. Therefore, all flows monitored as part of the 2005 Master Plan, were scaled to a 5-year storm frequency. The level of protection refers to the capability of the system to manage wet weather occurrences. For example, a 5-year storm frequency level of protection assumes that all wet weather flows of a 5-year frequency or less would be capable of being transported and treated. On the other hand, wet weather flows from a storm event greater than a 5-year frequency (such as a 10-year storm event) would exceed the capacity of the system.

Design Storm Event Determination - The storm event of May 11 & 12, 2002 closely approximated a 2-year rainfall event as defined by ISWS Bulletin 70/89. The rain event produced a total of 2.81 inches during a 14.5 hour period with a peak rain intensity of 1.45 inches of precipitation in 3 hours and 48 minutes. As a result of this storm, 26.3 MG was discharged via CSO Outfall 002 over a 24 hour period. The May

11th analytical results for the WWTP daily influent composite $CBOD_5$ was 70 mg/l and on May 12th was 43 mg/l. The influent composite for TSS was 122 mg/l and 54 mg/l respectively for that storm event. In addition, the WWTP effluent $CBOD_5$ was 3 mg/l and 4 mg/l, and the TSS was 4 mg/l and 5 mg/l respectively during the storm event.

The May 11th and 12th storm event was scaled to a 5-year event as follows:

- Step 1 – Determine Major Flow Components from Hydrograph (**Figure 2-7**)
  - Base flow before storm = 34.35 mgd
  - Peak Inflow = 47.86 mgd
  - Base Flow + Infiltration after storm = 74.38 mgd
  - Peak Infiltration (74.38 – 34.35) = 40.03 mgd
- Step 2 – Determine Scale Factor
  - May 11 & 12 Storm = 1.45 inches collected in 3 hrs 48 min.
  - ISWS 5-year Storm = 2.64 inches collected in 3 hrs 48 min.
  - Scale Factor = 2.64 / 1.45 = 1.82
- Step 3 – Determine Projected 5-Year Peak Inflow
  - (Inflow x Scale Factor) = (47.86 mgd x 1.82)
  - Projected 5-year Peak Inflow = 87.11 mgd
- Step 4 – Determine Total Projected Peak Storm Flow
  - Projected 5-Year Peak Inflow + Peak Infiltration + Base Flow
    = Total Projected Peak 5-Year Storm Flow
    = 87.11 mgd + 40.03 mgd + 34.34 mgd = 161.48 mgd
- Summary of May 11 & 12, 2002 projected to a 5-year storm event:
  - Base Flow = 34.35 mgd
  - Peak Inflow = 87.11 mgd
  - Peak Infiltration = 40.03 mgd
  - Projected 5-Year Peak Flow = 161.48 mgd



May 12, 2002 : Projected 5-Year Storm Flow = (47.86 mgd x 1.82) + 74.38 = 161.48 mgd

Figure 2-7

Wastewater Flows in Wet Weather - The "Wet Weather Facilities Study" (prepared in April 2005) discussed the cost-effectiveness of three alternatives to accommodate excess flows including 1) Transporting and Treating 2) Rehabilitation of the Sewer System, and 3) the construction of Flow-Equalization Basins in the high-flow areas of the Aurora collection system.

Past experience with I&I reduction projects in the FMWRD service area has revealed that approximately 50% reduction of inflow is achievable within the collection system. **Table 2-5** shows the hydraulic benefit of inflow removal using an inflow reduction of 38 mgd (or 44% of total inflow):

Table 2-5
Hydraulic Benefit of Inflow Removal

	Flow, mgd (before rehabilitation)	Projected Flow, mgd (after rehabilitation)
Lowest Flow Day	19.10	19.10
Average Daily Flow	34.35	34.35
Projected Peak Hourly Flow	161.48	123.48
Projected Peak Inflow Rate	87.11	49.11

As a part of the Wet Weather Facilities study, an economic feasibility analysis for inflow reduction was conducted between the three alternatives discussed above. As a result, Alternative 3 – Construction of Flow Equalization Basin (FEB) facilities for both the North Aurora Interceptor and the Waubonsie Interceptor was determined to be the most economically feasible alternative. This is discussed in more detail in Section 7.3.1 of this LTCP.

2.2.5 *Monitoring and Testing*

The ultimate goal of a CSO control is the attainment of WQS, including designated uses. The Fox River receives discharges from a number of point and non-point sources. The water quality monitoring completed by FMWRD focused on an area between Sullivan Road Bridge (upstream of all CSOs) and Route 34 (downstream of FMWRD's outfalls). Data gathering focused on quantifying loads from Outfalls 001 and 002 as defined by the District's NPDES permit and the COA's CSOs and storm sewers in the study area. By monitoring these point source discharges FMWRD has documented:

- The type and extent of the receiving water impacts caused by the CSO and other point sources of pollution, and;
- Quantified pollutant loads.

Two types of sampling were used to monitor discharges to the river: 1) flow monitoring to identify the hydraulic response to rainfall and determine the flows to the river and 2) sample collection and chemical analysis of the discharges to determine the quality of the discharge. Both flow and chemical analysis are used to quantify pollutant loadings to the river.

2.2.5.1 *Flow Monitoring*

Combined Sewer Overflows - Originally FMWRD used Marsh-McBirney flow meters for all monitoring both at the WWTP and throughout the COA's CSS. The Marsh-McBirney meters are designed to continuously log velocity and levels using an electromagnetic sensor for velocities and pressure transducers for flow levels. In mid 2009, FMWRD began to replace these meters with new ISCO flow meters which use a pressure transducer for measuring level and ultrasonic waves and associated Doppler affect to measure velocity.

As part of the City of Aurora's NPDES permit, WEDA has provided flow monitoring for all sixteen combined sewer overflows located within the City's CSS since 1996. The locations of these outfalls were described previously. The flow monitors at these locations are downloaded twice a month and any overflows are reported on a monthly basis as part of the discharge monitoring reporting (DMR) requirements. Dry weather overflows, are reported immediately to IEPA after they are discovered.

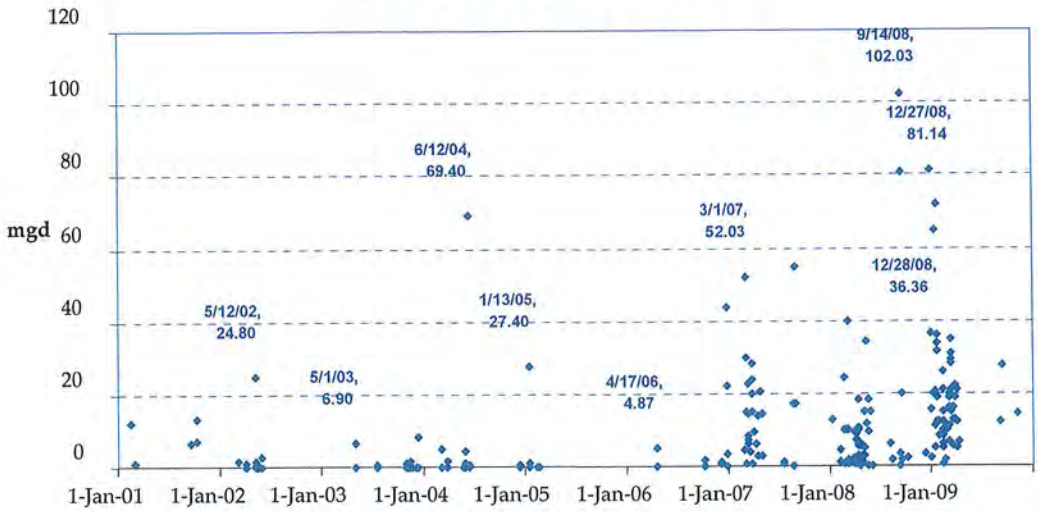
Wastewater Treatment Plant - The quantity of influent flow to the plant is monitored at all five (5) interceptors entering the WWTP site. The flow measurements collected are correlated with quantity of rainfall. The purpose of this data collection and the resulting analysis has been to:

- Ensure that reliable data is available to designers and plant managers to conclusively quantify excessive flows; and to,
- Generate sufficient flow data for each trunk main to allow sound engineering and plant operational decisions to be made regarding the handling and treatment of excess flows.

In addition, WEDA has installed flow meters in the FMWRD's CSO Outfall 002. The outfall remains dry except when flow into the WWTP exceeds the maximum practical treated flow, at which time Outfall 002 discharges to the river.

During the years 1996 to 2007, 75 CSO discharges occurred at Outfall 002 at the FMWRD WWTP as shown on **Figure 2-8**.

Figure 2-8
CSO Events at FMWRD



Storm Sewers - Originally flow monitoring of the storm sewers was not part of the plan of study. However, after reviewing preliminary results of storm samples collected during rain events in 2008, the data indicated that storm discharges to the river could provide significant pollutant loadings. Therefore, in 2009 flow monitors were installed at three locations which had been previously sampled for pollutants only.

The locations included:

A manhole located in a park area along North River Street: This 48 inch storm sewer collects storm water from the older parts of Aurora. In the spring time this location discharges continuously, however during the drier summer months discharges from this location are almost zero. The outfall is located on the west side of the Fox River.

A manhole located at Cleveland and Archer Avenue: This storm sewer runs through an industrialized area of Aurora and is part of the Turkey Creek storm sewer system with an outfall of 102 inches in diameter. This outfall is located on the west side of the Fox River within the center of the COA CSS.

A manhole in a residential area of Montgomery on Hartway: The storm sewer is approximately 90 inches in diameter. In the spring, the sewer continuously contains nearly a foot of water and discharges on the east side of the Fox River just below the Montgomery Dam. Even in the summer months there is usually some flow discharged by this sewer.

While flow levels were downloaded on a monthly basis from these locations, the only time flows were quantified was when flow quantities were needed to calculate loadings during a rain event. It is assumed that these storm sewers discharge to the Fox River on a frequent, if not continuous basis.

2.2.5.2 *Sampling and Analysis*

All manhole locations sampled for this study were equipped with ISCO 3700 (standard or compact) samplers that use a peristaltic pump for sample collection. The sampling cycle includes an air pre-sample purge and post-sample purge to clear the suction line before and after sampling. Each sampler was programmed to start collecting samples at the onset of an overflow event. In the case of the storm sewers, samples were collected when the storm water elevation was higher than the base flow. The samplers were programmed identically to collect samples at five minute intervals for the first 20 minutes of an overflow then another sample at 30 minutes, 45 minutes, 1 hour and every hour after that for up to five hours.

Samples collected were analyzed for the following parameters: BOD_5, total suspended solids, fecal coliforms, total kjedahl nitrogen, ammonia nitrogen, nitrate, nitrite, organic nitrogen, total phosphorus, dissolved phosphorus, chloride and fluoride.

CSS Water Chemistry Sampling - Overflow locations within the CSS have been sampled since 2008. The overflow locations which were equipped with samplers were based on the number of overflows per year as previously discussed. These locations included OVF 1, 4, 8, 10, 15 and 18.

Samples were not collected during every overflow event. The intent of the study was to capture the first flush of overflow after a significant dry period. Therefore, samples were collected and analyzed only when a significant rainfall event had occurred which was defined as at least 0.25 inches of rain within 1 hour proceeded by a dry weather period of approximately ten to fourteen days. **Table 2-6** lists rainfall events that were sampled in 2008 and 2009.

In addition to WEDA sampling the Outfall 002, FMWRD has done their own sampling of the overflow. Instead of an ISCO sampler that was used for this study, FMWRD uses a grab sample for analysis. During the 2008 sampling season, overflow events at the outfall were captured on May 11, September 4, and October 7, 2008. The sampler was removed in November 2008. In 2009 there were no overflows from June through September at the plant or in November. Two events were captured in October, one on October 23rd and one on October 30th. The sampler was removed in early December due to cold weather and construction activities. Results for Outfall 002 are summarized in **Table 2-7**.

Data collected from the combined sewer overflows within the City of Aurora were used as inputs to the model as part of the calibration and verification process. As will be discussed in the next section, Mill Street was used as the upstream boundary condition for modeling impacts from the FMWRD CSO outfall. Modeling of the data collected from the City of Aurora's CSOs and storm sewers will be coordinated between FMWRD and the COA in subsequent phases of the project.

Table 2-6
2008 and 2009 Monitored Rain Events
(FMWRD and COA CSO Pollutant Sampling)

Date of Rainfall Event Sampled	Amount of Rain (inches)	Duration (Hours)	OVFs	OVFs Sampled (002) –Fox Metro Outfall 002
May 11, 2008	1.7	9	1, 4, 8, 10, 15, 25, (002)	1, 4, 8, 15, (002)
July 8, 2008	0.38	4	8, 10, 15, (002)	4, 10
July 10, 2008	0.6	7	1, 4, 8, 10, 15	1, 4, 10
August 4, 2008	0.5	3	1, 2, 3, 4, 5, 8, 10, 18, 21, 22, 25	1, 4, 8, 10, Hartway
August 28, 2008	0.12	1	Storm Sewers Only	North River and Cleveland
Sept. 2 - 4, 2008	1.15	1.5	1, 4, 5, 8, 10, 15, 18, (002) Storm Sewers	1, 4, 8, 15, 18, (002), North River and Hartway
Sept. 8, 2008	9.0	0.9	1, 4, 8 25, (002)	(002)
Oct. 7 – 8, 2008	17.0	0.85	1, (002)	(002)
June 8, 2009	14.0	1.26	1, 4, 8, 10, 15, 18, 21	
July 4, 2009	8.0	0.35	Cleveland Storm Sewer	
July 20, 2009			Storm Sewers Only	
July 28, 2009	3.0	0.21	Storm Sewers Only	
August 7, 2009	5.0	0.6	1, 10, Storm Sewers	
Oct. 23, 2009	18.0	0.8	1, 4, 10, 15, 25 (002)	(002)
Oct. 30, 2009	15.0	0.84	001, 004, 008, 010,015,025 (002)	(002)

Table 2-7
Fox Metro Water Reclamation District
Sampling Results Outfall 002

Parameter		Collection Time, (hrs)	CSO Bypassed Volume, MG	Temperature °C	D.O. (mg/L)	pH (S.U.)	Conductivity (uS/cm)	BOD (mg/L)	TSS (mg/L)	Fecal Coliforms (#/100mL)	TKN (mg/L)	Ammonia N (mg/L)	Nitrate N (mg/L)	Nitrite N (mg/L)	Organic N (mg/L)	Total P (mg/L)	Soluble, Unreactive P (mg/L)*	Soluble, Reactive P (mg/L)**	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
Sample Collection Date																					
FMWRD	WEDA	Hours	MG	°C	mg/l	(S.U.)	uS / 100 ml	mg/l	mg/l	# / 100 ml	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
2/25/2007		8.00	4.69	-----	-----	-----	-----	130	142	-----	-----	10.10	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/1/2007		24.00	52.03	-----	-----	-----	-----	69	156	-----	-----	5.28	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/3/2007		21.00	14.91	-----	-----	-----	-----	117	96	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----	-----
3/4/2007		1.50	0.37	-----	-----	-----	-----	122	92	-----	-----	14.40	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/10/2007		24.00	22.73	-----	-----	-----	-----	116	100	-----	-----	ND	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/11/2007		23.00	14.64	-----	-----	-----	-----	90	80	-----	-----	11.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/12/2007		14.00	8.25	-----	-----	-----	-----	143	106	-----	-----	13.50	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/13/2007		17.00	7.40	-----	-----	-----	-----	132	134	-----	-----	13.60	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/14/2007		6.00	3.60	-----	-----	-----	-----	137	106	-----	-----	15.80	-----	-----	-----	-----	-----	-----	-----	-----	-----
4/1/2007		22.00	9.30	-----	-----	-----	-----	124	128	-----	-----	15.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
8/25/2007		20.00	17.35	-----	-----	-----	-----	34	90	-----	-----	ND	-----	-----	-----	-----	-----	-----	-----	-----	-----
2/18/2008		-----	10.03	-----	-----	-----	-----	97	178	-----	-----	6.48	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5/11/2008	5.00	34.45	-----	-----	7.32	770.00	83	310	1,178,000	13.82	5.72	<0.09	0.46	8.10	2.26	-----	0.61	153.00	0.32	-----
	7/8/2008	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7/11/2008	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8/4/2008	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8/28/2008	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	9/4/2008	5.00	3.24	-----	-----	-----	-----	116	309	-----	17.50	7.11	0.17	-----	10.39	2.32	-----	-----	107.86	0.37	31.36

Table 2-7
Fox Metro Water Reclamation District
Sampling Results Outfall 002

Parameter		Collection Time, (hrs)	CSO Bypassed Volume, MG	Temperature °C	D.O. (mg/L)	pH (S.U.)	Conductivity (uS/cm)	BOD (mg/L)	TSS (mg/L)	Fecal Coliforms (#/100mL)	TKN (mg/L)	Ammonia N (mg/L)	Nitrate N (mg/L)	Nitrite N (mg/L)	Organic N (mg/L)	Total P (mg/L)	Soluble, Unreactive P (mg/L)*	Soluble, Reactive P (mg/L)**	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
Sample Collection Date																					
FMWRD	WEDA	Hours	MG	°C	mg/l	(S.U.)	uS / 100 ml	mg/l	mg/l	# / 100 ml	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	9/8/2008	0.25	0.05	-----	-----	-----	-----	101	585	3,220,000	16.40	8.17	0.11	-----	8.23	2.99	-----	1.20	121.33	0.46	38.87
9/13/2008		20.00	80.63	-----	-----	-----	-----	20	60	-----	-----	0.08	-----	-----	-----	-----	-----	-----	-----	-----	-----
9/14/2008		24.00	102.03	-----	-----	-----	-----	20	48	-----	-----	0.586	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10/7/2008	3.00	1.98	-----	-----	-----	-----	235	591	2,581,818	27.55	13.25	0.32	-----	14.30	6.36	-----	2.61	196.36	0.60	50.10
3/8/2009		24.00	68.22	-----	-----	-----	-----	61	104	-----	-----	3	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/9/2009		24.00	27.72	-----	-----	-----	-----	43	5	-----	-----	4	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/10/2009		24.00	32.02	-----	-----	-----	-----	75	50	-----	-----	5	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10/23/2009	14.50	8.1	-----	-----	-----	-----	84	149	837,875	-----	8.47	-----	-----	-----	8.33	-----	-----	-----	-----	-----
	10/27/2009	24.00	0	-----	-----	-----	-----	52	94	914,286	-----	-----	-----	-----	-----	2.07	-----	-----	-----	-----	-----

2.3 Receiving Waters

The segment of the Fox River that has been studied (DT-38) as part of this LTCP is within a highly urbanized area with a mix of parks, residential, industrial and commercial lining either side of the river from IL Route 56 down to U.S. Route 34 in Oswego (located downstream of FMWRD CSO Outfall 002). In addition to the CSOs and storm sewers previously discussed there are many non-point sources in this segment. This segment of the Fox River is impaired for aquatic life use for dissolved oxygen, pH, total phosphorus, total suspended solids, and for fecal coliform for primary contact recreation use.

The Fox River is considered a general use waterway and therefore must meet general use water quality standards. According to the IPCB, "General Use standards will protect the State's water for aquatic life, wildlife, agricultural use, secondary contact use and most industrial uses and ensure the aesthetic quality of the State's aquatic environment. Primary contact uses are protected for all General Use waters whose physical configuration permits such use". A partial list of water quality standards are shown in **Table 2-8.**

Table 2-8
Partial List of Water Quality Standards

Constituent		*Unit*
Bacteriological (no. per 100 ml) (May – October)		
Fecal Coliform (30 day geometric mean)	200	no. / 100ml
Fecal Coliform (10% of Samples in any 30 day period)	400	no. / 100ml
Physical		
Dissolved Oxygen (mg/l)		
March thru July (any time)	5.0	mg/l
March thru July (daily mean – avg. over 7 days)	6.25	mg/l
August thru February (any time)	4.0	mg/l
August thru February (daily – avg. over 7 days)	4.5	mg/l
August thru February (daily mean – avg. over 30 days)	6.0	mg/l
pH		
Must be greater than	6.0	
and less than	9.0	
Temperature (maximum temp. rise above the natural River temp. shall not exceed)	5.0° F	Fahrenheit
Oil and Grease	15	mg/L

FMWRD regularly monitors upstream (Mill Street in Montgomery) and downstream of their outfall (U.S. Route 34 in Oswego). Samples are collected for analysis of both total and dissolved metals and conventional pollutants four times a year. Results for 2009 can be seen in **Table 2-9**.

Fox Metro Laboratory
682 State Route 31
Oswego, IL 60543
(630) 892-4378

Quarterly River Data Summary

Fox River Upstream Of Fox Metro Outfall
Non-Metals

Fox River - Mill St. Bridge Date	Time (24)	Sample I.D.	pH	°C	Turb. N.T.U.	Cond. uS/cm	DO mg/L	TSS mg/L	TDS mg/L	Hard mg/L	BOD mg/L	Cl^- mg/L	F^- mg/L	TKN mg/L	NH_3-N mg/L	NO_3-N mg/L	NO_2-N mg/L	PO_4-P mg/L	o-PO_4-P mg/L	Phenol ug/L	CN^-(T) ug/L	CN^-(WD) ug/L
1-Feb-00	8:10	2000-00842	8.20	0.2	ND	ND	12.9	3	582	381	< 2	ND	0.33	1.0	0.194	3.35		0.42		1.0	1.2	< 0.8
1-Jun-00	8:00	2000-04549	8.10	18.3	ND	ND	8.55	69	452	280	2	ND	0.28	1.9	0.157	2.20		0.30		3.0	3.4	0.8
1-Aug-00	9:00	2000-06559	7.97	22.3	ND	ND	6.84	110	441	271	2	ND	0.23	2.4	0.173	1.48		0.54		3.4	3.6	< 0.8
1-Nov-00	13:45	2000-09500	8.90	15.6	ND	ND	13.6	38	532	328	6	ND	0.30	1.7	0.025	1.35		0.37		4.8	< 0.8	< 0.8
5-Feb-01	11:25	2001-01059	8.30	2.0	ND	ND	ND	5	678	383	< 2	ND	0.23	1.0	0.312	0.92		0.17		1.3	1.6	< 0.8
4-Jun-01	11:00	2001-04891	8.23	15.0	ND	ND	10.2	38	512	315	4	ND	0.26	2.1	0.038	1.97		0.24		4.0	0.9	< 0.8
6-Aug-01	10:00	2001-06943	ND	28.4	ND	ND	7.65	46	572	296	5	ND	0.35	2.6	0.019	0.81		0.53		2.4	0.7	< 0.7
2-Nov-01	10:15	2001-09776	8.24	11.1	ND	ND	11.1	51	487	299	3	ND	0.25	1.7	0.159	2.61		0.30		1.7	1.8	< 0.7
1-Feb-02	10:10	2002-00915	8.41	1.5	6.98	1,160	23.2	10	638	337	3	134	0.32	1.1	0.025	2.42		0.29		1.6	2.1	< 0.7
4-Jun-02	8:40	2002-04690	7.78	19.7	25.8	844	8.22	58	501	266	4	30	0.26	2.0	0.370	1.66		0.29		3.3	3.3	< 0.7
30-Jul-02	9:08	2002-06494	8.66	26.2	27.6	1,023	7.71	49	609	310	6	165	0.38	2.7	0.020	3.02		0.70		3.1	2.3	1.6
2-Aug-02	10:35	2002-06629	8.99	28.2	29.1	1,030	8.84	48	641	302	6	172	0.34	2.7	0.016	2.77		0.75		< 1.6	0.9	< 0.7
29-Oct-02	9:20	2002-09330	8.26	8.6	12.4	1,006	11.52	22	562	299	3	107	0.26	1.4	0.108	2.15		0.48		3.6	1.8	< 0.7
5-Feb-03	12:35	2003-01121	8.26	0.2	5.89	1,407	16.51	8	858	371	7	241	0.43	1.8	0.467	3.93		0.64		5.3	6.2	0.8
2-Jun-03	10:25	2003-04958	8.37	17.2	18.8	990	10.57	39	605	326	4	153	0.32	1.7	0.027	1.74		0.31		2.2	3.9	1.3
1-Aug-03	9:50	2003-07011	8.63	24.4	29.1	879	8.55	43	550	250	6	133	0.32	2.0	0.026	1.13		0.48		3.5	2.6	< 0.7
6-Nov-03	10:12	2003-10056	8.21	10.1	33.3	820	12.50	60	494	257	5	129	0.31	1.9	0.090	1.53		0.38		2.8	1.1	< 0.7
5-Feb-04	9:46	2004-01032	7.73	-0.1	1.36	1,390	17.45	2	813	410	< 2	212	0.45	1.4	0.599	4.21		0.54		< 1.6	3.6	< 0.7
1-Jun-04	10:09	2004-04928	7.86	17.1	59.2	589	9.99	105	413	247	3	69	0.30	1.4	0.096	2.08		0.26		< 1.6	2.8	< 0.7
2-Aug-04	9:25	2004-07037	8.54	25.5	33.7	975	8.87	45	684	312	8	105	0.35	2.6	0.016	1.01		0.49		3.6	< 0.7	< 0.7
2-Nov-04	10:05	2004-10044	8.11	11.6	22.1	907	11.64	49	543	299	7	107	0.18	2.0	0.090	2.22		0.53		4.3	1.4	< 0.7
4-Feb-05	10:05	2005-01034	7.90	0.1	3.05	1,111	17.40	4	653	353	< 2	129	0.24	1.0	0.167	3.18		0.32		< 1.6	3.5	0.7
5-May-05	9:15	2005-03988	8.79	12.8	14.3	940	11.12	33	608	302	7	124	0.24	2.2	0.022	0.80		0.39		< 1.6	1.1	< 0.7
4-Aug-05	10:07	2005-07084	9.00	27.3	23.6	1,157	6.95	36	736	280	6	186	0.46	2.9	0.023	< 0.09		0.91		< 1.6	2.6	< 0.7
3-Nov-05	10:00	2005-10123	8.33	11.4	10.6	1,257	12.42	20	747	278	5	198	0.46	1.9	0.032	3.10		0.74		< 1.6	2.4	< 0.7
2-Feb-06	10:02	2006-01022	8.10	3.1	4.31	1,167	15.26	17	689	360	6	156	0.24	1.3	0.019	2.55		0.28		3.2	1.5	< 0.7
5-May-06	10:14	2006-04042	8.00	16.5	18.4	979	10.48	37	587	314	10	119	0.25	2.3	0.024	0.76		0.31		< 1.6	1.1	< 0.7
3-Aug-06	10:39	AB00116	8.82	28.6	27.60	1,079	6.31	40	606	263	8	129	0.37	2.7	0.099	0.30		0.63		2.4	1.6	< 0.7
2-Nov-06	10:20	AB03255	8.15	5.7	11.40	644	16.11	18	605	340	4	125	0.25	1.5	0.028	2.14		0.25		< 1.6	0.7	< 0.7
1-Feb-07	10:09	AC00965	7.78	0.1	2.73	658	16.11	4	702	406	< 2	123	0.29	0.8	0.053	3.67		0.28		< 1.6	3.3	1.3
3-May-07	10:08	AC04049	8.24	16.8	27	836	10.34	63	504	360	6	127	0.29	2.2	0.041	1.22		0.29		3.1	< 0.7	< 0.7
2-Aug-07	10:00	AC07285	8.80	28.5	30	1,048	7.71	37	546	309	6	152	0.22	3.0	0.040	0.19		0.45		7.5	< 0.7	< 0.7
8-Nov-07	10:09	AC11218	8.66	6.8	12	670	13.75	25	560	337	6	135	0.26	1.7	0.030	1.39		0.34		< 1.6	< 0.7	< 0.7
6-Feb-08	9:58	AD01122	7.55	0.1	9.7	818	14.71	6	804	347	2	235	0.28	1.0	0.140	2.77		0.25		< 1.6	2.4	1.2
7-May-08	10:09	AD04263	8.56	16.7	22	789	9.20	41	512	299	7	114	0.17	1.7	0.097	0.77		0.26		< 1.6	< 0.7	< 0.7
8-Aug-08	10:13	AD08058	8.18	24.2	22	942	7.75	34	1470	285	< 2	128	0.25	1.5	0.081	0.93		0.31		1.6	1.3	0.8
5-Nov-08	10:00	AD11424	8.03	12.5	4.7	820	11.23	6	540	337	< 2	131	0.21	0.84	0.049	1.84		0.25		2.8	1.6	< 0.7
11-Feb-09	11:26	AE01209	7.76	0.3	22	602	14.50	44	564	282	3	191	0.13	1.14	0.213	2.08	< 0.05	0.22	< 0.02	< 1.6	2.5	0.8
6-May-09	10:12	AE03969	7.88	15.8	20	686	9.76	52	423	278	4	91	0.20	1.52	0.051	1.20	< 0.05	0.24	< 0.02	< 1.6	1.0	< 0.5
29-Jul-09	9:44	AE06950	8.64	24.5	17	973	8.97	32	508	305	6	148	0.24	1.97	0.056	1.01	< 0.05	0.31	0.13	< 1.6	1.8	1.8
4-Nov-09	10:02	AE10332	8.21	8.7	14	616	11.54	21	467	301	< 2	100	0.19	1.03	0.102	1.54	< 0.05	0.15	0.10	14.0	1.3	< 0.1

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Quarterly River Data Summary

Fox River Upstream Of Fox Metro Outfall

Total Metals

Fox River - Mill St. Bridge			Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg*	Mo	Ni	K	Se	Sr	Ag	Na	Tl	Ti	V	Zn
Date	Time (24)	Sample I.D.	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1-Feb-00	8:10	2000-00842	82	< 3	< 2.9	115	< 0.6	< 0.4	77,000	< 0.6	< 1	10	103	< 1	41,100	18	< 0.1	6	0.8	5,010	1.2	ND	< 0.2	85,700	1.2	< 1	< 5	11
1-Jun-00	8:00	2000-04549	2,660	< 3	< 2.9	86	< 0.6	< 0.4	66,500	6	< 1	13	2,000	3	28,900	90	< 0.1	16	10	3,870	< 1.6	478	< 0.2	37,300	< 1.2	62	< 5	16
1-Aug-00	9:00	2000-06559	6,980	< 3	6.8	240	< 0.6	< 0.4	72,400	12	2	30	5,090	26	31,900	168	< 0.1	10	16	6,520	< 1.6	453	< 0.2	482,000	< 1	ND	< 5	67
1-Nov-00	13:45	2000-09500	ND	< 3	< 2	110	< 0.6	< 0.4	70,300	3	< 1	9	600	4	36,700	48	< 0.1	8	1	4,800	2	553	< 0.1	ND	2	17	< 5	8
5-Feb-01	11:25	2001-01059	178	< 3	< 2	72	< 0.6	< 0.4	83,600	2	< 1	5	173	< 1	50,500	27	< 0.1	8	4	4,300	< 1	651	< 0.1	86,600	< 2	2	< 5	12
4-Jun-01	11:00	2001-04891	880	< 3	< 2	75	< 0.6	< 0.4	ND	3	< 1	18	933	< 1	40,000	66	< 0.1	10	2	3,190	< 1	422	< 0.2	59,900	< 1	28	< 5	21
6-Aug-01	10:00	2001-06943	726	< 3	5.5	146	< 0.6	< 0.4	142,000	2	< 1	28	734	< 1	36,800	97	0.16	13	4	5,330	< 1	533	8.9	81,200	< 1.2	26	< 5	11
2-Nov-01	10:15	2001-09776	1,720	< 3	< 2.9	92	< 0.6	< 0.4	67,400	3	< 1	6	1,490	< 1	31,300	62.7	< 0.1	7	2	4,420	1.3	420	< 0.2	38,600	< 1.2	61	6	11
1-Feb-02	10:10	2002-00915	145	< 3	< 2.9	88	< 0.6	< 0.4	79,600	0.8	< 1	5	194	< 1	41,600	22.9	< 0.1	9	2	5,110	< 1	680	0.2	87,500	< 1.2	2	25	9.0
4-Jun-02	8:40	2002-04690	1,400	< 2	< 2.9	98	< 0.2	< 0.1	65,900	3	0.4	8	1,490	< 2	36,000	93.3	< 0.03	7	4	4,110	< 1	438	< 0.2	55,400	< 1.2	43	33	65
30-Jul-02	9:08	2002-06494	878	< 2	< 2.9	139	< 0.2	< 0.1	59,200	2	< 0.3	26	736	< 2	36,600	98.4	< 0.03	10	4	6,470	< 1	453	< 0.2	87,500	< 1.2	34	< 7	28
2-Aug-02	10:35	2002-06629	837	< 2	< 2.9	162	< 0.2	< 0.1	65,800	2	< 0.3	11	745	< 2	40,100	95.4	< 0.03	11	4	7,180	< 1	510	< 0.2	97,800	< 1.2	39	8	22
29-Oct-02	9:20	2002-09330	486	< 2	< 1.8	119	< 0.2	< 0.1	68,200	2	< 0.3	6	445	< 2	39,900	24.4	< 0.03	7	3	5,440	< 1.7	656	< 0.09	77,100	< 1.3	12	< 7	10
5-Feb-03	12:35	2003-01121	56	< 2	< 1.8	115	< 0.2	< 0.1	78,300	1	< 0.3	4	107	< 2	45,000	19.8	< 0.03	9	3	7,520	< 1.7	912	< 0.09	148,000	< 1.3	< 0.9	18	14
2-Jun-03	10:25	2003-04958	852	< 2	< 1.8	109	< 0.2	< 0.1	74,900	2	< 0.3	4	776	< 2	37,700	62.9	< 0.03	7	3	5,060	< 1.7	644	< 0.09	76,700	< 1.3	29	13	11
1-Aug-03	9:50	2003-07011	1,280	< 2	3.5	107	< 0.2	< 0.1	4,770	10	0.7	4	897	< 2	28,000	72.9	0.04	3	3	5,040	< 1.7	ND	0.15	67,200	< 1.3	34	< 7	15
6-Nov-03	10:12	2003-10056	1,580	< 2	2	124	< 0.2	0.3	51,000	5	1.6	8	1,340	4	31,400	49.2	< 0.03	4	4	4,550	< 1.7	449	< 0.09	ND	< 1.3	55	< 17	16
5-Feb-04	9:46	2004-01032	38	< 1	< 1.8	163	< 0.1	< 0.1	89,800	2.5	< 0.3	3	89	< 0.8	46,900	15	< 0.03	6	< 0.7	7,460	< 1.7	996	< 0.09	ND	< 1.3	< 0.7	< 2	18
1-Jun-04	10:09	2004-04928	3,010	< 1	2.3	82	0.1	0.5	57,900	6	1.5	4	2,410	1.9	24,200	86.7	< 0.03	4	2.3	4,780	2.1	284	0.1	25,000	< 1.2	106	10	17
2-Aug-04	9:25	2004-07037	705	< 1	3	138	0.2	0.7	69,800	OUT	1.3	3	690	2.1	36,300	98.7	< 0.03	8	1.4	6,900	< 1.7	567	< 0.09	53,700	< 1.3	19	11	14
2-Nov-04	10:05	2004-10044	930	< 1	< 1.4	134	< 0.1	0.5	58,400	4.3	1.5	2	1,070	3.7	32,400	63.8	< 0.03	6	1.5	8,410	< 0.9	487	0.3	ND	< 1.2	40	15	17
4-Feb-05	10:05	2005-01034	78	< 1	2.7	104	< 0.2	< 0.2	78,500	3.3	1.3	1.9	170	3.0	37,700	17.9	< 0.03	4.4	< 1	5,630	1.3	678	0.08	65,700	< 1.2	2	3	12
5-May-05	9:15	2005-03988	379	< 0.9	< 1.4	117	< 0.3	0.21	58,500	4.1	1.2	5	401	4	34,300	51	< 0.03	4.1	< 1	4,410	1.2	457	0.12	ND	< 1.2	18	< 5	8.9
4-Aug-05	10:07	2005-07084	198	< 0.9	4.3	196	< 0.3	0.21	57,300	3.6	1.3	< 2	214	5	32,000	56.1	< 0.03	7.5	1.0	5,210	1.6	609	< 0.06	ND	< 1.2	8	12	6.5
3-Nov-05	10:00	2005-10123	349	< 0.9	1.4	245	< 0.3	0.22	66,600	3.3	1.0	6	412	3	42,100	45.3	< 0.03	6.8	2.0	9,940	< 0.9	747	< 0.06	ND	< 1.2	14	< 1	18
2-Feb-06	10:02	2006-01022	235	< 0.8	1.5	106	< 0.09	0.10	77,600	2.9	0.4	4	298	1.8	39,500	30	< 0.03	5.1	< 0.5	5,340	1.7	786	< 0.06	ND	< 1.2	5	< 2	9.5
5-May-06	10:14	2006-04042	441	< 0.8	1.8	115	< 0.09	0.15	69,200	3.6	0.18	3	440	0.7	36,800	51	< 0.03	7.6	< 0.5	5,140	< 0.9	571	< 0.06	ND	< 1.2	11	2	11
3-Aug-06	10:39	AB00116	615	< 0.8	< 1.4	151	< 0.09	0.33	59,700	1.7	0.9	5	595	2.3	32,500	81	< 0.03	9.3	2.0	7,060	< 0.9	561	0.14	ND	< 1.2	28	9	28
2-Nov-06	10:20	AB03255	320	< 0.8	< 1.4	86	< 0.09	0.20	81,000	1.4	0.6	2.8	353	0.9	38,000	23	< 0.03	5.4	< 0.5	7,320	< 0.9	687	0.14	ND	< 1.2	9.1	< 2	13
1-Feb-07	10:09	AC00965	83	< 3	< 1.4	94	< 0.1	< 0.2	94,000	0.9	< 0.3	< 1	167	< 0.8	43,900	15	< 0.03	5.3	< 0.5	8,280	< 0.9	618	< 0.1	71,400	< 1	6	< 4	16
3-May-07	10:08	AC04049	920	< 3	< 1	85	< 0.1	< 0.21	77,500	2.7	0.8	3	1,070	2.0	36,200	74	0.04	4.4	1.0	4,210	< 1	412	< 0.1	ND	< 1	35	8	39
2-Aug-07	10:00	AC07285	563	< 3	3	121	< 0.1	< 0.2	59,300	2.0	< 0.3	2	462	< 0.8	35,200	66	< 0.03	5.2	0.6	7,530	< 1	441	< 0.1	64,000	< 1	16	ND	51
8-Nov-07	10:09	AC11218	216	< 3	1	106	< 0.1	< 0.2	75,200	1.6	0.9	7	243	2.8	41,000	23.8	< 0.03	5.1	0.6	10,100	< 1	589	< 0.1	58,200	< 1	8	< 4	24
6-Feb-08	9:58	AD01122	368	< 3	< 2	92.3	< 0.1	< 0.2	80,000	2.9	0.9	4	440	3.3	36,800	36.5	< 0.03	4.4	< 0.5	4,450	< 3	484	< 0.1	ND	< 1	79	< 4	18
7-May-08	10:09	AD04263	1,020	< 3	< 2	78	< 0.1	< 0.2	73,000	3.2	1.1	2	954	4.4	33,500	74	0.17	4.3	0.7	6,760	< 3	382	< 0.1	46,800	< 1	62	10	16
8-Aug-08	10:13	AD08058	797	< 3	< 2	116	< 0.1	< 0.2	68,200	0.6	< 0.3	5	789	< 0.8	36,200	79	< 0.02	5.5	2.6	4,580	< 3	320	< 0.1	43,400	< 1	21	< 4	137
5-Nov-08	10:00	AD11424	196	< 3	< 2	109	0.1	0.3	82,500	0.5	< 0.3	2	223	< 0.8	44,800	18.7	< 0.02	3.5	2.3	4,080	< 3	461	< 0.1	59,900	< 1	1	4	19
11-Feb-09	11:26	AE01209	1,260	< 3	< 2	92	< 0.1	1.5	75,500	2.3	0.5	7	1,410	< 1	34,700	106	< 0.02	2.8	5.0	4,170	< 3	333	< 0.1	94,600	< 1	51	< 7	25
6-May-09	10:12	AE03969	AF	< 3	< 2	64	< 0.1	3.1	68,100	1.8	0.8	< 2	1,100	< 1	31,500	62	< 0.02	2.8	2.7	3,380	< 3	259	< 0.1	46,600	< 1	34	< 7	13
29-Jul-09	9:44	AE06950	671	< 3	< 2	123	< 0.1	1.0	71,300	1.1	< 0.3	6	619	< 1	40,500	76	< 0.02	3.7	2.7	4,310	< 3	361	< 0.1	69,600	< 1	17	< 7	34
4-Nov-09	10:02	AE10332	573	< 3	< 2	73	< 0.1	1.3	73,000	0.8	< 0.3	4	575	< 1	34,700	34	< 0.02	3.5	2.1	3,370	< 3	335	< 0.1	51,800	< 1	21	< 7	16

*Hg by EPA Method 245.1

Table 2-9

Fox Metro Laboratory | 682 State Route 31 Oswego, IL 60543 (630) 892-4378

Quarterly River Data Summary

Fox River Upstream Of Fox Metro Outfall
Dissolved Metals

Fox River - Mill St. Bridge			Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	K	Se	Sr	Ag	Na	Tl	Ti	V	Zn
Date	Time (24)	Sample I.D.	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1-Feb-00	8:10	2000-00842	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Jun-00	8:00	2000-04549	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Aug-00	9:00	2000-06559	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Nov-00	13:45	2000-09500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5-Feb-01	11:25	2001-01059	89	< 3	< 2	72	< 0.6	< 0.4	82,600	2	< 1	3	13	< 1	41,600	22	ND	8	0.8	4,070	< 1	636	0.7	85,400	< 2	< 1	< 5	7
4-Jun-01	11:00	2001-04891	22	< 3	< 3	58	< 0.6	< 0.4	ND	1	< 1	13	14	< 1	32,500	2	ND	8	11	2,800	< 1	385	< 0.2	53,900	< 1	6	< 5	13
6-Aug-01	10:00	2001-06943	21	< 3	4.8	128	< 0.6	< 0.4	69,000	1	< 1	10	6	< 1	35,400	1	ND	13	5	4,770	< 1	498	0.8	76,800	< 1.2	< 1	< 5	4
2-Nov-01	10:15	2001-09776	34	< 3	< 2.9	73	< 0.6	< 0.4	62,200	< 0.6	< 1	8	29	< 1	30,000	3	ND	8	1	3,450	1.7	412	< 0.2	38,100	< 1.2	< 1	5	7
1-Feb-02	10:10	2002-00915	20	< 3	< 2.9	85	< 0.6	< 0.4	78,900	< 0.6	< 1	6	19	< 1	41,400	7	ND	10	1	5,070	1.1	660	< 0.2	87,100	< 1.2	< 1	25	7
4-Jun-02	8:40	2002-04690	6	< 2	< 2.9	76	< 0.2	< 0.1	57,600	< 0.2	< 0.3	5	13	< 2	33,300	1.3	ND	6	2	4,120	< 1	393	< 0.2	51,800	< 1.2	< 0.9	26	10
30-Jul-02	9:08	2002-06494	45	< 2	< 2.9	129	< 0.2	< 0.1	58,300	< 0.2	< 0.3	21	8	< 2	37,300	1.2	ND	11	2	5,330	< 1	463	< 0.2	90,600	< 1.2	< 0.9	< 7	18
2-Aug-02	10:35	2002-06629	44	< 2	< 2.9	143	< 0.2	< 0.1	61,800	< 0.2	< 0.3	11	4	< 2	38,900	1.3	ND	10	2	6,540	< 1	496	< 0.2	97,500	< 1.2	< 0.9	< 7	9
29-Oct-02	9:20	2002-09330	< 3	< 2	< 1.8	93	< 0.2	< 0.1	66,000	1	< 0.3	5	13	< 2	38,900	4.7	ND	7	< 0.3	5,330	< 1.7	571	< 0.09	75,600	< 1.3	< 0.9	< 7	6
5-Feb-03	12:35	2003-01121	12	< 2	< 1.8	100	< 0.2	< 0.1	78,700	0.8	< 0.3	4	24	< 2	45,100	13.7	ND	8	2	6,600	< 1.7	796	< 0.09	148,000	< 1.3	< 0.9	17	12
2-Jun-03	10:25	2003-04958	11	< 2	< 1.8	96	< 0.2	< 0.1	71,000	0.6	< 0.3	3	12	< 2	36,700	1.2	ND	7	2	4,360	< 1.7	617	< 0.09	75,400	< 1.3	< 0.9	10	5
1-Aug-03	9:50	2003-07011	< 3	< 2	3.2	93	< 0.2	< 0.1	46,600	7	0.4	2	6	< 2	28,400	1	ND	4	2	4,570	< 1.7	ND	0.11	70,300	< 1.3	< 0.9	< 7	4
6-Nov-03	10:12	2003-10056	< 3	< 2	< 1.8	102	< 0.2	0.2	46,900	3	1.0	6	22	< 2	30,200	3.6	ND	4	2	4,140	< 1.7	430	< 0.09	ND	< 1.3	< 0.9	< 17	5
5-Feb-04	9:46	2004-01032	< 4	< 1	< 1.8	157	< 0.1	< 0.1	88,800	2.4	< 0.3	3	21	< 0.8	46,100	10.8	ND	6	< 0.7	6,890	< 1.7	968	< 0.09	ND	< 1.3	< 0.7	< 2	11
1-Jun-04	10:09	2004-04928	39	< 1	< 1.4	54	< 0.1	0.2	51,400	2.2	0.6	2	55	< 0.8	22,800	2.2	ND	4	1.2	3,860	2.4	257	0.08	23,800	< 1.2	1.7	5	3
2-Aug-04	9:25	2004-07037	11	< 1	2.9	120	0.2	1.1	60,900	9.9	1.1	2	22	< 0.8	34,100	1.6	ND	7	5.1	5,630	< 1.7	492	0.09	50,000	< 1.3	< 0.7	10	5
2-Nov-04	10:05	2004-10044	3	< 1	< 1.4	118	< 0.1	0.4	56,300	2.0	1.0	< 1	20	1.5	33,000	2.9	ND	6	4.3	7,860	< 0.9	487	0.08	ND	< 1.2	< 0.7	13	6
4-Feb-05	10:05	2005-01034	< 5	< 1	3.1	104	< 0.2	< 0.2	83,100	10.5	1.4	2	64	3.0	38,800	12.5	ND	5.1	5.0	5,480	1.6	676	0.17	61,100	< 1.2	< 0.3	3	9
5-May-05	9:15	2005-03988	< 15	< 0.9	< 1.4	111	< 0.3	< 1	54,800	3.7	1.3	5	13	4.0	33,800	6.6	ND	4.1	2.0	4,370	< 0.9	484	0.13	ND	< 1.2	< 0.2	< 5	4.8
4-Aug-05	10:07	2005-07084	< 15	< 0.9	4	188	< 0.3	0.16	56,600	3.6	1.2	< 2	10	3.0	37,000	2	ND	7.9	1.0	7,640	1.8	607	< 0.06	ND	< 1.2	< 0.2	12	1.4
3-Nov-05	10:00	2005-10123	< 15	< 0.9	< 1.4	227	< 0.3	< 0.05	63,900	4.4	1.1	5	11	2	40,600	1.2	ND	7.1	2.0	9,230	< 0.9	711	< 0.06	ND	< 1.2	< 0.2	< 5	9.0
2-Feb-06	10:02	2006-01022	< 16	< 0.8	< 1.4	99	< 0.09	< 0.07	47,500	3.6	0.4	5	41	1.3	38,600	7	ND	4.9	< 0.5	5,940	1.5	5940	0.07	ND	< 1.2	< 0.4	< 2	9.4
5-May-06	10:14	2006-04042	< 16	< 0.8	2.4	105	< 0.09	0.10	67,200	2.4	0.3	2	12	< 0.5	36,400	1	ND	6.4	< 0.5	4,530	< 0.9	555	< 0.06	ND	< 1.2	< 0.4	< 2	3.4
3-Aug-06	10:39	AB00116	< 16	< 0.8	< 1.4	131	< 0.09	0.18	56,100	1.6	0.7	4	9	< 0.5	31,400	1	ND	9.2	1.5	6,590	1.9	520	0.16	ND	< 1.2	5	6	11
2-Nov-06	10:20	AB03255	< 16	< 0.8	< 1.4	78	< 0.09	0.15	77,500	1.0	0.6	2.8	24	< 0.5	36,800	23	ND	4.9	< 0.5	6,510	< 0.9	646	0.11	ND	< 1.2	< 0.4	< 2	5.3
1-Feb-07	10:09	AC00965	< 13	< 3	< 1	94	< 0.1	< 0.2	96,200	0.6	< 0.3	< 1	16	< 0.8	45,000	9	ND	5.3	< 0.5	7,620	< 1	605	< 0.1	67,500	< 1	3.1	< 4	9.6
3-May-07	10:08	AC04049	< 13	< 3	< 1	67	< 0.1	< 0.2	69,300	2.3	< 0.3	< 1	15	< 0.8	34,000	2.6	ND	4.4	< 0.5	3,500	< 1	382	< 0.1	ND	< 1	1.6	5	5.7
2-Aug-07	10:00	AC07285	82	< 3	2	110	< 0.1	< 0.2	55,800	2.7	< 0.3	2	72	< 0.8	34,300	1.8	ND	5.0	1.1	7,180	< 1	421	< 0.1	63,900	< 1	3.1	ND	9.8
8-Nov-07	10:09	AC11218	48	< 3	< 1	93	< 0.1	< 0.2	69,000	1.2	0.7	2	21	1.7	39,800	2.1	ND	4.8	< 0.5	9,980	< 1	579	< 0.1	59,900	< 1	1.5	< 4	6.5
6-Feb-08	9:58	AD01122	< 17	< 3	< 2	86	< 0.1	< 0.2	79,900	2.7	0.7	1	53	3.3	35,800	18.5	ND	4.4	< 0.5	4,200	< 3	463	< 0.1	ND	< 1	0.3	< 4	9.4
7-May-08	10:09	AD04263	112	< 3	< 2	64	< 0.1	< 0.2	67,800	2.8	0.8	AF	19	2.6	32,100	2.4	ND	4.6	< 0.5	AF	< 3	355	< 0.1	44,400	< 1	5.1	12	13
8-Aug-08	10:13	AD08058	< 17	< 3	< 2	104	< 0.1	< 0.2	63,300	< 0.1	< 0.3	3	21	< 0.8	34,700	2.9	ND	4.0	< 0.5	3,990	< 3	300	< 0.1	ND	< 1	< 0.2	< 4	23
5-Nov-08	10:00	AD11424	37	< 3	< 2	101	< 0.1	< 0.20	76,300	0.4	< 0.3	2	17	< 0.8	42,200	6.6	ND	3.4	1.9	3,600	< 3	432	< 0.1	ND	< 1	< 0.2	4	7.6
11-Feb-09	11:26	AE01209	9	< 3	< 2	72	< 0.1	0.90	69,500	0.3	< 0.3	4	31	< 1	32,900	39.9	ND	2.5	1.8	3,490	< 3	316	< 0.1	93,500	< 1	1.0	< 7	10
6-May-09	10:12	AE03969	AF	< 3	< 2	54	< 0.1	2.5	64,000	0.7	0.5	< 2	31	< 1	30,000	1.6	ND	2.8	1.9	2,890	< 3	253	< 0.1	46,600	< 1	0.6	< 7	2.9
29-Jul-09	9:44	AE06950	65	< 3	< 2	110	< 0.1	0.90	67,300	< 0.2	< 0.3	3	6	< 1	38,300	0.3	ND	3.5	1.9	3,870	< 3	340	< 0.10	69,500	< 1	1.2	< 7	6.1
4-Nov-09	10:02	AE10332	< 8	< 3	< 2	65	< 0.1	1.00	69,700	0.2	< 0.3	4	23	< 1	34,700	6.3	ND	3.3	1.6	3,100	< 3	328	< 0.10	50,600	< 1	0.7	< 7	4

Fox Metro Laboratory
682 State Route 31
Oswego, IL 60543
(630) 892-4378

Quarterly River Data Summary

Fox River Downstream Of Fox Metro Outfall

Non-Metals

Fox River - Rt. 34 Bridge			pH	°C	Turb.	Cond.	DO	TSS	TDS	Hard	BOD	Cl^-	F^-	TKN	NH_3-N	NO_3-N	NO_2-N	PO_4-P	o-PO_4-P	Phenol	CN^-(T)	CN^-(WD)
Date	Time (24)	Sample I.D.			N.T.U.	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
1-Feb-00	8:35	2000-00843	8.30	0.2	ND	ND	12.4	4	690	378	2	ND	0.31	1.0	0.182	3.43		0.42		< 1.0	< 0.8	< 0.8
1-Jun-00	8:30	2000-04550	8.10	18.4	ND	ND	8.29	78	578	274	3	ND	0.26	1.8	0.159	2.20		0.30		2.0	3.3	< 0.8
1-Aug-00	9:30	2000-06560	8.03	22.4	ND	ND	7.01	72	424	255	3	ND	0.22	1.8	0.099	1.36		0.42		3.1	9.8	< 0.8
1-Nov-00	14:30	2000-09501	8.90	15.0	ND	ND	12.8	34	538	329	7	ND	0.30	1.7	0.023	1.29		0.38		3.3	< 0.8	< 0.8
5-Feb-01	11:00	2001-01060	8.30	2.5	ND	ND	ND	6	712	387	< 2	ND	0.22	1.0	0.325	1.03		0.20		1.2	2.0	< 0.8
4-Jun-01	10:15	2001-04892	7.90	14.9	ND	ND	11.0	47	515	316	4	ND	0.24	1.4	0.036	2.06		0.26		3.5	0.9	< 0.8
6-Aug-01	10:20	2001-06944	ND	28.9	ND	ND	10.9	45	581	296	7	ND	0.33	2.5	0.018	0.66		0.54		3.2	< 0.7	< 0.7
2-Nov-01	11:00	2001-09779	8.34	11.5	ND	ND	11.1	43	477	298	3	ND	0.24	1.4	0.145	2.62		0.29		< 1.0	1.7	< 0.7
1-Feb-02	11:10	2002-00918	8.51	1.8	7.74	1,180	28.8	11	647	310	4	142	0.25	1.1	0.020	2.25		0.29		1.3	2.2	< 0.7
30-Jul-02	9:10	2002-06495	8.88	26.1	28.7	1,020	11.52	54	608	300	6	149	0.36	2.8	0.015	2.98		0.75		< 1.6	1.6	< 0.7
2-Aug-02	9:20	2002-06630	9.32	29.3	33.7	993	18.00	56	633	300	11	177	0.35	3.0	0.017	2.73		0.75		< 1.6	0.8	< 0.7
29-Oct-02	11:25	2002-09331	8.22	8.5	12.3	1,015	11.32	24	574	304	4	137	0.24	1.6	0.054	2.31		0.66		5.2	1.4	< 0.7
5-Feb-03	12:52	2003-01122	8.58	0.6	6.82	1,403	19.26	11	864	376	8	274	0.44	1.8	0.406	4.02		0.78		2.7	6.2	0.9
2-Jun-03	10:40	2003-04959	8.35	18.2	16.4	980	13.01	36	607	322	5	137	0.36	2.1	0.023	1.85		0.33		< 1.6	3.5	1.1
1-Aug-03	10:20	2003-07012	8.78	25.2	26.2	860	11.65	43	547	249	6	131	0.30	2.2	0.026	0.92		0.48		2.0	1.9	< 0.7
6-Nov-03	10:43	2003-10057	8.40	10.4	32.7	820	13.26	44	490	256	6	129	0.28	1.9	0.084	1.58		0.39		1.7	1.0	< 0.7
5-Feb-04	10:18	2004-01033	8.20	0.0	1.48	1,404	18.91	4	835	418	< 2	216	0.41	1.3	0.524	4.08		0.57		< 1.6	3.7	0.8
1-Jun-04	10:33	2004-04929	7.90	17.3	66.0	617	9.84	88	403	249	3	67	0.26	1.8	0.087	2.07		0.34		< 1.6	2.7	< 0.7
2-Aug-04	9:46	2004-07038	8.77	26.1	36.5	949	13.17	52	668	310	9	62	0.33	3.5	0.018	0.73		0.45		3.1	< 0.7	< 0.7
2-Nov-04	10:21	2004-10045	8.24	11.5	26.0	905	11.94	46	541	299	7	115	0.29	2.0	0.080	1.56		0.51		1.8	1.1	< 0.7
4-Feb-05	10:33	2005-01037	8.40	0.2	3.24	1,089	21.10	10	640	368	< 2	129	0.23	0.9	0.127	3.10		0.31		< 1.6	3.1	0.8
5-May-05	9:35	2005-03989	8.80	12.8	12.5	940	13.69	54	595	302	10	127	0.23	2.2	0.021	0.80		0.40		2.1	1.5	< 0.7
4-Aug-05	10:48	2005-07085	9.05	27.1	23.0	1,172	11.90	40	750	283	5	188	0.43	3.1	0.023	0.78		0.75		< 1.6	3.6	< 0.7
3-Nov-05	10:45	2005-10124	8.62	12.2	11.4	1,256	20.03	24	757	304	8	209	0.54	2.2	0.032	3.54		0.81		< 1.6	2.4	< 0.7
2-Feb-06	10:30	2006-01023	8.39	3.2	5.58	1,171	14.99	13	686	358	4	161	0.29	1.2	0.038	2.52		0.26		< 1.6	1.5	< 0.7
5-May-06	10:45	2006-04043	8.40	17.0	10.2	975	13.75	36	589	318	9	122	0.29	2.4	0.024	0.80		0.31		< 1.6	1.2	< 0.7
3-Aug-06	11:12	AB00119	8.94	27.9	24.6	933	6.60	52	527	225	9	105	0.29	2.7	0.061	0.26		0.61		< 1.6	1.1	< 0.7
2-Nov-06	10:50	AB03258	8.47	5.7	12.9	643	17.98	21	614	345	4	126	0.29	1.5	0.029	2.08		0.25		< 1.6	0.7	< 0.7
1-Feb-07	10:43	AC00968	8.15	0.0	4.24	616	16.85	11	724	401	< 2	126	0.30	0.9	0.052	3.64		0.30		< 1.6	3.1	1.3
3-May-07	10:38	AC04052	8.42	17.2	27	843	11.19	61	530	325	7	129	0.27	2.1	0.030	1.15		0.29		5.1	< 0.7	< 0.7
2-Aug-07	10:26	AC07288	9.04	29.4	26	1,054	12.16	39	546	319	7	153	0.19	2.7	0.036	< 0.09		0.42		2.4	< 0.7	< 0.7
8-Nov-07	10:37	AC11221	8.80	7.4	14	671	16.41	28	564	337	7	134	0.22	1.9	0.033	1.30		0.32		< 1.6	< 0.7	< 0.7
6-Feb-08	10:27	AD01125	8.10	0.1	7.9	821	15.67	10	790	334	3	221	0.22	1.0	0.122	2.79		0.25		< 1.6	2.8	1.3
7-May-08	10:38	AD04266	8.62	16.8	20	792	9.43	38	508	298	5	119	0.18	1.7	0.040	0.78		0.25		< 1.6	< 0.7	< 0.7
8-Aug-08	10:46	AD08061	8.33	25.2	22	957	8.58	34	1480	287	< 2	129	0.20	1.5	0.054	0.95		0.31		< 1.6	1.2	0.8
5-Nov-08	10:29	AD11427	8.65	13.3	4.1	823	16.14	9	528	337	2	130	0.18	0.91	0.024	1.63		0.25		< 1.6	1.3	< 0.7
11-Feb-09	12:01	AE01212	8.01	0.6	24	607	14.35	38	559	283	3	193	0.13	1.15	0.227	1.90	< 0.05	0.23	< 0.02	< 1.6	2.3	0.7
6-May-09	10:51	AE03972	8.05	16.1	23	690	9.77	57	424	271	3	93	0.21	1.58	0.045	1.19	< 0.05	0.24	< 0.02	< 1.6	0.9	< 0.5
29-Jul-09	10:36	AE06953	8.85	25.3	16	974	13.35	38	513	301	7	148	0.24	1.94	0.025	0.88	< 0.05	0.32	0.16	< 1.6	2.9	2.9
4-Nov-09	10:34	AE10335	8.30	8.9	12	616	11.97	19	472	300	< 2	101	0.22	1.02	0.079	1.53	< 0.05	0.15	0.09	17.2	1.3	< 0.1

Fox Metro Laboratory | 682 State Route 31, Oswego, IL 60543, (630) 892-4378

Quarterly River Data Summary

Fox River Downstream Of Fox Metro Outfall

Total Metals

Fox River - Rt. 34 Bridge			Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg*	Mo	Ni	K	Se	Sr	Ag	Na	Tl	Ti	V	Zn
Date	Time (24)	Sample I.D.	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1-Feb-00	8:35	2000-00843	84	< 3	< 2.9	107	< 0.6	< 0.4	74,400	0.7	< 1	6	89	< 1	49,600	16.9	< 0.1	5	1.4	5,240	< 1	ND	< 0.2	89,300	< 1.2	< 1	< 5	10
1-Jun-00	8:30	2000-04550	2,810	< 3	< 2.9	86	< 0.6	< 0.4	66,000	8	< 1	43	2,130	4	28,900	92.3	< 0.1	16	13	4,150	< 1	468	< 0.2	38,600	< 1.2	80	ND	30
1-Aug-00	9:30	2000-06560	2,380	< 3	4.7	131	< 0.6	< 0.4	67,200	5	< 1	14	1,940	5	29,600	105	< 0.1	9	10	4,800	< 1	418	0.3	46,400	< 1	92	< 5	18
1-Nov-00	14:30	2000-09501	ND	< 3	2	107	< 0.6	< 0.4	70,300	2	< 1	6	470	4	36,800	40.8	< 0.1	9	< 1	4,790	3	531	< 0.1	ND	< 2	15	< 5	6
5-Feb-01	11:00	2001-01060	261	< 3	< 2	79	< 0.6	< 0.4	83,300	2	< 1	4	226	< 1	41,400	27	ND	8	1.2	4,450	< 1	641	< 0.1	89,400	< 2	4	< 5	11
4-Jun-01	10:15	2001-04892	1,020	< 3	< 3	76	< 0.6	< 0.4	ND	3	< 1	12	1,050	< 1	38,300	11	< 0.1	9	2	3,370	1	420	< 0.2	61,000	< 1	37	< 5	17
6-Aug-01	10:20	2001-06944	764	< 3	3.6	139	< 0.6	< 0.4	110,000	4	< 1	6	808	1	36,200	98.6	< 0.1	13	5	5,160	< 1	513	0.2	79,500	< 1.2	30	< 5	14
2-Nov-01	11:00	2001-09779	1,820	< 3	< 2.9	95	< 0.6	< 0.4	70,000	3	< 1	6	1,680	< 1	32,500	70.8	< 0.1	8	3	4,780	2.2	448	< 0.2	40,600	< 1.2	71	9	13
1-Feb-02	11:10	2002-00918	118	< 3	< 2.9	87	< 0.6	< 0.4	79,700	< 0.6	< 1	6	160	< 1	42,100	21	< 0.1	10	1	5,630	< 1	671	< 0.2	87,900	< 1.2	6	25	9
30-Jul-02	9:10	2002-06495	980	< 2	< 2.9	147	< 0.2	< 0.1	63,800	2	< 0.3	20	827	< 2	39,100	107	< 0.03	12	4	7,590	< 1	505	< 0.2	94,800	< 1.2	34	< 7	24
2-Aug-02	9:20	2002-06630	1,000	< 2	< 2.9	155	< 0.2	< 0.1	66,400	2	< 0.3	12	676	< 2	40,700	92.2	< 0.03	12	3	8,430	< 1	525	< 0.2	102,000	< 1.2	33	8	20
29-Oct-02	11:25	2002-09331	469	< 2	< 1.8	132	< 0.2	< 0.1	67,700	2	< 0.3	7	417	< 2	19,500	23.5	0.03	7	< 0.3	5,740	< 1.7	681	< 0.09	76,000	< 1.3	11	< 7	15
5-Feb-03	12:52	2003-01122	59	< 2	< 1.8	116	< 0.2	< 0.1	76,300	1	< 0.3	4	122	< 2	44,100	20.3	< 0.03	8	3	7,260	< 1.7	930	< 0.09	152,000	< 1.3	< 0.9	15	17
2-Jun-03	10:40	2003-04959	634	< 2	< 1.8	106	< 0.2	< 0.1	74,300	1	< 0.3	3	591	< 2	37,700	56.8	< 0.03	8	2	4,890	1.7	632	< 0.09	ND	< 1.3	18	12	10
1-Aug-03	10:20	2003-07012	1,150	< 2	2.8	109	< 0.2	< 0.1	49,700	12	0.8	5	857	7	29,100	77.9	0.15	3	3	5,270	< 1.7	ND	0.16	68,400	< 1.3	25	< 7	18
6-Nov-03	10:43	2003-10057	1,790	2	< 1.8	129	0.2	0.5	52,200	6	1.9	10	1,590	9	31,700	58	< 0.03	4	5	4,900	< 1.7	442	< 0.09	ND	< 1.3	62	< 17	39
5-Feb-04	10:18	2004-01033	49	< 1	< 1.8	163	< 0.1	< 0.1	91,300	2.6	< 0.3	3	107	11	47,200	14.9	< 0.03	6	< 0.7	7,820	< 1.7	998	< 0.09	ND	< 1.3	< 0.7	< 2	24
1-Jun-04	10:33	2004-04929	3,550	< 1	2.2	85.4	0.1	0.5	57,700	6.6	1.5	5	2,730	3.9	24,100	97.1	< 0.03	3	2.7	4,730	2.2	289	0.11	25,700	< 1.2	169	10	21
2-Aug-04	9:46	2004-07038	587	< 1	5.3	133	0.3	0.5	67,700	12.7	1.4	2	631	7.8	36,500	98.4	< 0.03	7	6.7	6,620	< 1.7	558	< 0.09	54,300	< 1.3	14	11	13
2-Nov-04	10:21	2004-10045	1,010	< 1	< 1.4	138	< 0.1	0.5	57,700	4.4	1.4	3	1,100	3.6	32,800	66	< 0.03	6	1.4	8,880	1.2	508	0.07	ND	< 1.2	33	15	15
4-Feb-05	10:33	2005-01037	131	< 1	4.1	103	< 0.2	< 0.2	77,200	3.0	1.2	1.5	242	2	37,400	20.2	< 0.03	4.5	< 1	5,710	1.2	729	0.07	61,700	< 1.2	2.1	5	17
5-May-05	9:35	2005-03989	468	< 0.9	< 1.4	125	< 0.3	0.35	57,400	4.1	1.3	5	474	5	35,300	57.5	< 0.03	4.4	< 1	5,240	1.1	519	0.46	ND	< 1.2	40	< 5	12
4-Aug-05	10:48	2005-07085	254	< 0.9	4.3	191	< 0.3	0.22	57,600	3.7	1.3	< 2	282	6	37,300	56.1	< 0.03	8.5	1	9,140	1.6	658	< 0.06	ND	< 1.2	7.2	11	7.4
3-Nov-05	10:45	2005-10124	259	< 0.9	2.0	227	< 0.3	0.17	65,600	3.1	1.1	6	341	4	40,800	43.1	< 0.03	6.4	5	10,300	< 0.9	728	0.14	ND	< 1.2	8.0	< 5	25
2-Feb-06	10:30	2006-01023	213	< 0.8	< 1.4	106	< 0.09	< 0.07	77,700	3.3	0.3	3	281	1.5	39,500	29	< 0.03	5.6	< 0.5	5,820	2.3	780	< 0.06	ND	< 1.2	6.5	< 2	11
5-May-06	10:45	2006-04043	453	< 0.8	< 1.4	116	< 0.09	0.14	70,300	3.1	0.6	4	455	0.9	37,200	51	< 0.03	6.3	< 0.5	5,590	< 0.9	572	0.10	ND	< 1.2	13	< 2	10
3-Aug-06	11:12	AB00119	738	< 0.8	< 1.4	133	< 0.09	0.39	53,900	2.0	0.9	5.6	727	3.6	28,900	78	< 0.03	8.6	2.1	7,160	1.7	477	0.16	ND	< 1.2	117	7	40
2-Nov-06	10:50	AB03258	366	< 0.8	< 1.4	84	< 0.09	0.15	78,700	1.6	0.5	3.2	425	16.6	36,700	24	< 0.03	5.3	< 0.5	6,820	< 0.9	684	0.14	ND	< 1.2	8.7	3	35
1-Feb-07	10:43	AC00968	271	< 3	< 1	95	< 0.1	< 0.2	93,500	1.4	0.5	2	364	< 0.8	43,300	24.2	< 0.03	5.0	< 0.5	7,970	< 1	619	< 0.1	70,700	< 1	10	< 4	15
3-May-07	10:38	AC04052	1,000	< 3	< 1	88	< 0.1	< 0.2	79,500	3.0	1.4	3	1,090	2.0	36,700	74	0.04	5.0	0.09	4,070	< 1	395	< 0.1	ND	< 1	40	< 4	34
2-Aug-07	10:26	AC07288	547	< 3	2	120	< 0.1	< 0.2	58,900	2.0	< 0.3	1	447	1.1	35,100	63	< 0.03	4.8	0.5	8,330	< 1	443	0.1	65,800	< 1	19	ND	22
8-Nov-07	10:37	AC11221	324	< 3	1	98	< 0.1	< 0.2	69,900	1.8	0.9	3	347	3.4	41,200	27	< 0.03	4.8	1.9	9,280	< 1	594	< 0.1	62,800	< 1	12	5	22
6-Feb-08	10:27	AD01125	370	< 3	< 2	90.8	< 0.1	< 0.2	80,000	2.8	0.8	3	431	5.4	36,800	35.5	< 0.03	4.2	< 0.5	4,430	< 3	483	< 0.1	ND	< 1	15	< 4	16
7-May-08	10:38	AD04266	968	< 3	< 2	78	< 0.1	< 0.2	72,400	3	1.1	2	881	4.3	33,500	72	< 0.03	4.4	0.7	6,270	< 3	378	< 0.1	45,600	< 1	31	9	25
8-Aug-08	10:46	AD08061	861	< 3	< 2	119	< 0.1	0.3	68,600	2.7	0.6	3	790	< 0.8	36,800	78.6	< 0.02	4.1	3.7	4,410	< 3	330	< 0.1	43,000	< 1	58	9	77
5-Nov-08	10:29	AD11427	182	< 3	< 2	106	< 0.1	0.4	82,600	0.4	< 0.3	3	200	< 0.8	44,400	15.8	< 0.02	3.5	2.5	3,990	3	449	< 0.1	59,200	< 1	4	5	29
11-Feb-09	12:01	AE01212	1,180	< 3	< 2	87.3	< 0.1	1.6	73,300	2.1	0.4	6	1,530	< 1	34,400	114	< 0.02	2.4	2.8	3,980	< 3	330	< 0.1	95,900	< 1	45	< 7	24
6-May-09	10:51	AE03972	AF	< 3	< 2	66.3	0.2	3.1	72,000	1.7	0.9	< 2	1,080	< 1	31,700	61	< 0.02	2.8	2.4	3,290	< 3	272	< 0.1	47,700	< 1	33	< 7	12
29-Jul-09	10:36	AE06953	641	< 3	< 2	126	< 0.1	1.1	72,500	1.4	< 0.3	4	536	< 1	40,000	75	< 0.02	3.8	2.3	4,500	< 3	357	< 0.1	69,600	< 1	17	< 7	25
4-Nov-09	10:34	AE10335	498	< 3	< 2	70	< 0.1	1.0	71,100	0.7	< 0.3	3	507	< 1	34,800	29.7	< 0.02	3.6	1.9	3,160	< 3	335	< 0.1	52,000	< 1	16	< 7	15

Quarterly River Data Summary

Fox River Downstream Of Fox Metro Outfall

Dissolved Metals

Fox River - Rt. 34 Bridge			Al	Sb	As	Ba	Be	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	K	Se	Sr	Ag	Na	Tl	Ti	V	Zn
Date	Time (24)	Sample I.D.	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1-Feb-00	8:35	2000-00843	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Jun-00	8:30	2000-04550	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Aug-00	9:30	2000-06560	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Nov-00	14:30	2000-09501	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5-Feb-01	11:00	2001-01060	86	< 3	< 2	68	< 0.6	< 0.4	79,400	1	< 1	3	21	< 1	39,300	21	ND	7	2	4,130	< 1	609	< 0.1	89,800	< 2	< 1	< 5	8
4-Jun-01	10:15	2001-04892	28	< 3	< 3	60	< 0.6	< 0.4	ND	1	< 1	17	14	< 1	32,300	1.6	ND	8	7	2,800	< 1	380	< 0.2	54,600	< 1	< 1	< 5	11
6-Aug-01	10:20	2001-06944	16	< 3	5.4	118	0.6	< 0.4	86,300	2	< 1	10	9	< 1	34,500	1.3	ND	22	4	4,450	< 1	485	< 0.2	77,700	< 1.2	2	< 5	5
2-Nov-01	11:00	2001-09779	20	< 3	< 2.9	72	< 0.6	< 0.4	61,700	1	< 1	4	27	< 1	29,900	2.4	ND	7	0.8	3,000	1.5	418	< 0.2	38,800	< 1.2	< 1	5	3
1-Feb-02	11:10	2002-00918	19	< 3	< 2.9	83	< 0.6	< 0.4	78,100	< 0.6	< 1	6	7	< 1	41,300	6.3	ND	10	1	4,890	< 1	665	< 0.2	89,200	< 1.2	< 1	26	6
30-Jul-02	9:10	2002-06495	33	< 2	< 2.9	123	< 0.2	< 0.1	56,800	0.2	< 0.3	13	22	< 2	36,100	1.3	ND	11	2	5,830	< 1	469	< 0.2	91,000	< 1.2	< 0.9	< 7	11
2-Aug-02	9:20	2002-06630	35	< 2	< 2.9	136	< 0.2	< 0.1	61,700	0.3	< 0.3	11	7	< 2	39,000	2.4	ND	12	< 0.3	6,950	< 1	504	< 0.2	99,200	< 1.2	< 0.9	< 7	8
29-Oct-02	11:25	2002-09331	8	< 2	< 1.8	88	< 0.2	< 0.1	61,400	1.0	< 0.3	6	23	< 2	36,100	3.1	ND	6	3	5,130	< 1.7	553	< 0.09	72,200	< 1.3	1.9	< 7	14
5-Feb-03	12:52	2003-01122	12	< 2	< 1.8	93	< 0.2	< 0.1	75,200	0.8	< 0.3	6	21	< 2	43,500	12.5	ND	8	3	7,410	< 1.7	764	< 0.09	150,000	< 1.3	< 0.9	15	13
2-Jun-03	10:40	2003-04959	35	< 2	2.2	97	< 0.2	< 0.1	73,100	0.6	< 0.3	3	15	< 2	21,300	1.2	ND	8	2	4,500	< 1.7	620	0.1	ND	< 1.3	< 0.9	12	6
1-Aug-03	10:20	2003-07012	29	< 2	2.6	91.3	< 0.2	< 0.1	45,200	7	0.3	2	9	< 2	27,900	1.3	ND	4	2	4,410	< 1.7	ND	0.11	68,000	< 1.3	< 0.9	< 7	6
6-Nov-03	10:43	2003-10057	< 3	< 2	< 1.8	103	< 0.2	0.2	47,900	3	1.3	7	22	< 2	30,600	3.4	ND	4	3	3,810	< 1.7	420	< 0.09	ND	< 1.3	< 0.9	< 17	6
5-Feb-04	10:18	2004-01033	24	< 1	< 1.8	155	< 0.1	< 0.1	88,400	2.2	< 0.3	3	12	< 0.8	45,700	9.9	ND	6	< 0.7	7,410	< 1.7	950	< 0.09	ND	< 1.3	< 0.7	< 2	11
1-Jun-04	10:33	2004-04929	14	< 1	1.9	54.7	< 0.1	0.2	51,300	2.1	0.5	2	50	< 0.8	23,000	2.4	ND	4	< 0.7	3,740	1.9	259	0.07	23,700	1.2	< 0.7	4	3
2-Aug-04	9:46	2004-07038	6	< 1	3	110	< 0.1	0.4	57,600	4.4	0.9	6	10	< 0.8	34,000	1.6	ND	7	4.8	5,490	< 1.7	533	< 0.09	53,900	< 1.3	< 0.7	12	5
2-Nov-04	10:21	2004-10045	< 5	< 1	< 1.4	123	< 0.1	0.4	61,000	2.5	1.0	< 1	16	1.9	34,900	2.1	ND	6	1.2	8,580	< 0.9	514	< 0.06	ND	< 1.2	4.9	14	6
4-Feb-05	10:33	2004-01037	< 5	< 1	2.9	100	< 0.2	< 0.2	74,900	5.7	1.3	1.4	36	2.0	36,500	9.7	ND	5.2	3.0	5,310	0.9	694	< 0.06	61,400	< 1.2	< 0.3	2	9
5-May-05	9:35	2005-03989	< 15	< 0.9	< 1.4	105	< 0.3	< 1	52,600	3.7	1.2	4	41	4	32,200	8.1	ND	4.2	5	4,100	1	424	0.13	ND	< 1.2	< 0.2	< 5	6
4-Aug-05	10:48	2005-07085	< 15	< 0.9	3.1	161	< 0.3	0.17	52,300	3.1	1.2	< 2	17	3	33,600	3.9	ND	8.1	1	8,330	< 0.9	564	< 0.06	ND	< 1.2	< 0.2	12	3
3-Nov-05	10:45	2005-10124	< 15	< 0.9	1.8	208	< 0.3	0.14	61,300	4.3	1.2	6	16	2	39,100	1.5	ND	6.5	2	6,930	< 0.9	708	0.11	ND	< 1.2	< 0.2	< 5	13
2-Feb-06	10:30	2006-01023	29	< 0.8	< 1.4	102	< 0.09	< 0.07	75,700	2.8	< 0.2	4	53	1.8	39,400	7	ND	5.5	< 0.5	5,250	2	802	0.11	ND	< 1.2	< 0.4	< 2	10
5-May-06	10:45	2006-04043	< 16	< 0.8	2.3	106	< 0.09	0.07	68,100	2.4	0.3	1.7	22	< 0.5	36,600	2	ND	6.2	< 0.5	5,440	< 0.9	554	0.08	ND	< 1.2	< 0.4	< 2	3.5
3-Aug-06	11:12	AB00119	< 16	< 0.8	< 1.4	111	< 0.09	0.19	49,200	0.8	0.6	3.8	10	< 0.5	27,500	1	ND	9.0	2.1	5,960	< 0.9	455	0.22	ND	< 1.2	4.1	5	12
2-Nov-06	10:50	AB03258	< 16	< 0.8	< 1.4	79.3	< 0.09	0.09	77,300	1.0	0.5	2.0	40	< 0.5	36,700	2	ND	5.3	< 0.5	6,420	< 0.9	675	0.12	ND	< 1.2	< 0.4	< 2	5.4
1-Feb-07	10:43	AC00968	< 13	< 3	< 1	< 0.4	< 0.1	< 0.2	58,500	5.2	< 0.3	< 1	5	< 0.8	51,400	24	ND	2.0	< 0.5	AF	< 1	8	< 0.1	50,800	< 1	4.6	< 4	1.1
3-May-07	10:38	AC04052	< 13	< 3	< 1	67	< 0.1	< 0.2	79,500	1.6	2	3	15	< 0.8	34,600	2.3	ND	5.0	< 0.5	3,470	< 1	368	< 0.1	ND	< 1	< 0.2	< 4	6.5
2-Aug-07	10:26	AC07288	51	< 3	1	107	< 0.1	< 0.2	55,200	1.1	< 0.3	< 1	13	< 0.8	33,800	1.7	ND	4.9	< 0.5	7,130	< 1	412	< 0.1	62,500	< 1	< 0.2	ND	5.1
8-Nov-07	10:37	AC11221	34	< 3	< 1	97	< 0.1	< 0.2	73,100	1.3	0.9	4	15	2.1	40,300	2.3	ND	5.0	< 0.5	10,400	< 1	559	< 0.1	55,400	< 1	4.6	< 4	22
6-Feb-08	10:27	AD01125	< 17	< 3	< 2	83	< 0.1	< 0.2	77,500	2.2	0.6	2	22	2.8	35,500	17.8	ND	4.6	< 0.5	4,170	< 3	459	< 0.1	ND	< 1	< 0.2	< 4	7.6
7-May-08	10:38	AD04266	63	< 3	< 2	78	< 0.1	< 0.2	66,200	1.8	0.6	< 1	15	3.0	31,700	2.0	ND	4.4	< 0.5	6,460	< 3	357	< 0.1	45,200	< 1	0.8	7	7.3
8-Aug-08	10:46	AD08061	< 17	< 3	< 2	102	< 0.1	< 0.2	63,600	0.6	< 0.3	< 1	20	< 0.8	34,500	1.1	ND	3.8	3.0	4,010	< 3	303	< 0.1	ND	< 1	< 0.2	5	15
5-Nov-08	10:29	AD11427	58	< 3	< 2	100	< 0.1	0.4	78,000	0.4	< 0.3	2	92	< 0.8	43,600	5.8	ND	3.4	2.3	3,630	< 3	445	< 0.1	ND	< 1	< 0.2	< 4	8.8
11-Feb-09	12:01	AE01212	19	< 3	< 2	70	< 0.1	0.8	68,800	0.5	< 0.3	3	28	< 1	32,600	39	ND	2.4	1.6	3,270	< 3	314	< 0.1	90,000	< 1	1.4	< 7	4.6
6-May-09	10:51	AE03972	AF	< 3	< 2	54	0.1	2.7	66,600	0.5	0.6	< 2	21	< 1	31,500	1.5	ND	2.8	1.7	2,850	< 3	264	< 0.1	47,200	< 1	< 0.3	< 7	2.5
29-Jul-09	10:36	AE06953	52	< 3	< 2	112	< 0.1	0.9	71,300	0.2	< 0.3	3	6	< 1	38,700	0.4	ND	3.7	2.0	3,850	< 3	341	< 0.1	69,400	< 1	0.5	< 7	5.7
4-Nov-09	10:34	AE10335	< 8	< 3	< 2	59	< 0.1	1.0	63,000	0.3	< 0.3	2	26	< 1	31,000	5.4	ND	3.0	1.3	2,560	< 3	290	< 0.1	46,000	< 1	1.2	< 7	5.2

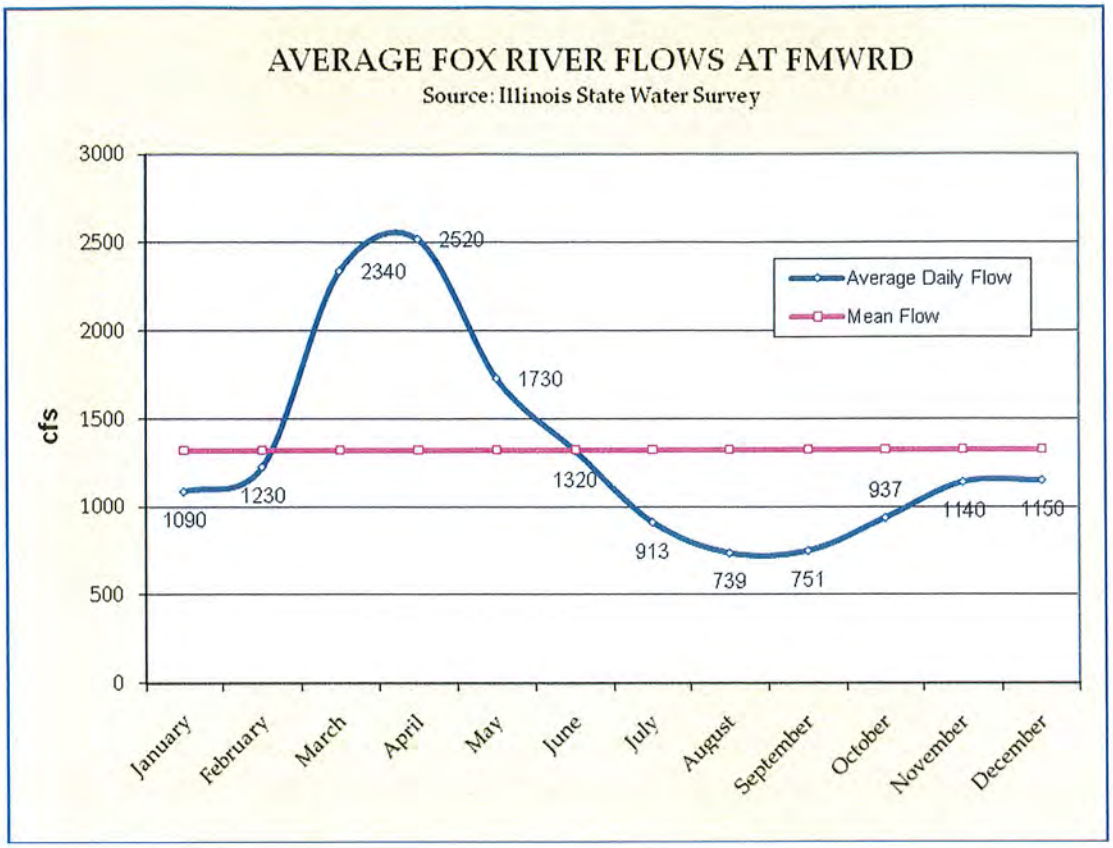
FMWRD also collects weekly dissolved oxygen levels from both upstream (Mill Street) and downstream (Route 34) locations. The samples are collected every Tuesday between 10:00 am and 11:30 am. The 2009 data is summarized on a monthly basis in Table 2-10.

Table 2-10
Monthly Dissolved Oxygen Event Mean Concentrations at Boundary – Mill Street Bridge and Route 34 Bridge

Location	Dissolved Oxygen Concentration in mg/L											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mill St. Bridge	15.8	14.7	14.3	12.7	9.6	8.8	8.9	9.0	9.2	10.4	11.7	13.8
Route 34 Bridge	16.3	15.4	15.0	13.4	9.9	9.2	11.2	11.5	11.3	11.3	12.4	14.7

Figure 2-9 shows average stream flow for the Fox River at FMWRD. This graph was developed from data provided by the ISWS Illinois Stream-flow Assessment Model (ILSAM) web site. ILSAM produces statistical estimates of flow quantity in Illinois streams. The ILSAM flow estimates are representative of long-term climatic conditions, with base periods covering the past 50 years or more, but also account for recent man-made modifications to the flow amount (i.e. reservoirs, water-supply withdrawals, and discharges from wastewater treatment plants). Values are updated periodically as a result of additional review and analysis or to account for recent changes in water use or water resource development. As can be seen from this chart, peak flows on the Fox River generally occur in the early spring around March or April and low flows are reached in late summer (August and September).

Figure 2-9



2.3.1 *Previous Studies*

Existing sources for gathering Fox River water quality data have been helpful to determine current river water quality trends. The Illinois State Water Survey has assembled a detailed and comprehensive report entitled "Fox River Watershed Investigation - Phase I Report".

The report compiles all available data that has been collected within the Fox River Watershed. Data sources for this report include the following:

- Local - FMWRD collects water quality data from the river on a regular basis for NPDES monitoring reports and permit applications. Data is also collected in support of future work to be completed at the WWTP. Data collected ranges from dissolved oxygen levels at various locations, to metals sampling on a yearly basis.

- Ammonia levels along a 40 mile stretch of the Fox from Carpentersville to Yorkville were evaluated in 1995.

- State - In 2006, the Illinois Department of Natural Resources (IDNR) developed a listing of "Biologically Significant Streams" including the Fox River through the Facility Planning Area.

The IEPA has been collecting a wide variety of water quality data where stations are sampled for biological, chemical and/or in-stream habitat data, as well as stream flow. This agency also operates an Ambient Water Quality Monitoring Network (AWQMN) of fixed stations to support surface water chemistry data needs. Integrated water column samples are collected on a 6-week sampling frequency and analyzed for a minimum of 55 universal parameters including field pH, temperature, specific conductance, dissolved oxygen (DO), suspended solids, nutrients, fecal coliform bacteria, and total and dissolved heavy metals.

As part of their intensive river basin surveys, the IEPA in cooperation with the IDNR have collected water chemistry and biological data (fish and macroinvertebrates) and qualitative and quantitative in-stream habitat information, including stream discharge, which is collected to characterize stream segments within the basin, identify water quality conditions, and evaluate aquatic life use-impairment. Fish tissue contaminant and sediment chemistry sampling are also conducted to screen for the accumulation of toxic substances. These studies are conducted every five years on a rotating basis.

- Federal Sources - The USEPA maintains two data management systems containing water quality, biological, and physical data on the nation's waters: the Legacy Data Center (LDC), and the new STORET (short for STOrage and RETrieval). The LDC contains historical data dating back from the early part of the 20th Century to the end of 1998. The STORET system contains data collected since 1999.

  In addition, the USGS offers water quality data that can be processed at their offices throughout the United States. Their data system has four components: 1) Ground-Water-Site-Inventory System, 2) the Water-Quality System, 3) The Automated Data-Processing System, and 4) the Water-Use Data System. The Water-Quality System offers the results of over 3.5 million analyses of water samples that describe the chemical, physical, biological, and radiochemical characteristics of both surface water and groundwater.

  The USGS operates a river gauging station at the Montgomery Dam which is located downstream of the City of Aurora and upstream of the FMWRD WWTP. This gauging station records variation elevations and flows of the Fox River. Instantaneous data as well as yearly data from the Montgomery Station gauging station can be accessed at the USGS website. Some of the data logged at this gauging station was used as part of the flow verification process discussed later in this section.

2.3.2 *Monitoring and Testing*

While the watershed has been studied extensively, the segment of the Fox River which flows through the City of Aurora and past the FMWRD WWTP has not. Therefore, an ongoing receiving water monitoring program for the Fox River was initiated by WEDA in April 2008 to collect sufficient water data with the goal of quantifying real-time impacts associated with CSOs and storm sewer discharges. Other objectives of the monitoring program were to identify existing pollutant sources and impacts, define baseline conditions, and to support the development of a reliable water quality model. Storm event data collected for the river and CSOs during this time period were used for calibration and verification of a model to simulate impacts to the river under wet weather conditions. The study area extends from IL Route 56 in North Aurora to U.S. Route 34 in Oswego, which is downstream of the FMWRD CSO outfall. The study area is shown in **Figure 2-10**.

Monitoring took several forms including baseline monitoring, wet weather monitoring and continuous monitoring for dissolved oxygen, temperature, pH and conductivity in the Fox River. In addition, several types of biological studies have been conducted which include fish surveys, macroinvertebrate collections, and mussel surveys. This section details these studies.

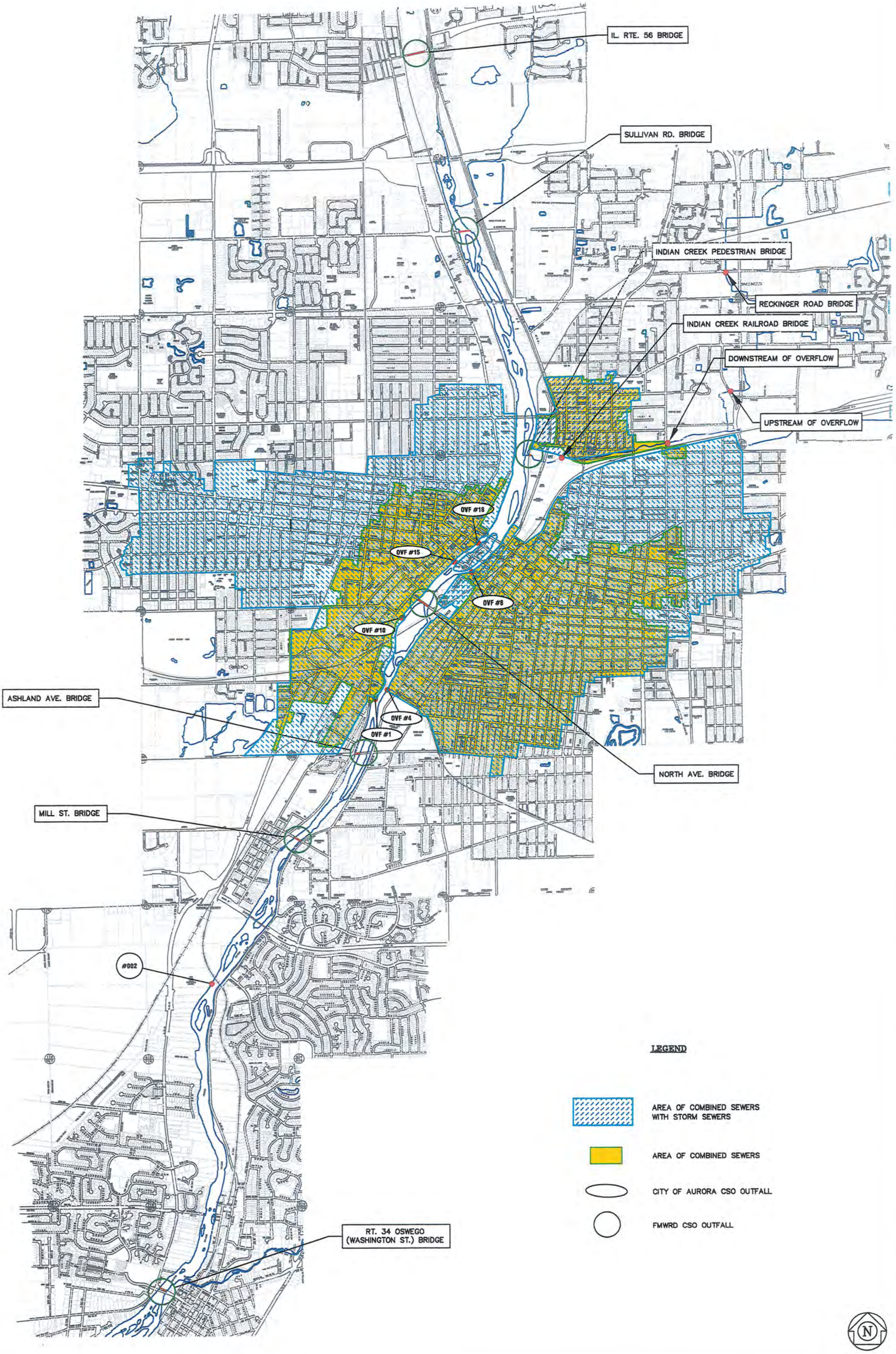
All of the receiving water monitoring activities to date has been performed in accordance with either the sampling/testing approach that was approved by the IEPA for the Fox River Study Group or based on guidance from the Illinois State Water Survey. The ISWS provided review and input into the Quality Assurance Project Plan (QAPP) written by WEDA and Deuchler Environmental Inc. (DEI). This document was completed in April 2008 before the start of the 2008 sampling season and has been amended to include the 2009 intensive sampling and other changes such as monitoring locations. The 2008 QAPP with the 2009 amendment is included in **Appendix D**.

2.3.2.1. *Baseline Sampling*

In 2008 and 2009 the Fox River was sampled on a bi-monthly to monthly basis to develop a baseline data set within the study area. The purpose of this sampling was two-fold: 1.) to develop a baseline of river conditions in this area so that future changes in water quality can be better evaluated and 2.) to provide data for model calibration and verification. Sample procedures can be found in the QAPP and a summary of monthly results for this sampling can be found within **Appendix D**. Samples collected were analyzed for fecal coliform, BOD, total suspended solids, chlorophyll a, fluoride, chloride, nutrients including total and dissolved phosphorus, total Kjeldahl nitrogen, total nitrogen, ammonia, nitrate, nitrite and field parameters including dissolved oxygen, temperature, conductivity and pH. With the exception of fecal coliform samples (which were always grab samples), the samples collected were primarily transect samples collected across the span of a bridge. Samples were collected from five sample locations from Sullivan Road Bridge which is the upstream boundary of the study area southerly to the U.S. Route 34 (Washington Street) Bridge located in Oswego. Other bridges sampled between the Sullivan Bridge and the U.S. Route 34 Bridge included North Avenue, Ashland and Mill Street. A map of these monitoring locations can be found as **Figure 2-10** and **Table 2-11** summarizes all water chemistry sampling.

Table 2-11
Monitoring Programs

Parameter	Baseline Monthly	2008 Wet Weather	2009 Intensive	Continuous Monitoring
Temperature (Field)	x	x		x
pH (field)	x	x		x (2009)
D.O. (field)	x	x		x
Conductivity (field)	x	x		x (2009)
BOD_5	x	x	x	
TSS	x	x	x	
Nitrate	x	x		
Nitrite	x	x		
Ammonia NH_3	x	x	x	
TKN	x	x		
Total Phosphorus	x	x	x	
Dissolved Phosphorus	x	x		
Fecal Coliform	x	x	x	
Chloride	x	x		
Fluoride	x	x		
Chlorophyll a	x			



WALTER E. DEUCHLER ASSOCIATES, INC.

Consulting Engineers – Aurora, Illinois

REVISIONS

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FIGURE 2-10
CSO LONG TERM CONTROL PLAN
STUDY AREA

SHEET

OF

2.3.3 *Wet Weather Sampling*

2.3.3.1 *2008 Wet Weather Sampling*

Wet weather surveys were performed to determine the impacts of CSO and storm water on water quality during and after a storm event. This data was also used to support model calibration and verification. Wet weather river water quality was collected at up to five bridge locations as discussed in the previous section. Sampling was completed only if it appeared that a significant storm was to occur. A significant rainfall event for this project was defined as at least 0.25 inches of rain within 1 hour preceded by a dry weather period of approximately ten to fourteen days. If possible, a sample from each bridge was collected once on the day preceding the forecasted storm event. In 2008, at least two samples were collected (once in the morning and once in the afternoon) during the storm event. In addition, bridge samples were collected twice a day for four to five days after a storm event.

2.3.3.2 *2009 Wet Weather Intensive Sampling*

After the data from the 2008 wet weather sampling was evaluated and reviewed it was found that impacts from the storm event to the river had dissipated within a few hours after a storm. In order to capture the peak impacts an intensive sampling event was staged in 2009. Immediately upon the start of a significant rain event, samples were collected every fifteen to twenty minutes over an approximately five hour period at three locations along the Fox River on three different bridges (Sullivan, Mill Street and U.S. Route 34) and on Indian Creek at an abandoned railroad bridge.

Due to the large number of samples that were collected during the intensive sampling (approximately 170), a limited number of parameters could be analyzed. Based on previous modeling results, it was determined that the most important parameters to analyze included: phosphorus, ammonia, BOD, TSS and bacteriological parameters. These parameters were determined to have the greatest impact to the river.

2.3.4 *Continuous Monitoring Program*

Since the summer of 2005, FMWRD has used YSI data sondes at three locations to collect dissolved oxygen and temperature at approximately thirty minute time intervals from April through October depending on river conditions. In 2009 the sampling was expanded to include pH and conductivity and an additional monitoring station was added. In 2008, data sondes were located at Sullivan Road, Ashland Avenue and Route 34. In 2009 Mill Street was added to the project to serve as a boundary condition for the purpose of the LTCP. At this time, DO conditions will be discussed as part of modeling the impacts from only the FMWRD CSO and treated WWTP outfalls. Therefore only data collected at Mill Street and Route 34 will be discussed in this report although, as with the other water quality data, the upstream locations were used for model verification and calibration. Future modeling will focus on the upstream locations.

2.3.5 *Stream Flow Monitoring*

As was previously mentioned, there is a gauging station in the middle of the study area at the Montgomery Dam. However, there were no gauging stations near the beginning of the study area to measure river flow entering the study area. Therefore, a gauging station was installed below the North Aurora Dam. Because some of the flow from the Fox River is diverted through a mill race prior to the dam, two gauges were installed: one to monitor velocities and levels at the dam and another to monitor velocities and levels through the mill race east of the dam. In addition, it was determined that Indian Creek has a significant impact on the river during wet weather events. A third gauging station was installed approximately 1/4 mile east of the

Indian Creek confluence into the Fox River (away from the Fox River's hydraulic influence).

2.3.6 *Data Management*

All data was placed into excel spreadsheets (see **Appendix E**). These results were then formatted and transferred into an environmental database (Microsoft Access) by WEDA. The database which is managed by ISWS is structured after another database developed for the FRSG. The database allows WEDA to easily transfer data to the ISWS and can be linked to other databases for the Fox River. This database allows the data to be directly read by the model as inputs.

2.3.7 *Boundary Conditions at Mill Street*

While data was collected from Sullivan Road to Mill Street and was used to help calibrate and verify the model, for the purposes of this LTCP the results will not be further discussed except when discussing model development. Mill Street was selected as the upstream limit for modeling impacts from FMWRD. While WEDA acknowledges there are significant impacts to the Fox River such as the City of Aurora CSOs and storm sewers, by using Mill Street as a boundary condition, these and other influences are incorporated as part of the upstream water quality boundary conditions for this section of the Fox River. Once the boundary condition at Mill Street was established, it was used to evaluate all present and future impacts from the FMWRD CSO and treated outfalls. The remaining data will be evaluated at a later date.

To establish the conditions at Mill Street, water quality samples collected at the Mill Street Bridge (station 27) between April 30, 2008 and July 8, 2009 for baseline sampling purposes were used. If grab samples were collected at the same time as spatial samples, the grab samples were omitted from the analysis. However, the ratios between spatial and grab samples were used to scale the concentrations of other grab samples collected on the same day if the difference between the two samples exceeded 20 percent.

The analytical results from the Mill Street Bridge samples were used to compute a 25th (low scenario), 50th and 75th (high scenario) percentiles for the following constituents: fecal coliform, ammonia nitrogen, nitrate, organic nitrogen, ortho-phosphorus, organic phosphorus, BOD and total suspended solids.

In order to determine the extent as to which discharge data influenced the concentration of the constituents a relationship was established to determine the boundary conditions at different flow conditions.

The USGS maintains a gauge station (05551540) at the Montgomery Dam immediately upstream of Mill Street. Since the instantaneous (15-min interval) data observed since September 30, 2007 was still classified as provisional at the time of this analysis, an alternative means of estimating flow at Mill Street was needed. The discharges that the model simulated at Mill Street between April 30 and October 31, 2008 were used to develop an iterative travel time adjustment procedure applied to flow measurements collected at the North Aurora dam gauges. This adjustment procedure was then used to estimate the discharge that occurred at Mill Street during the sample period of November 1, 2008 through July 8, 2009.

Since the water that passes through the Mill Race in North Aurora can be detained for extended periods, travel times for the west side of the channel were used to make these adjustments. Empirical relationships between travel time and discharge were developed for both the west and east channels of the river. The following iterative procedure was applied to estimate the discharges that occurred during the times at which samples were collected between November 1, 2008 and July 8, 2009.

1. Look up the discharge at the North Aurora Dam observed during the fifteen-minute interval immediately prior to the time of the Mill Street measurements below the Montgomery Dam.

2. Compute travel time between the North Aurora Dam and Mill Street (Montgomery Dam) using an equation derived from the long term model:

$$t_T = 3.4791 Q_{NAD}^{-0.6034}$$

3. Subtract the travel time from the time at which the sample was collected at the Mill Street bridge to compute the time at which the sampled flow at Mill Street would have passed over the North Aurora Dam:

$$t_{NAD} = t_{MS} - t_T$$

4. Look up the discharge at the North Aurora Dam that occurred at the fifteen minute interval prior to t_{NAD}.

5. Examine the discharge record at North Aurora Dam at least one full day prior to the collection of the sample at Mill Street and one full day after the collection of the sample to see if there has been a major change in the flow that could cause the discharge at Mill Street to be inaccurately estimated.

This same methodology was also applied to the data collected for May through October 2008 in order to calculate the discharges at the times during which samples were collected.

The travel time adjustment procedure yielded estimates that differed by less than three percent from the flows the model simulated during the 2008 long-term modeling period, with the exception of August 4, 2008 which differed by more than five percent. Flow estimates for five of the eight samples that were captured after the long-time period could be compared with provisional data that could be obtained from the

Montgomery gauge. None of these estimates differed from the provisional data by more than five percent. Therefore, the demonstrated accuracy of this method combined with the small number of samples collected after October 31, 2008 makes this a plausible approach. However, three-day hydrographs of the flow at North Aurora Dam were also checked to assure that none of these samples occurred during extreme events in which the travel time adjustment period would be highly invalid. **Table 2-12** summarizes boundary conditions established at Mill Street.

Table 2-12
Water Quality Boundary Conditions
Fox River at Mill Street

Percentiles	Fecal coliform	NH3,4	NO3	N-org	P-ortho	P-org	TP	P-ortho (input)	P-org (input)	BOD5	TSS
Low 25th	113	0.024	0.76	1.32	0.07	0.15	0.258	0.114	0.143	1.25	24
Mid 50th	236	0.04	1.04	1.47	0.09	0.16	0.3	0.133	0.167	3	31
High 75th	488	0.105	1.38	1.75	0.12	0.18	0.353	0.156	0.190	4	42
# of samples	47	58	55	53	22	19	52			50	58

It should be noted that the boundary condition established at the 75th percentile for fecal coliform exceeds the water quality standard.

2.3.8 *Biological Studies*

2.3.8.1 Macroinvertebrate Studies

Since 2007, the macroinvertebrate population has been monitored by DEI using Hester-Dendy samplers. A list of locations and results can be found in **Table 2-13**. Nine-plate samplers were placed in the water for 4 to 6 weeks to collect sufficient organisms on the plate. Once removed, the samplers were preserved for future identification of the organisms. Riverwatch program protocols (NGRREC 2008) were used to identify the macroinvertebrates. Each organism was identified by family and scored using the Macroinvertebrate Biotic Index (MBI) score of pollution tolerance. The MBI score ranges from 0 to 11 with a higher score assigned to the more pollution tolerant organisms. The MBI score corresponds to a rating of Excellent, Good, Fair, Poor, and Very Poor. **Table 2-13** shows the MBI score ranges and the associated quality ratings for each category. Currently only the first two sets of samples have been processed for 2009. None of the samples collected from Indian Creek and Waubonsie Creek on a monthly basis in 2009 have been processed.

These results show that the Fox River is impaired prior to entering the study area. Most locations were rated Poor or Very Poor irrespective of the CSO or FMWRD effluent discharge points. The worst results were consistently located within the New York dam pool in Aurora, even though there are few CSO events in this area. Both the upstream and downstream sample locations closest to the FMWRD CSO discharge point were primarily in the poor category, showing no discernable difference in the score between upstream and downstream locations. Some of the sample locations, such as Mill Street West (just below the Montgomery Dam) and Millstone Park West in Oswego, had highly variable results. These results are inconclusive and more sampling will be conducted in the future. Ongoing efforts will continue to monitor trends and assess water quality changes as more data is added to the biological assessment.

TABLE 2-13
2006-2009 MBI Scores and Ratings

Locations* (Listed below from US to DS)	**GPS Locations**	2006	2007	2008 -Round 1	2008 -Round 2	2008 -Round 3	2009-Round 1	2009-Round 2
Sullivan Rd., Aurora	N 41° 47.332' W 088° 19.044'	Not collected	7.76 Very Poor	Lost	6.50 Very Poor	Lost	5.54 Fair	7.99 Very Poor
Indian Trail West, Aurora	N 41° 46.919' W 088° 18.827'	6.06 Poor	Not collected	Not collected	Not collected	Not collected	Not collected	Not collected
U.S. Of Ill. Ave. W. Bank, Aurora	N 41° 46.450' W 088° 18.640'	Not collected	Not collected	Not collected	6.29 Very Poor	5.72 Poor	5.55 Fair	7.07 Very Poor
Pierce St., Aurora	N 41° 46.055' W 088° 18.552'	Not collected	Not collected	9.52 Very Poor	Lost	9.43 Very Poor	6.27 Very Poor	9.74 Very Poor
West Park West, Aurora	N 41° 45.990' W 088° 18.664'	9.93 Very Poor	11.00 Very Poor	5.89 Poor	6.73 Very Poor	Lost	6.85 Very Poor	10.76 Very Poor
West Park East, Aurora (D.S. of Indian Creek Confluence)	N 41° 45.998' W 088° 18.577'	8.54 Very Poor	Lost	Lost	Lost	5.96 Poor	5.73 Poor	7.02 Very Poor
North Ave. West, Aurora	N 41° 45.198' W 088° 19.384'	5.95 Poor	7.01 Very Poor	Not collected	Not collected	Not collected	5.83 Poor	5.92 Poor
North Ave. East, Aurora	N 41° 45.167' W 088° 19.302'	5.79 Poor	7.12 Very Poor	Not collected	Not collected	Not collected	5.67 Fair	Lost
Ashland Ave. West, Montgomery	N 41° 44.304' W 088° 19.843'	Not collected	Not collected	Not collected	6.73 Very Poor	Lost	5.95 Poor	10.49 Very Poor
Ashland Ave. East, Montgomery	N 41° 44.267' W 088° 19.795'	Not collected	Not collected	Not collected	9.24 Very Poor	9.64 Very Poor	Not collected	Not collected
Mill St. West, Montgomery	N 41° 43.733' W 088° 20.422'	4.92 Good	6.52 Very Poor	Lost	5.55 Fair	Lost	5.60 Fair	Lost
Mill St. East, Montgomery	N 41° 43.706' W 088° 20.370'	5.40 Fair	6.46 Very Poor	Lost	Lost	Not collected	5.72 Poor	5.95 Poor
Rte 30 Pedestrian Walkway, Montgomery	N 41° 43.250' W 088° 20.618'	Not collected	Not collected	Not collected	Not collected	6.94 Very Poor	Not collected	Not collected
FMWRD between CSO and Effluent Discharge	N 41° 42.866' W 088° 21.041'	5.99 Poor	6.00 Very Poor	5.53 Fair	6.18 Poor	Not collected	5.95 Poor	6.24 Poor
Millstone Park West, Oswego	N 41° 41.615' W 088° 21.037'	Not collected	Not collected	Not collected	5.66 Fair	Lost	7.26 Very Poor	6.31 Very Poor
Millstone Park East, Oswego	N 41° 41.615' W 088° 21.037'	Not collected	Not collected	Not collected	Lost	Lost	5.78 Poor	8.47 Very Poor
Rte. 34 West, Oswego	N 41° 41.072' W 088° 21.455'	Not collected	Not collected	Not collected	Not collected	Not collected	5.91 Poor	Lost
Rte. 34 East, Oswego	N 41° 41.033' W 088° 21.392'	Not collected	Not collected	Not collected	Not collected	Not collected	5.61 Fair	5.61 Fair

* All sample locations were sampled with a Hester-Dendy macroinvertebrate sampler
Not Collected – sampler was not collected at this location during the sampling event
Lost – sampler lost during the sampling event, generally due to flooding or human tampering

2.3.8.2 Fish Studies

Fish studies were also conducted from August 18th to October 31st in 2008 and again from March 31st to October 31st in 2009. Two segments of the Fox River will be discussed as part of this report. Segment 3 extends from approximately the V.L. Gilman Trail downstream to the Montgomery Dam. Segment 4 extends from CSO Outfall 002 at FMWRD to the U.S. Route 34 Bridge in Oswego. The limits of Segments 3 and 4 are shown in **Figure 2-11**. All fish were collected in 2008 using minnow seine and fyke nets only; in 2009 electrofishing was added.

In the one and one-half years that sampling has been done a total of 3,313 fish representing thirty-four species were collected using all gear types (fyke nets, minnow seine and boat electrofishing) from Segment 3 (upstream of FMWRD) and a total of 1,206 fish representing 33 species from Segment 4 (downstream of FMWRD). **Table 2-14** summarizes the number of species collected in Segment 3 and Segment 4; all gear types. DO sensitive (*) and pollution intolerant species (+) are compared. The most common species in Segment 3 were bluegill, bluntnose minnow and spotfin shiner, while the most common species were shorthead redhorse, spotfin shiner and common carp in Segment 4.

FIGURE 2-11

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Consulting Engineers - Aurora, Illinois

DESIGNED CJC | DRAWN SAL | APPROVED PFM | DATE 2/8/10 | SCALE NTS | CAD DWG F:\ASD\06060-06\Fig2-11 | JOB NO. 111/06060/06

CSO LONG TERM CONTROL PLAN
MUSSEL AND FISH STUDY AREA

Table 2-14
Summary of Species Collected in Segments 3 and 4
All Gear Types

	Segment 3	Segment 4
Total Fish	3,313	1,206
Total Species	34	33
Total DO species (*)	3	5
Total DO individuals	138	97
Percentage of DO individuals	4.2	8.0
Total Pollution Intolerant species (+)	4	4
Total Pollution Intolerant individuals	172	140
Percentage of Pollution Intolerant individuals	5.2	11.6

When species counts are compared the two segments were nearly identical. However, a large disparity exists in relation to the total number of fish sampled between the two segments. Segment 3 resulted in almost three times the number of individuals captured than Segment 4. This can largely be attributed to differences in habitat characteristics between the two segments, mainly depth, which has an effect on sampling gear selection and efficacy. Segment 3 is a deep pool, as result of the impoundment created by the Montgomery Dam on the south end. The dam can also degrade the habitat by increasing sedimentation, turbidity and decomposition at the same time decreasing oxygen and flow, and as a result, decreasing the abundance of fish sensitive to impaired water quality. Segment 4, on the other hand, is shallow, especially during the summer months. Therefore, the use of deep water gear, like fyke nets, was limited in Segment 4 but not in Segment 3. Fyke nets were utilized 3 times in Segment 4, compared to 33 times in Segment 3, thereby skewing the data with respect to total fish captured in favor of Segment 3. See **Appendix F** for a listing of all species identified.

However, when looking at boat electrofishing data only (see a summary of results in **Table 2-15**), more fish were collected in Segment 4 (787) in less time (4.3 hrs), when compared to Segment 3 (744 fish in 5 hrs). This may also be attributed to differences in habitat characteristics. The pool-like conditions in Segment 3 provide more area for fish to inhabit thus making their capture by way of boat electrofishing more difficult (they have more area in which to elude the shock). In Segment 4 fish are likely more concentrated due to decreased depth, increasing the ease of their capture. Conversely, proportions and catch rates for DO sensitive and pollution intolerant fish were higher in Segment 3 than Segment 4.

Table 2-15
Summary of Species Collected in Segments 3 and 4 by Electrofishing Catch Rate (No. of Fish/ Hour)

	Segment 3	Segment 4
Total Fish	744	787
Total Species	23	25
Total DO species (*)	3	4
Total DO individuals	125	75
Proportion of DO individuals	0.168	0.095
Total Pollution Intolerant species (+)	3	4
Total Pollution Intolerant individuals	156	121
Prop. of Pollution Intolerant individuals	0.210	0.154
Sampling Time (hrs); boat electrofishing only	5.0	4.3
No. fish (all species) sampled per hour	149.3	181.5
No. DO sensitive fish sampled per hour	25.1	17.3
No. Pollution Intolerant fish sampled per hour	31.3	27.9

At this point, it is difficult to conclude whether the increased number of DO sensitive fish in Segment 3 is a result of water quality, sampling effort or habitat. Additional sampling downstream of Segment 3 as well additional sampling at Segment 4 should help to better define the variations found upstream and downstream of the outfall. Identification of the remaining preserved specimens as well as subsequent sampling will aid in further analyses and conclusions.

2.3.8.3 *Mussel Studies*

Mussel sampling was conducted in 2008 and 2009 at twelve locations both upstream and downstream of CSO Outfall 002. These twelve sites are listed (from upstream to downstream): Sullivan Road in Aurora, North Avenue in Aurora, FMWRD near the CSO discharge point in Oswego, Violet Patch Park West Bank in Oswego, Violet Patch Park East Bank in Oswego, Millstone Park West Bank in Oswego, Millstone Park (a.k.a. Troy Park) East Bank in Oswego, Hudson Park in Oswego, Route 34 West Bank in Oswego, Route 34 East Bank in Oswego, 106 Riverside Ct. in Oswego, 22 Riverside Ct. in Oswego.

Mussel sampling was conducted using IDNR protocols with each site searched for a minimum of 4 man hours. All live mussels were measured, identified, and placed back in their respective locations as soon as possible after collection. Dead shells were collected and taken back to the laboratory for future identification.

When reviewing mussel data as an indicator of stream quality, it is not the type of mussel that is significant as the presence or absence of mussels as an indicator of pollution. Mussels are highly intolerant of pollution, especially native mussels.

Live mussel results can be found in **Table 2-16**. No live mussels were found at FMWRD near Outfall 002, Violet Patch Park West, Millstone Park West Bank, or Route 34 West Bank. One mussel bed was found as part of this study at North Avenue in Aurora. The mussel bed is located just south of downtown Aurora approximately three miles upstream of the FMWRD CSO Outfall 002. This bed had the highest number of individuals (113) and the highest species diversity (5). Scattered mussels as defined by IDNR as less than one per square meter, were found at seven other sites sampled along the Fox River both upstream and downstream of CSO Outfall 002. The mapleleaf (Quadrula quadrula) and the white heelsplitter (Lasmigona complanata) mussels were the most abundant species found. All of the species found are known to be common throughout the Fox River. No rare, threatened, or endangered mussel species were found. Results of the mussel survey are shown in **Table 2-16.**

Table 2-16
Live Mussel Summary by Site
Listed from Upstream to Downstream. 2008-2009 Cumulative Results.

Common Name	Scientific Name	Sullivan Rd., Aurora	North Ave., Aurora	Violet Patch East, Montgomery	Millstone East Bank (Troy Park), Oswego	Hudson Crossing Park, Oswego	Route 34 East Bank, Oswego	106 Riverside Ct., Oswego	22 Riverside Ct., Oswego
Fingernail clam	*Sphaeriidae sp.*					3			
Giant floater	*Pyganodon grandis*		9				1	1	
Mapleleaf	*Quadrula quadrula*		63		2				1
Paper pondshell	*Utterbackia imbecillis*								
Pimpleback	*Quadrula pustulosa*		1						
Plain pocketbook	*Lampsilis cardium*	1	7			1	2		
Three ridge	*Amblema plicata*								
White heelsplitter	*Lasmigona complanata*		33	2	3		9	1	
Asiatic clam*	*Corbicula fluminea*					37			
Zebra mussel*	*Dreissena polymorpha*	1	1	1	2				
Total # of Native Individuals		**1**	**113**	**2**	**5**	**4**	**12**	**2**	**1**
Total # of Native Species		**1**	**5**	**1**	**2**	**2**	**3**	**2**	**1**

*Invasive species in North America, excluded from the totals.
The following sites were searched but no live mussels were found: FMWRD near Outfall 002, Violet Patch Park West, Millstone Park West Bank, and Route 34 West Bank.

2.3.9 *Fox River Water Model*

The calibrated and verified model was used to evaluate the effects of wet weather events on the water quality of the Fox River considering the treatment capabilities of the existing treatment plant. The wet weather events are associated with rain and are defined in terms of duration and return interval. Four wet weather events were simulated with the following recurrence intervals: 3-month, 1-year, 5-year and 10-year. These four wet weather as well as dry weather scenarios were combined with various permutations of river flow and river water quality scenarios which resulted in a total of thirty four scenarios being developed. These scenarios compare existing water quality during dry and wet weather conditions. Also evaluated were scenarios where "no action" (i.e. no improvements) to the WWTP plant were made and what the impacts to the river would be if the WWTP was not upgraded in the future.

The design storm events are discussed in Section 2.2.4 and Section 5.2.3. Since it is impossible to say what future conditions of the Fox River will be, the boundary conditions at Mill Street which were discussed in the previous section remained the same during all scenarios.

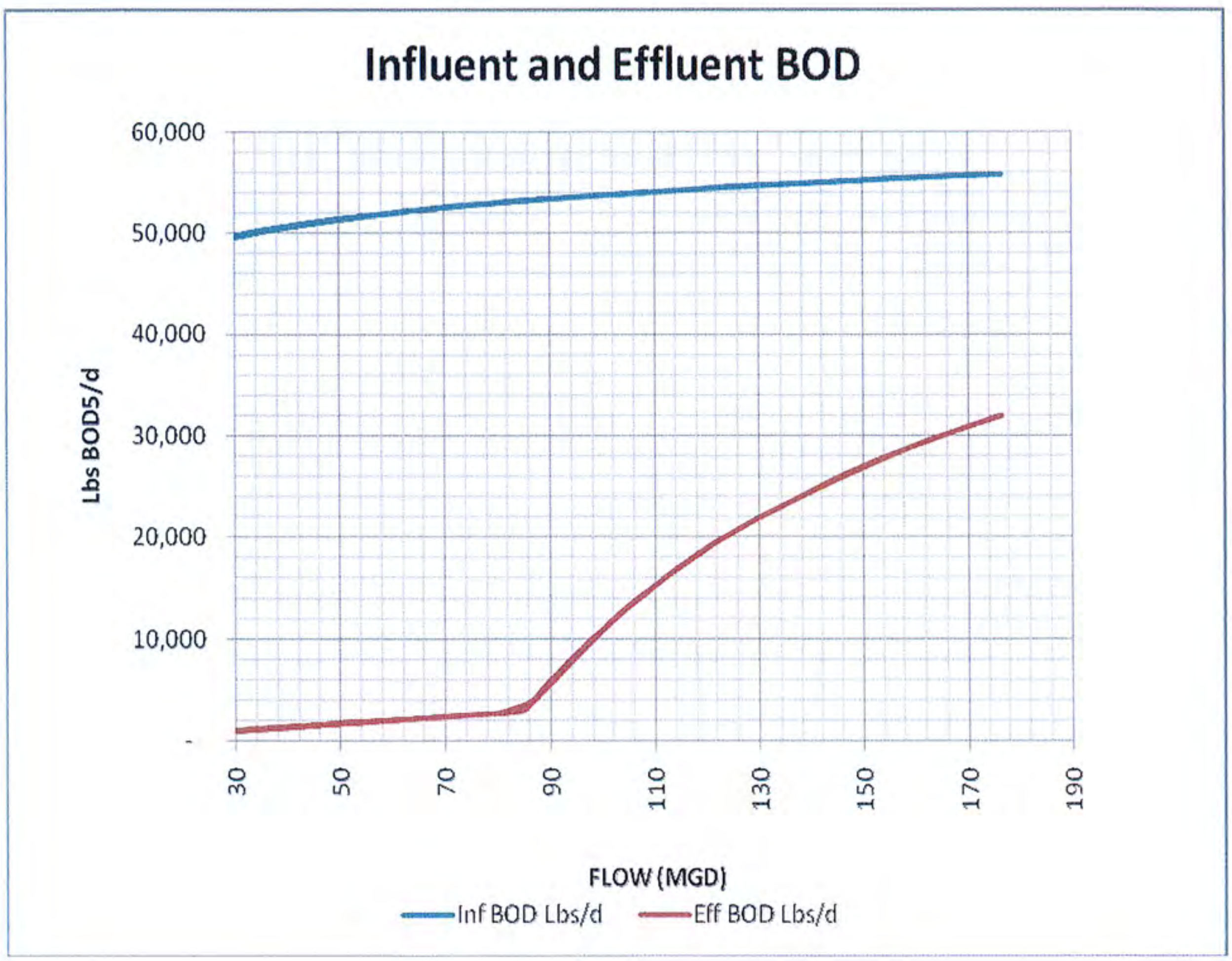
Parameters that were evaluated included: BOD, total phosphorus, total suspended solids, nitrate, total nitrogen and ammonia. Existing treatment plant performance data was statistically analyzed to determine effluent concentrations for the various modeling scenarios described above. Generally, as flow increases the loading increases, and the concentration decreases as a result of the dilutions from infiltration, inflow and the influence of storm water in the combined sewer. The influent and effluent parameters used in developing the FMWRD CSO and treated WWTP discharges to be in used in the water quality model are shown in **Table 2-17**.

TABLE 2-17
EXISTING INFLUENT PARAMETERS

STORM EVENT		Existing	3 Month	1 Year	5 Year	10 Year
FLOW	MGD	**36.53**	**115.72**	**137.81**	**171.38**	**190.6**
BOD	mg/l	167.33	54.58	47.31	39.23	36.35
	lbs/d	50,979	52,675	54,375	56,072	57,782
TSS	mg/l	168.67	55.02	47.69	39.55	36.64
	lbs/d	51,387	53,100	54,812	56,529	58,243
NH3	mg/l	14.97	4.88	4.23	3.51	3.25
	lbs/d	4,561	4,710	4,862	5,017	5,166
ORG-N	mg/l	11.81	3.85	3.34	2.77	2.57
	lbs/d	3,598	3,716	3,839	3,959	4,085
NO3-N	mg/l	0.44	0.14	0.12	0.10	0.10
	lbs/d	134	135	138	143	159
TP	mg/l	5.88	1.92	1.66	1.38	1.28
	lbs/d	1,791	1,853	1,908	1,972	2,035
TN	mg/l	27.22	8.87	7.69	6.38	5.92
	lbs/d	8,293	8,560	8,838	9,119	9,410
EFFLUENT PARAMETERS (Flow Weighted Based on Treatment Plant Effluent and CSO Discharge)						
BOD	mg/l	4.00	17.54	20.72	21.89	22.06
	lbs/d	1,219	16,933	23,814	31,289	35,069
TSS	mg/l	3.60	23.13	26.81	28.47	28.84
	lbs/d	1,097	22,320	30,808	40,699	45,852
NH3	mg/l	0.54	1.85	2.12	2.22	2.23
	lbs/d	165	1,782	2,437	3,167	3,543
ORG-N	mg/l	1.19	2.24	2.38	2.38	2.37
	lbs/d	363	2,158	2,736	3,402	3,763
NO3-N	mg/l	9.00	2.19	1.35	0.75	0.49
	lbs/d	2,742	2,112	1,552	1,067	779
TP	mg/l	2.00	1.61	1.53	1.32	1.22
	lbs/d	609	1,555	1,759	1,880	1,943
TN	mg/l	10.73	6.27	5.85	5.34	5.09
	lbs/d	3,269	6,052	6,726	7,636	8,085

It is important to note that the design maximum flow capacity of the existing treatment plant is 85 MGD under existing conditions. For modeling scenarios with flows in excess of 85 MGD, there would be a discharge to the CSO Outfall. This is evidenced by the example below (**Figure 2-12**), for lbs BOD_5/day discharged. The influent BOD_5 is increasing at a decreasing rate as a result of infiltration, inflow and storm flow in the combined sewer interceptor. The effluent BOD_5 increases to 85 MGD and then increases dramatically as flows are discharged through the CSO Outfall. The amount of ammonia discharged increases with an increase in flow. Conversely, the amount of nitrate discharged decreases with an increase in flow rate due to the limitation of the single-stage nitrification process.

Figure 2-12



3. Public Participation

3.1. Purpose

Although the FMWRD has continuously improved the quality of their wastewater discharges over the years by upgrading their treatment processes, it has not undergone a significant expansion since 1990. The implementation of the LTCP as described in this document will result in a significant capital expenditure by FMWRD. Therefore, FMWRD felt it was important to inform the public of the proposed upgrades and the resulting improvements to the wastewater discharges and allow the public to have input into this work. This section describes the formation of the Citizen Advisory Committee (CAC) as part of the public participation process.

3.2. Policy Overview and Purpose

The EPA's 1994 CSO Control Policy stresses that *"In developing its long-term CSO control plan, the permittee will employ a public participation process that actively involves the affected public in the decision-making to select the long term CSO controls".*

3.3. Identification of Stakeholders

As a regional wastewater treatment facility FMWRD sought representatives from each community serviced by FMWRD. These communities included the City of Aurora, Village of Montgomery, Village of North Aurora, Village of Oswego, Village of Sugar Grove and United City of Yorkville. In addition, representatives from several environmental organizations were also sought to participate including the Sierra Club, the Fox River Ecosystem Partnership and the Fox Valley Park District, which is the largest park district within the FMWRD facility planning area. Invitation letters were sent to the Mayors/Presidents of each of these communities/organizations requesting them to send a representative to participate in an advisory panel. The final participating member represented the FMWRD Board of Trustees. Together these stakeholders formed the CAC, which was tasked with the responsibility of:

- Providing guidance on the development of the LTCP including the identification of sensitive areas and control methods.
- Weighing the environmental benefits, such as improved water quality as well as social values against the economic costs to strike an appropriate balance.
- Serving as liaisons to their respective constituencies by informing them of the proposed plans and to bring back feedback.
- Come to agreement on a recommended LTCP.
- Advocate once the LTCP is finalized.

3.4. The Structure of CAC

WEDA conducted all the meetings on behalf of FMWRD. The first meeting was held on April 29, 2009. A binder which included contact information, a tentative meeting schedule, a history of the FMWRD (formerly the Aurora Sanitary District) and a brief description of the treatment plant was presented to each member. Binders were to be brought to each subsequent meeting for use as reference material and for adding additional information as it was presented.

Generally all meetings followed the same format: distribution of meeting materials, introduction and presentation of the topic followed by a general discussion and question/answer session. A list of the meetings and the topics covered can be found in **Table 3-1**. An agenda was issued prior to each meeting along with the minutes of the previous meeting. **Appendix G** is a copy of the CAC binder which includes the following materials:

- CAC membership list and support staff.
- Agenda for each meeting.
- Meeting presentation.
- Minutes of each meeting including attendees
- Support documentation and reference materials

Table 3-1

Meeting Schedule and Topics Covered

1	April 29, 2009	General background of CSOs and the purpose of the LTCP; roles and responsibilities of the CAC; History of FMWRD Combined Sewer System.
2	May 27, 2009	Existing wastewater treatment plant operations and procedures; included a tour of the FMWRD wastewater treatment plant.
3	June 24, 2009	FMWRD's existing 20-year Master Plan and current efforts to implement the plan.
4	July 21, 2009	Sensitive areas.
5	Aug. 26,2009	Water quality assessment performed to date on the Fox River including: water chemistry, macroinvertebrate sampling, fish sampling and mussel sampling.
6	Oct. 28, 2009	The Illinois State Water Survey presented the water quality modeling performed to date.
7	March 23, 2010	CSO control technologies; Recommended LTCP; Financial Capability Assessment; Implementation Plan

After the presentation and discussion period at the March 23, 2010 meeting, a motion was made that the *"CAC concur with the staff recommended CSO LTCP as presented and further recommend that it be forwarded to the FMWRD Board of Trustees for formal action."* A vote of the CAC members was taken and the motion was passed unanimously.

Upon IEPA's review of this LTCP, the FMWRD's receipt of comments or suggested modifications (if any) from the IEPA and the incorporation of same into the LTCP, a public hearing will be held by the FMWRD regarding the final LTCP.

Additional CAC meetings will be held as needed to discuss various potential issues such as IEPA's review comments, necessary amendments to the LTCP, new regulations impacting the LTCP, etc. It is also the intent of FMWRD to continue meeting with the municipal representatives of the CAC to address development planning, I&I, sewer system maintenance and other wastewater collection system issues.

3.5. Additional Public Participation

In addition to the CAC, FMWRD has provided public forums for comments in conjunction with the implementation of various phases of the 2005 Master Plan and as required in their NPDES permit including:

- Submittal of a summary report of Phase 1 of the 2005 Master Plan titled *"Phase 1 Improvements – North Plant Upgrades"* to the Northeastern Illinois Planning Commission (NIPC, aka Chicago Metropolitan Agency for Planning) on February 27, 2007. This included a public hearing held by NIPC and a public comment period.
- Upon IEPA's review of the 2005 Master Plan and determination that the project was technically sound and cost-effective, a public hearing was held by FMWRD on July 18, 2007 that included a public comment period for the Preliminary Environmental Impact Determination Letter from IEPA associated with the Temperature Phased Anaerobic Digester (TPAD) Project.
- Upon IEPA's review of the 2005 Master Plan and determination that the project was technically sound and cost-effective, a public hearing was held by FMWRD on June 18, 2008 that included a public comment period for the Preliminary Environmental Impact Determination Letter from IEPA associated with the

remaining portions of Phase 1 (Contracts 1 and 3).

- In accordance with item nos. 6, 8 and 12 of Special Condition 14 of FMWRD's NPDES permit No. 0020818, a presentation of the FMWRD's Pollution Prevention Plan, CSO Operation and Maintenance Plan and CSO Public Notification Plan was made to the general public at a public information meeting held on December 27, 2007.

4. SENSITIVE AREAS

4.1. Purpose

The purpose of this section is to determine if the FMWRD CSO Outfall 002 discharges to a sensitive area.

4.2. Policy Overview and Purpose

The EPA's 1994 CSO Control Policy dictates that the highest priority in the development of control alternatives in the LTCP is to dictate the elimination, relocation, or control of CSO discharges into "sensitive areas". Section II.C.3 of that policy defines a sensitive area as a receiving stream meeting any of the following criteria:

1. Outstanding National Resource Waters (ONRW), or
2. Waters containing threatened or endangered species or their habitat, or
3. Shellfish beds, or
4. Public drinking water intakes or their designated protection areas, or
5. Primary contact recreational areas.

If an overflow is determined to be within a sensitive area, the LTCP must address the following issues listed in Section II.C.3 of the 1994 CSO Control Policy:

- Prohibit new or significantly increased overflows;
- Eliminate or relocate overflows that discharge to sensitive areas wherever physically possible and economically achievable, except where elimination or relocation would provide less environmental protection than additional treatment; or, where elimination or relocation is not physically possible and economically achievable, or would provide less environmental protection than additional treatment, provide the level of treatment for remaining overflows deemed necessary to meet WQS for full protection of existing and designated

uses;

- Where elimination or relocation has been proven not to be physically possible and economically achievable, perform a reassessment at each subsequent NPDES permit term based on new or improved techniques to eliminate or relocate, or on changed circumstances that influence economic achievability.

4.3. Outfall Overview

The CSO discharges on the west bank of the Fox River immediately downstream of a railroad that defines the northeast property limit of the FMWRD. The outfall is shown in **Figure 4-1**.

Figure 4-1

FMWRD CSO Outfall 002

4.4. Sensitive Area Criteria

An analysis of CSO Outfall 002 was performed to determine if this overflow discharged into a sensitive area of the Fox River. A summary of the results are discussed below:

4.4.1. Outstanding National Resource Waters

As defined in the 1994 CSO Control Policy Section II.C.3, one of five criteria used to determine if a CSO is discharging to a sensitive area is if the receiving stream is designated as an Outstanding National Resource Water. Pursuant to correspondence with the Illinois EPA on January 12, 2009, the Illinois EPA stated that the State of Illinois had no waters listed on the Outstanding National Resource Waters list. In addition, this segment of the Fox River is designated in the Illinois Integrated Water Quality Report and Section 303(d) List of 2008 as "impaired".

Since Illinois does not have any designated Outstanding National Resource Waters, this criterion is not met for the FMWRD CSO.

4.4.2. Threatened or Endangered Species or Habitat

The second criterion for determining whether a CSO discharges to a sensitive area is if the area contains threatened or endangered species or their habitat. A letter dated October 21, 2008 from the Illinois Department of Natural Resources (IDNR) stated that there are records of River Redhorse (*Moxostoma carinatum*) both above and below the stretch of the Fox River in our project area (Kendall County, Township 37N, Range 8E, and Section 5). However, there are no IDNR records of the River Redhorse being sampled within the project area. A copy of this letter may be found in **Appendix G**.

In addition, fish studies (see Section 2.3.8) were conducted by Deuchler Environmental, Inc. (DEI) in the vicinity of the project area in 2008 and 2009. Sampled fish were collected using minnow seines, fyke nets and electrofishing. Out of approximately 4,500 fish sampled over the two year period, no River Redhorse was found.

A letter dated October 22, 2008 was also received from the United States Fish and Wildlife Service that stated there were no records of federal threatened or endangered species or their habitat for the Fox River in our project area. A copy of this letter may also be found in **Appendix G**.

Based upon the above, this criterion is not met for the FMWRD CSO.

4.4.3. Shellfish Beds

The third criterion for determining whether a CSO discharges to a sensitive area is if the area contains shellfish beds. A letter dated October 21, 2008 from the Illinois Department of Natural Resources (IDNR) indicated the IDNR's database contained no records of mussel beds for the Fox River in our project area. There are records of scattered mussels (none of which are state listed species), which means there are less than 1 per square meter. A copy of this letter may be found in **Appendix G**.

In addition, mussel sampling (see Section 2.3.8) was conducted in 2008 and 2009 by Deuchler Environmental, Inc. (DEI) at twelve locations both upstream and downstream of CSO Outfall 002. The sampling was conducted using INDR protocols with each site searched for a minimum of 4 man hours. No live mussels were found at 4 of the sites, which include the FMWRD near CSO Outfall 002. One mussel bed was found at North Avenue in Aurora, approximately 3 miles upstream of CSO Outfall 002 and not in the vicinity of the . Scattered mussels, as defined by IDNR above, were found at the remaining 7 sites along the Fox River both upstream and downstream of CSO outfall. All of the species found are known to be common throughout the Fox River. No rare, threatened or endangered mussel species were found.

Based upon the above, this criterion is not met for the FMWRD CSO.

4.4.4. Public Drinking Water Intakes or Their Designated Protection Areas

The fourth criterion for determining whether a CSO discharges to a sensitive area is if the CSO is within the protection area for a drinking water intake structure. CSO Outfall 002 is located on the Fox River at the FMWRD WWTP between the

Villages of Montgomery and Oswego. According to the Public Works Department for the Village of Montgomery, their raw water supply is obtained from eight groundwater wells withdrawing water from four different aquifers. The Village of Montgomery does not have a water intake structure located on the Fox River. According to the 2007 Annual Water-Quality Report for the Village of Oswego, the raw water supply is obtained from seven groundwater wells withdrawing from a sandstone aquifer. The Village of Oswego does not have water intake structures located on the Fox River. The closest known public drinking water intake is located in the City of Aurora, approximately 5 miles upstream of CSO Outfall 002. There are no other known public drinking water intakes on the Fox River in the vicinity of CSO Outfall 002.

Based upon the above, this criterion is not met for the FMWRD CSO.

4.4.5. Primary Contact Recreation

One of the main factors in determining if a CSO discharges to a sensitive area is if the receiving stream is associated with primary contact recreational use. The Illinois water quality standards define primary contact as:

> *"any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing,"*

Secondary contact is defined as:

> *"any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and*

recreational boating and any limited contact incident to shoreline activity."

The recreational use of a stream is difficult to assess due to the limited amount of data associated with local use patterns. The recreational use of the Fox River within the project limits was based on knowledge of (1) land use in the project area, (2) stream accessibility and (3) local use of the stream.

4.4.5.1. Land Use

The land use surrounding the CSO outfall was determined by reviewing the Village of Montgomery and Village of Oswego zoning maps, reviewing aerial photography (see **Figure 4-2**) and by conducting field inspections of the outfall location.

Figure 4-2

Surrounding Land Use

The land use categories identified in the zoning maps of Montgomery and

Oswego along the Fox River in the vicinity of CSO Outfall 002 are: residential and general manufacturing. CSO Outfall 002 is located on the west bank of the Fox River at the northern boundary of the Fox Metro Water Reclamation District property in the center of a general manufacturing and industrial zone. This zone extends approximately 2,600 feet upstream and 3,200 feet downstream of the outfall.

Sensitive areas by definition are typically located near recreational zones. The nearest recreational park along the west bank of the Fox River is Millstone Park located approximately 1.7 miles downstream of Outfall 002. The nearest recreational park along the east bank of the Fox River is Violet Patch Park located approximately 3,300 feet downstream of the outfall. There are no primary contact recreational activities and minimal secondary contact recreational activities (primarily fishing) at either of these parks.

4.4.5.2. Stream Accessibility

The existing FMWRD WWTP is surrounded by a chain link fence with locked gates. The fence runs along the west bank of the Fox River, inhibiting access to the Fox River and the CSO Outfall for approximately 1,500 feet south of CSO Outfall 002. In addition, the FMWRD owns the land south of the existing WWTP, on which they intend to construct future treatment facilities that will also be enclosed by chain link fencing further restricting access to the west bank of the Fox River for a total of 3,200 feet downstream of CSO Outfall 002.

A railroad right-of-way and overpass of the Fox River borders the northern boundary of the FMWRD property restricting public access to both the river and FMWRD property. Furthermore, the property north of the railroad is the site of a former manufacturing facility. Contamination is present with ongoing assessment and remediation activities. This property is enclosed by a chain link fence restricting public access to the river for approximately 2,600 feet upstream of the outfall. Therefore, access to the west bank of the Fox River near the CSO outfall is very limited.

4.4.5.3. Local Use of the Stream

As previously stated, the Illinois water quality standards define primary contact as recreational activities such as swimming and water skiing. The Fox River is too shallow in the project area to support primary contact recreational activities such as swimming and water skiing. WEDA recorded cross sections of the Fox River at four locations near, above and below Outfall 002 including: IL Rte 30 (approximately 2,535 feet upstream of FMWRD), FMWRD, ComEd R.O.W. (approximately 2,640 feet downstream of FMWRD), and Violet Patch Park (approximately 5,280 feet downstream of FMWRD). **Figure 4-3** shows the recorded cross sections and the water level on the day of the survey. As shown in **Figure 4-3** the deepest pool recorded is five feet deep at IL Rte 30 and the average depth is approximately three feet.

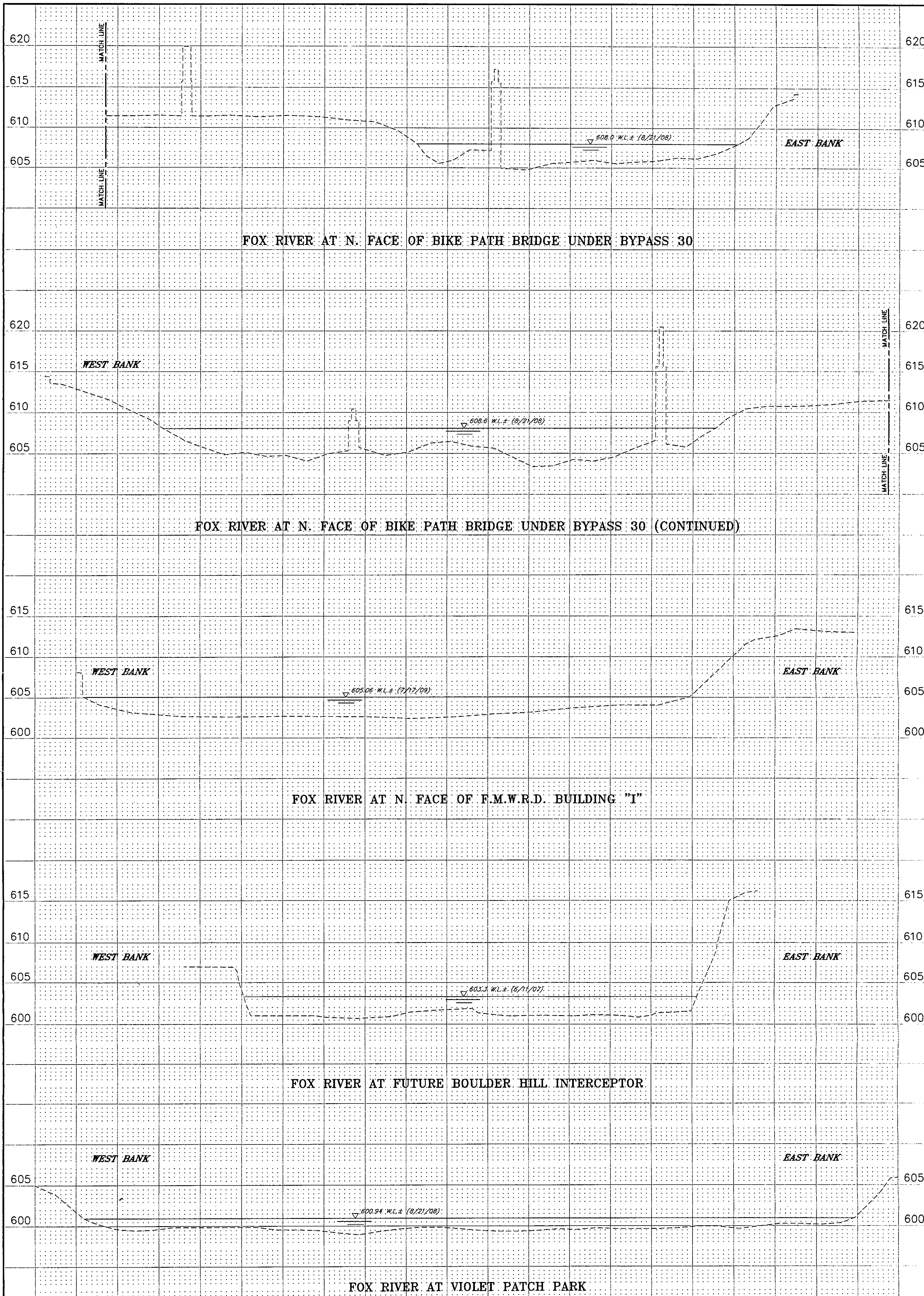


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FIGURE 4-3 – CSO LTCP
FOX RIVER – CROSS SECTIONS
FOX METRO WATER RECLAMATION DISTRICT

SHEET 1 OF 1

This section of the Fox River also contains many rocks and riffles that are hazardous to swimming, water skiing and other primary contact activities. None of these primary contact activities have ever been observed by FMWRD personnel in the segment of the Fox River in the vicinity of CSO Outfall 002 and the FMWRD's property. Secondary contact activities such as fishing and canoeing have been observed, but only intermittently.

As previously discussed, the nearest recreational park along the west bank of the Fox River is Millstone Park located approximately 1.7 miles downstream of Outfall 002 and the nearest recreational park along the east bank of the Fox River is Violet Patch Park located approximately 3,300 feet downstream of the outfall. There are no primary contact recreational activities and minimal secondary contact recreational activities (primarily fishing and other shoreline activities) at either of these parks.

A bike path follows the east bank of the Fox River but does not have access points to the river. Boating access is also limited along this stretch of the river. According to maps provided by the Chicago Area Paddling/Fishing Guide website, there are no public access boat ramps that can accommodate trailered power boats within a mile upstream or downstream of the FMWRD CSO outfall.

Based upon the existing land uses, limited public access for recreational uses and lack of primary recreational activities, this criterion is not met for the FMWRD CSO.

4.5. Public Participation

Sensitive areas were discussed with the CAC, as previously described in Section 3, at a meeting on July 21, 2009. A presentation was given by WEDA at the meeting followed by a discussion among the members of the CAC. The presentation covered the information contained in this section such as: regulatory policy, sensitive area criteria, sensitive area analysis to date, and sensitive area determination. After the presentation and discussion period a vote was taken of the CAC members as to whether the FMWRD CSO discharges to a sensitive area. The results of the vote were 8 votes to 0 votes in favor that the CSO does not discharge to a sensitive area.

4.6. Regulatory Determination

Due to the timeline of events and ongoing studies of the Fox River, a preliminary determination request was not submitted to IEPA prior to the preparation of this document. As part of its review of the LTCP, we request that the IEPA approve of the determination that CSO Outfall 002 does not discharge to a sensitive area.

4.7. Conclusions

In conclusion, none of the five criteria for sensitive areas identified in Section II.C.3 of the 1994 CSO Control Policy were met. The criteria and results are summarized in **Table 4-1.**

Table 4-1
Sensitive Area Assessment

CSO Discharge Receiving Water	Current Use Classification Compared to Sensitive Areas Classification				
	ONRW	Threatened or Endangered Species	Shellfish Bed	Public Drinking Water Intakes	Primary Contact Recreation
Fox River	None	None	None	None	None

As a result, it was determined that CSO Outfall 002 is not located within a sensitive area.

5. Planning Approach

This section will describe future hydraulic and pollutant loading to the FMWRD. Increased flow and pollutant loadings affect the capacity of the WWTP and its ability to fully treat the influent wastewater. When the WWTP's capacity is exceeded, CSO events occur. Therefore it is necessary to project the anticipated future flow and loading in order to establish CSO controls that will be effective for the duration of the planning period. In addition, this section will address the Long Term Control Plan objectives and the planning approach used. As stated in earlier sections, the development of this LTCP relied heavily on the planning approach previously conducted in development of the 2005 Master Plan. The planning approach taken in development of the 2005 Master Plan has been summarized and amended as follows.

5.1 Planning Period

The planning period for this report is 20 years, which reflects the period of the 2005 Master Plan from 2005 to 2025. This planning period is used extensively throughout this report for population projections, hydraulic loading projections, pollutant loading projections, implementation schedule, etc. However, for the purposes of financial planning presented within this document, the 20-year planning period used is from 2009 to 2028.

5.2 Planning Area Projections

5.2.1 Land Use and Future Land Acquisition

It is assumed that growth and development will occur in the FPA over the planning period. The 2005 Master Plan outlined potential areas for growth and annexation.

5.2.2 *Population Projections*

The 2005 Master Plan identified demographic data and population projections through the year 2025. **Table 5-1** summarizes the 2005 Master Plan projections. The estimated PE at the end of the planning period (2025) is 419,105, which is an increase of 66%.

Table 5-1
Population Projections for Municipalities Served by FMWRD

	Population Equivalent						Number of Households	
City / Village	2000	2010	2015	2020	2025	2030	2000	2030
North Aurora [1,2]	10,585	15,476	16,598	17,802	19,092	20,694	4,019	7,092
Oswego [3]	18,777	31,247	40,308	51,998	67,077	86,322	4,476	24,663
Aurora [1,2,8]	142,990	169,610	176,140	182,921	189,963	197,300	46,171	66,722
Montgomery [1,2,7]	5,471	9,848	11,079	12,464	14,022	16,069	1,581	3,926
Boulder Hill [2]	8,169	8,416	8,542	8,670	8,800	8,900	2,848	3,102
Sugar Grove [1]	3,909	9,851	15,639	24,827	39,413	62,742	1,272	20,529
Yorkville	2,400	2,400	2,400	2,400	2,400	2,400		
Morgan Creek Service Area [4]	NA	8,500	14,450	24,565	41,761	72,700	NA	20,771
Existing Unincorporated Areas Population [5]								
Areas around Aurora (estimated)	9,989	9,989	9,989	9,989	9,989	9,989	2,854	2,854
Areas around Montgomery (estimated)	1,274	1,274	1,274	1,274	1,274	1,274	364	364
Areas around N. Aurora (estimated)	53	53	53	53	53	53	15	15
Areas around Sugar Grove (estimated)	1,750	1,750	1,750	1,750	1,750	1,750	500	500
Areas East of Oswego	3,868	3,868	3,868	3,868	3,868	3,868	1,105	1,105
Areas West of Oswego	1,100	1,100	1,100	1,100	1,100	1,100	1,000	1,000
Development of Future Unincorporated Areas								
Areas South of Oswego [6]		2,882	5,360	9,970	18,544	38,400	238	10,971
Totals	210,334	276,262	308,549	353,649	419,105	523,560	66,443	163,614

(1) Population Projections are based on Northeastern Illinois Planning Commission 2030. Forecasts as endorsed on September 30, 2003.

(2) Population Figures for 2000 are based on 2000 Census Population Counts based on a Map prepared by the Center for Governmental Studies at Northern Illinois University. Montgomery 2003 Numbers are actually 2002 numbers collected from a special census held in October and November of 2002. North Aurora has not conducted a special census at this time. This is an estimate for 2004.

(3) Population projections are based on figures proved by the Oswego Economic Development Corporation for years 1990, 2000, 2003 and 2008.

(4) Morgan Creek Service Area Population Figures are Based on an additional 7,270 acres being added to Fox Metro's Service Area and 10 P.E./acre.

(5) Estimates are based on review of existing property maps. Future projections are assumed to remain constant for Unincorporated Areas and that these areas will remain unincorporated.

(6) South of Oswego 2030 Population Figures are Based on an estimated additional 3,840 acres of undeveloped land below Oswego's proposed ultimate boundary.

(7) Montgomery's web page indicates population will be 13,200 by 2010.

(8) Population Figures for 2003 are based on an article in Beacon News dated March 10, 2004 entitled "Aurora Grows Big into Kendall, Will".

Population Projections updated by C. Carter (3/11/04)

5.2.3 *Hydraulic Loading*

The projected population growth and the associated increase in commercial and industrial activity will result in a corresponding increase in wastewater flows. The projected average flow rates have been calculated using historical flows to the WWTP and population projections. As discussed in detail in Section 2.2.4, peak flow rates were projected to 5-year design storm flows that have been dampened under the assumption that 50% of existing inflow will be removed from the system. Projections of the Average Daily Flow, Maximum Daily Flow, Peak-Hour Flow, and Peak Instantaneous Flow to the WWTP were developed for the 20-year planning period. The Maximum Daily Flow includes infiltration and the Peak Hour Flow is based on the 5-year design storm. The Peak Instantaneous Flows are based on historical patterns observed. These flows and others are summarized in **Table 5-2** below:

Table 5-2
Future Projected Flows at WWTP for a 5-Year Storm

	(A)	(B)	(C)	(D)	(E)	(F)
Year	Average Daily Flows, (MGD)	Maximum Daily Flows (MGD)	Peak Hour Flows (MGD)	Peak Instant. Flows (MGD)	Design Peak Hr. Flow to Full Treatment (MGD)	Design Peak Hr. Flow To Excess Treatment (MGD)
2007	35.68	108.52	138.33	146.65	85.00	53.33
2010	38.55	113.34	144.72	153.52	85.00	59.72
2014	41.82	121.22	152.30	161.72	85.00	67.30
2015	42.99	123.85	154.28	163.91	131.30	22.98
2020	48.05	136.40	165.26	174.92	131.30	33.96
2025	52.67	142.97	174.34	183.96	131.30	43.04

In addition to the 5-year storm projections performed as part of the 2005 Master Plans, projected existing (2005) and future (2025) flows tributary to the WWTP were modeled for the 3-month, 1-year and 10-year storm events. Hydrographs for each of these scenarios along with the 5-year storm event can be found in **Appendix J** with a summary of the peak instantaneous flows listed in **Table 5-3**.

Table 5-3
Existing (2005) and Future (2025) Projected Flows (5 min. avg.) at WWTP

Scenarios	Design Storm Events	Peak Instant. Flows (MGD)
Existing (2005) Conditions	3-month	124.76
	1-year	140.25
	5-year	162.97
	10-year	178.81
Future (2025) Conditions	3-month	132.49
	1-year	157.85
	5-year	172.44
	10-year	182.22

As seen in **Tables 5-2 and 5-3**, all Existing and Projected Peak Flows associated with rain events of a 3-month storm intensity and greater exceed the current capacity of the WWTP (85 mgd design maximum flow) resulting in a CSO event.

5.2.4 *Pollutant Loading*

Pollutant loading in wastewater can vary significantly based on: 1) habits of the population served which will cause short-term (hourly, daily and weekly) variations, 2) seasonal fluctuations which normally will cause longer term variations, 3) and industrial activities which cause both long-term and short-term variations.

The projected WWTP organic loadings are tabulated for the planning year 2025 below in **Table 5-4**. The table shows the anticipated loadings from average daily loadings up to maximum daily loadings, at the average daily flow to the plant. In collection system improvements and evaluate CSO control strategies to reduce the impact of the FMWRD CSO Outfall 002 on the Fox River.

5.4 Development of LTCP

5.4.1 Planning Approach

The CSO control policy outlines two different approaches when considering CSO control: the presumptive approach or the demonstrative approach.

The Presumptive Approach requires reducing the CSOs to meet one of three criteria as described below. By meeting one of these three criteria there is presumed to be an adequate level of control to meet applicable state and local WQS in the receiving stream. The acceptability of using the presumptive approach is subject to the approval of the permitting authority (IEPA). Also, if implementation of the CSO controls based upon the presumption approach do not result in meeting the requirements of the WQS, additional controls beyond those already implemented may be required. The three criteria are listed below:

1. *"No more than an average of four overflow events per year, provided that the permitting authority may allow up to two additional overflow events per year. For the purpose of this criterion, an overflow event is one or more overflows from a combined sewer system as a result of a precipitation event that does not receive the minimum treatment specified."*

2. *"The elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer system during precipitation events on a system-wide annual average basis."*

3. *"The elimination or removal of no less than the mass of the pollutants, identified as*

The demonstration approach requires that CSO discharges that remain after LTCP implementation will meet the Water Quality Standards (WQS) for that body of water.

This LTCP was developed utilizing the Presumptive Approach outlined above.

5.4.2 *Goals and Objectives*

This LTCP was developed with the following goals and objectives:

- Clear levels of control to meet health and environmental objectives,
- Flexibility to consider the site-specific nature of the FMWRD CSO and find the most cost-effective way to control it,
- Phased implementation of CSO controls to accommodate the financial capability of FMWRD, and
- Review and revision of water quality standards during the development of CSO control plans to reflect the site-specific wet weather impact of the CSO.

6. Screening of CSO Control Technologies

6.1 Introduction

There are numerous CSO control technologies that can be considered for application to Combined Sewer Systems (CSS). However, as previously discussed, the CSS is owned and maintained by the City of Aurora and as such a large portion of the available CSO control technologies will be addressed in the preparation of their required LTCP. The FMWRD only owns and maintains the Original Combined Sewer Interceptor (OCSI) and CSO Outfall 002, located at the headworks to the WWTP. There are fewer CSO control technologies that would be applicable to CSO Outfall 002. These have been grouped into the following general categories:

- Source Control
- Inflow Control
- Sewer Separation
- Sewer System Optimization
- Storage
- Treatment
- Floatables Control

In FMWRD's 2005 Master Plan, controls for CSO Outfall 002 were reviewed extensively. Although all of the CSO control technologies listed above were considered within the Master Plan, not all were found to be technically or economically feasible. A summary assessment of the selected technologies in each of the above categories is provided in **Table 6-1** and further described in this section.

Table 6-1
Assessment of CSO Control Technologies

CSO Control Technology	Performance: CSO Volume	Bacteria	Floatables	Suspended Solids	Implementation and Operational Factors
Source Control					
Public Education	None	Low	Medium	Medium	Part of ongoing FMWRD NMC Plan.
Industrial Pretreatment	Low	Low	Low	Low	FMWRD has program in place.
Combined Sewer Flushing	Low	Low	Low	Low	Maximizes existing collection system volume, reduces first flush effect, subject to resettling problem, labor intensive
Inflow Control					
Water Conservation	Low	Low	Low	Low	Part of Public Education efforts.
Inflow/Infiltration Control	Low	Low	Low	Low	Based on past experience, 50% inflow removal achievable with no infiltration removal. Part of ongoing FMWRD efforts.
Sewer Separation					
Rain Leader Disconnection	Medium	Medium	Low	Low	Low cost, requires home owners' participation, and has potential for increased storm water pollutant loads. FMWRD has pursued as part of SSES projects with serviced municipalities.
Partial Separation	High	Medium	Low	Low	Disruptive to affected areas, cost intensive, potential for increased storm water pollutant loads, requires home owners' participation. The CSS is owned and operated by the COA and will be addressed in the COA LTCP.
Complete Separation	High	Medium	Low	Low	Disruptive to affected areas, cost intensive, potential for increased storm water pollutant loads, requires home owners' participation. The CSS is owned and operated by the COA and will be addressed in the COA LTCP.
Sewer System Optimization					
Optimize Existing System	Medium	Medium	Medium	Medium	Part of existing FMWRD NMC Plan, low cost relative to large scale structural BMP's, limited by existing system volume and dry weather flow dam elevations.

Table 6-1 (Cont'd)

Assessment of CSO Control Technologies

CSO Control Technology	Performance				Implementation and Operational Factors
	CSO Volume	Bacteria	Floatables	Suspended Solids	
Storage					
Earthen Reservoirs	High	High	High	High	Requires large space, disruptive to affected areas, unsuitable for urban environment, potential odor problems and safety issues
Open Concrete Reservoirs	High	High	High	High	Smaller footprint than earthen reservoirs, disruptive to affected area, increased O&M costs, potential odor problems and safety issues
Closed Concrete Reservoirs	High	High	High	High	Smaller footprint than earthen reservoirs, least disruptive to affected area, increased O&M costs, potential odor problems and safety issues minimized, aesthetically acceptable
Treatment – Expansion of WWTP					
Primary Treatment	Low	Medium	Medium	Medium	Effective with solids and floatables. Increases O&M. This option is currently under design.
Biological/ Secondary Treatment	High	High	High	High	Limited space at existing site. Inability to handle excessive hydraulic surges associated with wet weather events. Land acquired by FMWRD adjacent to existing WWTP for future expansion. Increases O&M.
Tertiary Filtration	Low	Medium	Low	High	Provides for additional level of solids and BOD removal. Newer, more efficient technologies available to fit existing footprint. This option has been implemented.
Disinfection	None	High	None	None	Controls potentially dangerous pathogenic micro-organisms. Increases O&M. This option is currently under construction.

6.2 Source Control

Source controls affect the quantity or quality of runoff that enters the collection system. Best management practices (BMPs) can be applied to control pollutants where they can accumulate. Most source controls are implemented by the City of

Aurora to reduce pollutants entering the CSS, however, some BMPs applicable to the FMWRD include the following:

6.2.1 Public Education

Public education programs can be aimed at reducing

- Littering by the public and the potential for litter to be discharged to receiving waters during CSO events, and
- Illegal dumping of contaminants in the sewer system that could be discharged to receiving water during rain events.

As a part of its nine minimum controls program, FMWRD has implemented a public education program. Elements of the program include: classroom programs and tours of the WWTP; a new and informative FMWRD website; inserts in the sewer bills; a permanent display regarding wastewater at SciTech (a hands-on science museum for children located in Aurora); a prescription drug drop off program; a fats, oils and grease (FOG) program; participation in community events such as County Fairs and local creek cleanups with the Kiwanis Club, and various presentations to community groups.

While public education programs cannot reduce the volume, duration, or frequency of CSO overflows, it can help improve CSO quality by reducing contaminants, floatable debris and litter that can reach the Fox River. Public education is an integral part of this LTCP as it is combined with other control measures to provide significant water quality improvements. FMWRD has satisfactorily implemented this alternative.

6.2.2 *Combined Sewer Flushing*

The objective of combined sewer flushing is to flush out deposited sewage solids and transmit these solids to the WWTP during dry-weather conditions to prevent storm events from flushing them to receiving waters. Combined sewer flushing consists of introducing a controlled volume of water over a short duration at key points in the collection system. The flushing water source can be from external water from tank trucks and gravity or pressurized feed or from internal water collected and detained from normal flows. Past attempts by FMWRD to flush the OCSI (69-inch segmental clay tile sewer) have been unsuccessful in removing the solids due to the volume of water required (23,000 gallons per minutes to achieve a scour velocity of 2 feet per second) and the extremely flat gradient (0.03%). This alternative has been eliminated from further consideration.

6.3 Inflow Control

Inflow control involves retarding or eliminating storm water inflow to the CSS and lowering the magnitude of the peak flow through the system, thereby reducing overflows. The methods considered for inflow control are described below:

6.3.1 *Water Conservation*

Water conservation is geared toward reducing the dry weather flow in the system, thereby allowing the system to accommodate more CSO. Water conservation includes measures such as installing low flow fixtures and high efficiency appliances (i.e. washing machines, dish washers, etc.), public education to reduce wasted water, leak detection and correction, and other programs.

As part of its public education program, FMWRD has been actively promoting water use reduction and recycling measures to the public within their FPA.

FMWRD has satisfactorily implemented this alternative.

6.3.2 *Infiltration and Inflow Reduction*

Infiltration is ground water that enters the collection system through leaking pipe joints, cracked pipes, manholes, and other similar sources. Excessive amounts of infiltration can take up hydraulic capacity in the collection system. In contrast, inflow in the form of surface drainage is intended to enter the CSS. Sources of inflow that might be controlled within the combined sewer system area include the following:

- Inflow in the separate sanitary system located upstream of the CSS, and
- Inflow from private properties such as roof drains, sump pumps, foundation drains, etc.

It can be difficult and expensive to achieve significant reductions in flow from I&I measures. Areas and sources of I&I must first be identified through flow monitoring studies and sanitary sewer evaluation survey (SSES) tasks including smoking testing, dye water testing, sewer televising, manhole inspections and building surveys. Then the identified sources of I&I can be removed, rehabilitated or replaced as needed. Past experience with I&I reduction projects in the FMWRD service area has revealed that approximately 50% reduction of inflow and 0% reduction of infiltration is achievable within the collection system. I&I reduction will be retained for further consideration in Section 7.

6.4 Sewer Separation

Sewer separation involves the partial or complete removal of public and/or private storm sewer components from the combined sewer system. This alternative reduces or prevents sanitary wastewater from being discharged to receiving waters.

However, when combined sewers are partially or completely separated, storm sewer discharges will increase and as a consequence contribute more pollutant load to the receiving waters since the storm water is no longer captured and treated in the combined sewer system.

Varying degrees of sewer separation to reduce the quantity of flow within the combined sewer system are described below:

6.4.1 Rain Leader (Gutters and Downspouts) Disconnection

Rain leaders are disconnected from the combined sewer system and the storm runoff is diverted elsewhere. Depending on the location of the disconnection, the leaders may be drained to a dry well, vegetation bed, a lawn, a storm sewer, or the street. Unfortunately, this method can contribute to lawn or street flooding and only briefly delays the storm water from eventually entering the combined sewer system through catch basins. In conjunction with local municipalities serviced by the FMWRD, the FMWRD has conducted numerous smoke testing investigations over the years to locate rain leader connections and has subsequently coordinated their disconnection by the individual homeowners. FMWRD has satisfactorily implemented this alternative.

6.4.2 Partial Separation

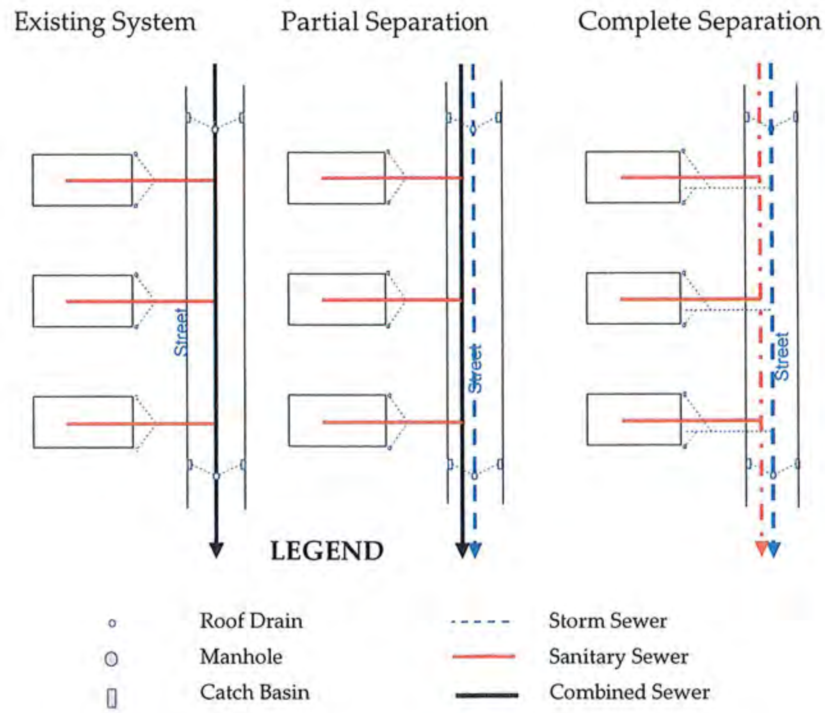
Partial separation involves the removal of publicly owned storm sewer structures such as catch basins and inlets from the combined sewer system through the construction of a new storm sewer system. Private sources of storm water from rain leaders, footing drains, sump pumps, etc. remain connected to the combined sewer system. This alternative involves substantial excavation, street traffic disruption, soil erosion potential and other problems. As previously stated, the CSS is owned and maintained by the COA. This alternative will be addressed in the development of the COA's LTCP and has been eliminated from further consideration by the FMWRD.

6.4.3 Complete Separation

In addition to the removal of publicly owned storm sewer structures such as catch basins and inlets, private sources of storm water from rain leaders, footing drains, sump pumps, etc. are also removed resulting in two separate sewer systems: a storm sewer system and a sanitary sewer system. This alternative involves substantial excavation, street traffic disruption, soil erosion potential, coordination with private property owners and other problems. As previously stated, the CSS is owned and maintained by the COA. This alternative will be addressed in the development of the COA's LTCP and has been eliminated from further consideration by the FMWRD.

Figure 6-1 below shows a diagram of these methods of separation. The City of Aurora has aggressively dealt with varying degrees of sewer separation for years, and continues to do so when the opportunity arises for the reduction of basement backups, street flooding and CSO discharges. This alternative has been and will continue to be a high priority for the City of Aurora.

Figure 6-1
SEWER SEPARATION ALTERNATIVES



6.5 Collection System Optimization

This CSO control technology involves making the best use of existing facilities to limit overflows. The approach involves evaluating the current standard operating procedures for facilities such as sewer systems, pump stations and treatment facilities to determine if improved operating procedures can be developed to provide benefit in terms of CSO control. In addition, regular maintenance and inspection of the OCSI, observation and response of flows within the OCSI and maximizing the conveyance capacity and in-line storage of the OCSI are also implemented.

The FMWRD routinely inspects and maintains all of their collection facilities, including pump stations. Equipment is regularly exercised, repaired and/or replaced based on the life expectancy of the equipment. The FMWRD, in cooperation with the

City of Aurora, also provides flow monitoring of the OCSI to observe flow patterns and measure flow volumes in response to various storm events, which has over time developed into a hydraulic familiarity with the interceptor. As flows change significantly in a reach of the CSS, it will trigger an investigative response resulting in a physical inspection (including sewer televising) and remedy action. Each year, FMWRD budgets time and resources to provide cleaning and rehabilitation to the interceptors that require it. This pro-active approach has proven to minimize flow related problems and maximize conveyance capacity in the interceptors.

FMWRD has satisfactorily implemented this alternative.

6.6 Storage

The objective of off-line or retention basins is to reduce overflows by capturing combined sewage in excess of WWTP capacity during wet weather for controlled release into wastewater treatment facilities after the storm. Off-line basins can provide a relatively constant flow back into the interceptor or treatment plant and thus reduce the size of treatment facilities required. Retention basins have had considerable use and are well documented. These storage basins can be located at overflow points in the collection system or at a point near the WWTP. Land availability near the desired point of the interceptor is a major factor in determining the feasibility of using retention basins for this purpose.

The following types of off-line storage designs have been used successfully by other sanitary districts and municipalities for this purpose:

6.6.1 *Earthen Reservoirs*

Earthen reservoirs can serve as CSO storage facilities at locations where large tracts of land are readily available. Earthen reservoirs have sloped sides, are typically uncovered, and include a synthetic liner or concrete liner to prevent exfiltration and to facilitate maintenance. Earthen reservoirs are typically used in relatively unpopulated areas where land is plentiful and odors are not objectionable. Because they are generally uncovered, they can present a public safety issue in an urban area and are aesthetically objectionable. This alternate has been eliminated from further consideration because of a lack of available land area and the highly urbanized environment of the selected locations.

6.6.2 *Open Concrete Reservoirs*

Open concrete reservoirs are similar to earthen reservoirs except that they have vertical walls which require less land area and are easier to clean. However, open tanks placed in a highly urbanized area are still aesthetically objectionable and pose public safety issues and the potential of objectionable odors. Considering the urban nature of the projected interceptor overflow locations selected, open concrete reservoirs have been eliminated from further consideration.

6.6.3 *Closed Concrete Reservoirs*

Closed concrete reservoirs are similar to open tanks except that they are covered and include mechanical facilities to minimize their aesthetic and environmental impact. Closed concrete reservoirs typically include odor control systems, wash-down/solids removal systems, and access for cleaning and maintenance. Closed concrete reservoirs represent a viable alternative and have been retained for further consideration in Section 7.

6.7 Treatment – Expansion of WWTP

WWTPs that serve combined sewer systems are designed to provide secondary treatment of the dry-weather flow, plus some portion of the wet-weather combined wastewater flow. Increased trash and grit removal and handling facilities are typically employed to handle the high trash and grit loads associated with storm water runoff. The various treatment processes in a WWTP are discussed below.

6.7.1 *Primary Treatment*

6.7.1.1 Screening

The objective of screening is to provide high rate solids/liquid separation for combined sewer floatables and debris thereby preventing floatables from entering receiving waters. Screening systems can either be mechanically or manually cleaned. The existing screening systems and capacities at the WWTP were evaluated extensively in the development of the 2005 Master Plan and were deemed to be satisfactory for the existing facilities. However, screening systems for new facilities associated with potential expansion on property south of the existing WWTP have been retained for further consideration in Section 7.

6.7.1.2 Grit Removal

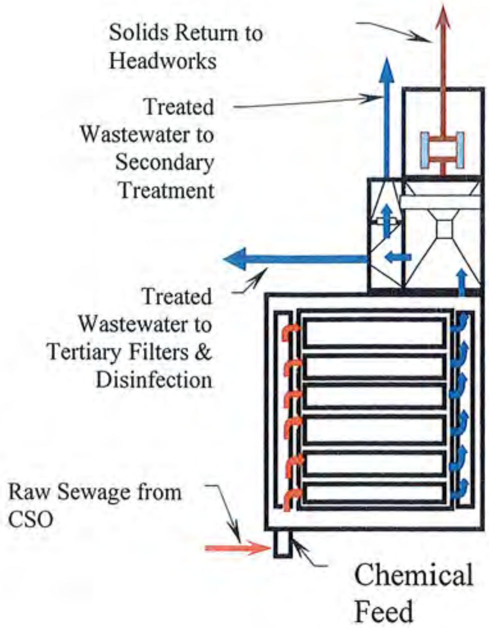
The key to choosing an optimized grit removal system is to know the gradation of grit for the locality as well as the average daily flow and the peak wet-weather flow for the treatment plant. If a community has a combined sewer system, the collection system will gather additional gravel and sand from storm water, leading to a higher concentration of sediments, including coarse grit. The existing grit removal systems and capacities at the WWTP were evaluated extensively in the development of the 2005 Master Plan and were deemed to be satisfactory. However, grit removal systems for new facilities associated with potential expansion on property south of the existing WWTP have been retained for further consideration in Section 7.

6.7.1.3 Sedimentation

The objective of treatment by sedimentation is to remove readily settleable solids and floating material and thus reduce the suspended-solids content. When raw wastewater is placed in a relatively quiescent state, those solids having a higher specific gravity than water will tend to settle, and those with a lower specific gravity will tend to rise. It is one of the most common and well-established unit operations for wastewater treatment. Efficiently designed and operated primary sedimentation tanks should remove from 50 to 70 percent of the suspended solids and from 25 to 40 percent of the BOD_5. Sedimentation tanks also provide storage capacity and are very adaptable to chemical additives, such as alum, ferric chloride and polymers which provide higher suspended solids and BOD removal. A schematic diagram of a chemically enhanced primary treatment (CEPT) system is shown in **Figure 6-2**.

Figure 6-2

Chemically Enhanced Primary Treatment



Sedimentation systems for treatment of excess wet weather flows at the existing WWTP and for new facilities associated with potential expansion on property south of the existing WWTP were evaluated extensively in the development of the 2005 Master Plan and have been retained for further consideration in Section 7.

6.7.2 Biological Treatment/Secondary Treatment

The objective of biological treatment is to coagulate and remove non-settleable colloidal solids and to stabilize the organic matter. This is accomplished using a variety of microorganisms, principally bacteria. The microorganisms metabolically convert the colloidal and dissolved carbonaceous organic material and ammonia into various gases and into the cell tissue. Since the cell tissue has a specific gravity slightly greater than that of water, the resulting cells can be removed via clarification.

Biological/secondary treatment systems at the existing WWTP were evaluated extensively in the development of the 2005 Master Plan and were eliminated from further consideration due to insufficient space at the existing site and inability to handle excessive hydraulic surges associated with wet weather events. However, Biological/secondary treatment systems for new facilities associated with potential expansion on property south of the existing WWTP have been retained for further consideration in Section 7.

6.7.3 Tertiary Filtration

Tertiary filtration is principally used for achieving supplemental suspended solids removal and particulate BOD.

Tertiary filtration system upgrades at the existing WWTP were evaluated extensively in the development of the 2005 Master Plan and have been retained for further consideration in Section 7.

6.7.4 Disinfection

The purpose of disinfection is to control the discharge of pathogenic microorganisms into receiving waters. Disinfection can be accomplished by the use of one of the following methods:

1) chemical agents,
2) physical agents,
3) mechanical means, or
4) radiation.

Currently, FMWRD uses sodium hypochlorite solution for their disinfectant, and is required to disinfect the wastewater effluent during the months of May through October of each year. Upgrades to the chlorine contact tanks at the existing WWTP were evaluated extensively in the development of the 2005 Master Plan and have been retained for further consideration in Section 7.

6.8 Solids and Floatables Control

Technologies that provide solids and floatables control do not reduce the frequency or magnitude of CSO overflows, but can reduce the presence of aesthetically objectionable items such as cups, paper, styrofoam, and sanitary matter, etc. As previously discussed, the existing screening systems and capacities at the WWTP were evaluated extensively in the development of the 2005 Master Plan and were deemed to be satisfactory for the existing facilities. In addition, all combined sewer flows that are unable to pass through the existing screening systems, pass through a manually cleaned bar screen prior to being discharged to the Fox River. Retained materials are manually raked and removed after every CSO discharge. FMWRD has satisfactorily implemented this alternative.

6.9 Screening of Control Technologies

The various treatment technologies described previously have been screened for further, in-depth consideration. The results of the analysis are summarized below in **Table 6-2**.

Table 6-2
Screening of CSO Control Technologies

CSO Control Technology	Retained for Consideration	Implemented to Satisfactory Level	Eliminated from Further Consideration	Consideration by Others
Source Control				
Public Education		X		
Combined Sewer Flushing			X	
Inflow Control				
Water Conservation		X		
I&I Reduction	X			
Sewer Separation				
Rain Leader Disconnection		X		
Partial Separation			X	X
Complete Separation			X	X
Sewer System Optimization				
Optimize Existing System		X		
Storage				
Earthen Reservoirs			X	
Open Concrete Reservoirs			X	
Closed Concrete Reservoirs	X			
Treatment – Expansion of WWTP				
Primary Treatment	X			
Biological/Secondary Treatment	X			
Tertiary Filtration	X			
Disinfection	X			
Floatables Control				
Screening		X		

7.0 DEVELOPMENT OF CONTROL PROGRAM ALTERNATIVES

7.1 Introduction

This section describes the development of control plan alternatives identified in Section 6 as being retained for further consideration and the factors used to evaluate the alternative plans. The alternatives identified for further consideration include: I&I reduction, storage and treatment. CSO control elements that apply to the FMWRD CSO Outfall 002, as well as those that apply to the entire wastewater collection system, are discussed and developed in this section. The alternative elements are evaluated based upon their ability to comply with regulatory requirements, feasibility and ease of operation and maintenance. Final alternatives are selected herein based upon the merits of the alternative as compared to the criteria.

7.2 Evaluation of Alternative Elements and Selection of Control Plan Alternative

Options for CSO control can be divided into the following categories: system wide elements and treatment plant elements. Elements in each of these categories can be combined to constitute a complete LTCP.

7.2.1 *System Wide Elements*

System wide CSO control elements identified in Section 6 for further consideration include I&I reduction and Storage. A detailed economic analysis was performed as part of the 2005 Master Plan and the 2005 Wet Weather Facilities Study (**Appendix C**) to determine the level of I&I that could be cost-effectively removed from the collection system. As previously discussed in Section 2.2.4, past experience indicates that approximately 50% reduction of inflow is achievable within the collection system. This analysis compared three alternatives for the potential removal of 50% of the inflow: 1) sewer rehabilitation (I&I reduction), 2) flow equalization basins in closed concrete storage tanks (storage) and 3) transport and full wastewater treatment. A summary of the cost-effective analysis performed as part of the 2005 Wet Weather Facilities Study for each of these alternatives is shown in **Table 7-1** in 2005 dollars.

TABLE 7-1
System Wide Elements Cost-Effective Analysis

	Option 1	Option 2	**Option 3**
	Sewer Rehab	Transport & Treatment	**Flow EQ Storage Basins**
Capital Cost	$93,669,695	$527,940,452	$47,091,460
Present Worth of O&M Costs	$0	$3,165,979	$1,628,477
Present Worth of Salvage Costs	-$5,024,166	-$46,928,134	-$3,532,999
Total Present Worth	$88,645,529	$481,012,318	$45,186,938
Average Annual Equivalent Cost	$9,028,743	$48,992,167	**$4,602,389**

As demonstrated, Option 3 – Flow Equalization Storage Basins was deemed to be the most cost-effective solution. Option 2 clearly demonstrates that transporting and providing full treatment for only 50% of the peak inflow is not a feasible alternative.

In addition to the cost-effective analysis, the selection of the appropriate alternative also considered non-monetary factors such as environmental and social benefits. These factors included environmental effects, contributions to water quality objectives, implementation capabilities, energy and resource use, reliability and expandability. **Table 7-2** was prepared to display the costs and effects of the three alternatives in quantitative terms. The evaluation of each alternative regarding environmental impact and water quality impact were ranked with:

+	=	improvement
-	=	adverse effect
N	=	no effect
T	=	temporary effect
U	=	unknown

Under monetary costs, the implementation capability, energy and resource use, and reliability of the options are ranked from 1 to 4, with 4 being the lowest ranking.

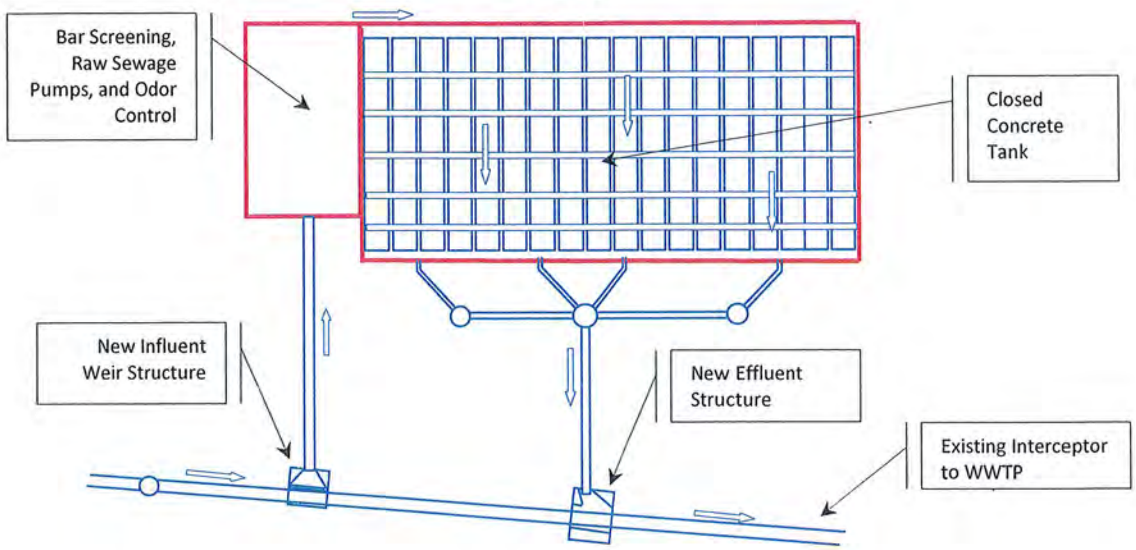
TABLE 7-2
Ranking of System Wide Elements Alternatives

SIGNIFICANT EFFECTS					
		Options	1	2	3
1.	Environmental Effects				
	a.	Aquatic biota	+	-	+
	b.	Terrestrial	N	N	N
	c.	Wildlife Habitat	N	N	N
	d.	Cultural areas	N	N	N
	e.	Groundwater and Surface Water Pollution	+	+	+
	f.	Air Pollution	T	T	T
	g.	Aesthetics, noise, odor, and dust	T	T	T
	h.	Land Use	N	N	N
	i.	Social factors	N	N	N
2.	Monetary Costs				
	a.	Capital	2	3	1
	b.	Operational	1	3	2
	c.	Average Annual Equivalent Cost	2	3	1
3.	Contributions to Water Quality Objectives		1	1	1
4.	Implementation Capabilities		2	4	1
5.	Energy and Resource Use		1	3	3
6.	Reliability (Plant upsets, spills, and CSO overflows)		2	1	1
7.	Expandability		1	1	1
	Composite Ranking		**1.5**	**2.4**	**1.4**

Again Option 3 – Flow Equalization Storage Basins was deemed to be the best solution and Option 2 was shown not to be a feasible alternative. Detailed reasons for selecting Option 3 were included in Section 6.3 of the 2005 Wet Weather Facilities Study.

Flow Equalization Storage Basins operate by stripping off excess storm flows from an interceptor, pumping and storing these flows for the duration of the storm event and then returning the flows slowly to the interceptor once the storm flows subside. Settled solids would also be returned to the interceptor as the storage tanks empty. All stored flow would then be transported to the WWTP for full treatment. A diagram of a typical Flow Equalizing Storage Basin Facility is shown in **Figure 7-1**.

Figure 7-1
Typical Flow Equalizing Storage Facility



7.2.2 *Treatment Plant Elements*

Treatment plant CSO control elements identified in Section 6 for further consideration included expansion of the various WWTP processes including primary treatment, biological/secondary treatment, tertiary filtration and disinfection. A detailed evaluation of four liquid train alternatives and four solids handling alternatives was performed as part of the 2005 Master Plan. The following summarizes this detailed evaluation.

7.2.2.1 Liquid Train Alternatives

Four options for liquid process trains were evaluated for treatment of peak flows. The basis of design for each option assumed the reduction of peak inflow through the alternative methods discussed in Section 7.2.1. These liquid process trains were as follows:

Option 1: Conventional Activated Sludge system with two facilities providing secondary treatment up to 147 mgd and primary treatment and disinfection up to 174 mgd

Option 2: Integrated Fixed Film Activated Sludge (IFAS) system providing secondary treatment up to 120 mgd and primary treatment and disinfection up to 174 mgd

Option 3: Up-flow Submerged Biological Aerated Filter (BAF) system providing secondary treatment up to 120 mgd and primary treatment and disinfection up to 174 mgd

Option 4: Conventional Activated Sludge system with two facilities providing secondary treatment up to 131 mgd and primary treatment and disinfection up to 185 mgd

A summary of the cost-effective analysis of these alternatives is shown in **Table 7-3.**

TABLE 7-3
COST EFFECTIVE SUMMARY - LIQUID TRAIN OPTIONS

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
Capital Cost	$107,446,577	$104,326,951	$112,555,356	**$103,748,642**
PW of Operational Costs	$11,894,528	$13,097,269	$15,184,478	**$11,146,051**
PW of Salvage Value	($11,158,652)	($8,181,926)	($11,649,228)	**($16,117,500)**
Total PW	$108,282,453	$109,242,293	$116,090,606	**$98,777,193**
Average Annual Equivalent Cost	$11,028,807	$11,126,569	$11,824,085	**$10,060,675**

As demonstrated, Option 4 was deemed to be the most cost-effective solution.

In addition to the cost-effective analysis, the selection of the appropriate alternative also considered the previously discussed non-monetary. The evaluation of each alternative according to environmental impact and water quality impact is shown in **Table 7-4**.

Table 7-4
RANKING OF FINAL LIQUID OPTIONS

SIGNIFICANT EFFECTS						
		Liquid Options	1	2	3	4
1.	Environmental Effects					
	a.	Aquatic biota	+	+	+	+
	b.	Terrestrial	N	N	N	N
	c.	Wildlife Habitat	N	N	N	N
	d.	Cultural areas	N	N	N	N
	e.	Groundwater and Surface Water Pollution	+	+	+	+
	f.	Air Pollution	T	T	T	T
	g.	Aesthetics, noise, odor, and dust	T	T	T	T
	h.	Land Use	N	N	N	N
	i.	Social factors	N	N	N	N
2.	Monetary Costs					
	a.	Capital	3	2	4	1
	b.	Operational	2	3	4	1
	c.	Average annual	3	2	4	1
3.	Contributions to Water Quality Objectives		1	2	2	1
4.	Implementation Capabilities		3	2	4	1
5.	Energy and Resource Use		2	3	4	1
6.	Reliability (Plant upsets, spills, and CSO overflows)		1	2	2	1
7.	Expandability to 105 MGD		1	3	3	1
8.	Expandability for Denitrification		1	3	3	1
	Composite Ranking		**1.89**	**2.44**	**3.33**	**1.00**

Again, Option 4 was clearly shown to be the best solution. Detailed reasons for selecting Option 4 were included in Section 5.3 of the 2005 Master Plan.

7.2.2.2 *Chemically Enhanced Primary Treatment*

A part of Option 4 recommended in the 2005 Master Plan includes a chemically enhanced primary treatment (CEPT) facility. The purpose of a CEPT system is to provide primary treatment of design peak flows to the WWTP that are in excess of the secondary treatment capacity. Coagulants may be added to the primary treatment step to improve solids capture, reduce the HRT requirement, and therefore reduce the required footprint of the structure.

This system includes screening, grit removal, raw sewage pumping, chemically enhanced primary treatment, tertiary filtration and chlorination/dechlorination. Solids captured in this primary treatment alternative will flow by gravity back to the WWTP headworks for full secondary treatment when peak storm flows subside. The CEPT effluent would also receive tertiary filtration and disinfection prior to discharge to the Fox River through the treated plant Outfall 001.

7.2.2.3 Solids Handling Alternatives

Four options for solids handling were also evaluated and are described as follows:

Option A: Single State High-Rate Anaerobic Digestions (Mesophilic)

Option B: Temperature Phased Anaerobic Digestion (TPAD)

Option C: Autothermal Thermophilic Aerobic Digestion (ATAD)

Option D: TPAD with Sludge Dryer

A summary of the cost-effective analysis of these alternatives is shown in **Table 7-5.**

TABLE 7-5
COST EFFECTIVE SUMMARY - SOLIDS HANDLING OPTIONS

	OPTION A	OPTION B	OPTION C	OPTION D
Capital Cost	$72,995,796	$17,003,010	$30,047,547	**$14,972,372**
PW of Operational Costs	$10,465,249	$8,923,414	$9,479,533	**$9,295,967**
PW of Salvage Value	($ 8,644,053)	($ 1,731,292)	($2,023,526)	**($ 1,505,657)**
Total PW	$74,816,991	$24,195,132	$37,503,554	**$22,762,683**
Average Annual Equivalent Cost	$ 7,620,276	$ 2,464,328	$3,819,820	**$2,318,429**

As demonstrated, Option D was deemed to be the most cost-effective solution.

In addition to the cost-effective analysis, the selection of the appropriate alternative also considered the previously discussed non-monetary factors. The evaluation of each alternative regarding environmental impact and water quality impact are shown in **Table 7-6**.

Table 7-6
RANKING OF FINAL SOLIDS OPTIONS

		Solids Management Options	A	B	C	D
1.	Environmental Effects					
	a.	Aquatic biota	N	N	N	N
	b.	Terrestrial	N	N	N	N
	c.	Wildlife Habitat	N	N	N	N
	d.	Cultural areas	N	N	N	N
	e.	Groundwater and Surface Water Pollution	+	+	+	+
	f.	Air Pollution	T	T	T	T
	g.	Aesthetics, noise, odor, and dust	T	T	T	T
	h.	Land Use	N	N	N	N
	i.	Social factors	N	N	N	N
2.	Monetary Costs					
	a.	Capital	4	2	3	1
	b.	Operational	4	2	3	1
	c.	Average annual	4	2	3	1
3.	Contributions to Water Quality Objectives		1	1	1	1
4.	Implementation Capabilities		4	1	3	2
5.	Energy and Resource Use		4	2	3	1
6.	Reliability (Plant upsets)		1	2	1	2
7.	Expandability		4	2	3	1
8.	Solids Reduction Potential		4	3	2	1
	Composite Ranking		3.33	1.89	2.44	1.22

Again, Option D was clearly shown to be the best solution. Detailed reasons for selecting Option D were included in Section 5.3 of the 2005 Master Plan.

7.3 Factors in Evaluation of Control Plans

7.3.1 Evaluation Factors

The following factors were considered as part of the alternatives evaluation and selection of final control plans.

7.3.1.1 *Regulatory Compliance*

Alternatives were evaluated on their ability to conform to CSO Control Policy requirements and to achieve any required pollutant load reductions for the Fox River.

7.3.1.2 *Ease of Implementation*

The selected alternatives were rated on implementability factors, which included whether acquisition of land is required, and, if so, how difficult it will be. The complexity of construction was also taken into consideration. If the CSO control alternative required land or difficult construction within confined urban areas, it was considered less desirable to implement.

7.3.1.3 *Operational Complexity*

The degree of operational complexity for each system alternative included such factors as the complexity of the treatment technologies involved and the number of satellite facilities required.

7.3.1.4 *Ability to Upgrade*

Each system alternative was rated on how difficult it would be to upgrade the existing facilities and to construct the planned facilities. This consideration included the acreage of additional land available at the site for future expansion.

7.3.2 ***Regulatory Compliance***

7.3.2.1 *CSO Discharge Regulations*

The Presumptive Approach in the 1994 CSO Control Policy requires reducing CSO discharges to meet one of three criteria, the first of which is no more than an average of four to six overflow events per year. By meeting this criteria there is presumed to be an adequate level of control to meet applicable state and local WQS in the receiving stream. The theoretical storm return period is the inverse of the probability that the event will be exceeded in any one year. Therefore, on the average, four CSO overflow events per year would be equivalent to a 3-month storm recurrence and is the planning standard to be employed in this LTCP. See **Table 7-7** below.

Table 7-7
Recurrence Intervals and Probabilities of Occurrences

Recurrence interval, in years	Probability of occurrence in any given year	Percent chance of occurrence in any given year
100	1 in 100	1%
50	1 in 50	2%
25	1 in 25	4%
10	1 in 10	10%
5	1 in 5	20%
4	1 in 4	25%
2	1 in 2	50%
1	1 in 1	100%
0.5	2 in 1	200%
0.25	4 in 1	400%

The CSO Control Policy further requires that the long term CSO control plan consider a reasonable range of alternatives that would meet the water quality objectives that are established for the receiving stream. The suggested range of controls should be sufficient to:

1) achieve zero overflows per year,
2) allow an average of 1 to 3 overflows per year,
3) allow an average of 4 to 7 overflows per year, and to

4) allow 8 to 12 overflows per year.

Furthermore, the analysis of alternatives should be sufficient to make a reasonable assessment of cost and performance. The final long term control plan will become the basis for NPDES permit limits and requirements, and must therefore meet CWA requirements.

7.3.2.2 Performance of Selected CSO Control Alternatives

Table 7-8 below lists the projected performance of the preliminary CSO Control alternatives, if they were in place during the years 2007 through 2009.

Table 7-8

Projected Performance of Selected CSO Control Alternatives
Overflow Events of 2007 through 2009

		Outfall 002	Net Reduction in Loadings to the River at the CSO Outfall		
No.	Preliminary Control Alternative	Overflows / Year	BOD5 #/yr	TSS #/yr	NH_3-N #/yr
1	No Improvements	15.7	346,672 / 0%	431,433 / 0%	22,256 / 0%
2	Flow Equalization Storage Basins				
	North Aurora (only)	7.0	138,445 / 40%	179,427 / 42%	9,655 / 43%
	Waubonsie (only)	6.3	150,102 / 43%	195,092 / 45%	10,293 / 49%
3	Chemically Enhanced Primary Treatment (only)	1.7	335,278 / 97%	410,702 / 95%	21,807/ 98%
4	2025 WWTP w/ all CSO Controls	0.3	346,559 / 99.97%	431,161 / 99.94%	22,253 / 99.99%

8.0 RECOMMENDED CONTROL PLAN

8.1 Introduction

This section summarizes the various elements of the LTCP developed and recommended in Section 7. It has been selected considering regulatory requirements, an alternatives evaluation, public input and consultation and an analysis of financial capability. Additional non-monetary factors such as reliability and ease of operation and maintenance were also taken into consideration. The goal of the recommended plan is to meet the requirements of Special Condition 14 of FMWRD's NPDES permit (IL0020818), which is specifically that *"all combined sewer overflows and treatment plant bypasses shall be given sufficient treatment to prevent pollution and the violation of applicable water quality standards. Sufficient treatment shall consist of the following:*

- *Treatment as described in PCB 85-224 and dated July 13, 1988 shall be provided,*
- *Any additional treatment, necessary to comply with applicable water quality standards and the federal Clean Water Act, including any amendments made by the Wet Weather Water Quality Act of 2000,*
- *All CSO discharges authorized by this Permit shall be treated, in whole or in part, to the extent necessary to prevent accumulations of sludge deposits, floating debris and solids in accordance with 35 IL Adm. Code 302.203 and to prevent depression of oxygen levels,*
- *Overflows during dry weather are prohibited,*
- *The collection system shall be operated to optimize transport of wastewater flows and to minimize CSO discharges, and*
- *The treatment system shall be operated to maximize treatment of wastewater flows.*

The recommended LTCP satisfies each of the above requirements.

8.2 Recommended LTCP Plan

FMWRD is committed to improving the water quality of the Fox River. The elements of the recommended LTCP developed in Section 7 have been selected to provide significant improvements to the quality of the receiving water while balancing ratepayer affordability. The plan consists of both system wide elements and treatment plant improvements and upgrades. Together these elements constitute the complete LTCP for FMWRD.

8.2.1 System Wide Components

System wide elements of the recommended plan include improvements to the collection system in order to reduce peak flow and to reduce the cost of providing additional transportation capacity for a hydraulically overloaded collection system, as well as to reduce the cost for providing additional peak flow treatment capacity at the WWTP. The LTCP recommends the construction of two satellite wastewater storage facilities adjacent to two of the major interceptors: the North Aurora Interceptor and the Waubonsie Interceptor. These two storage facilities described below will reduce the 2025 peak hour flow to the WWTP by 47.9 mgd.

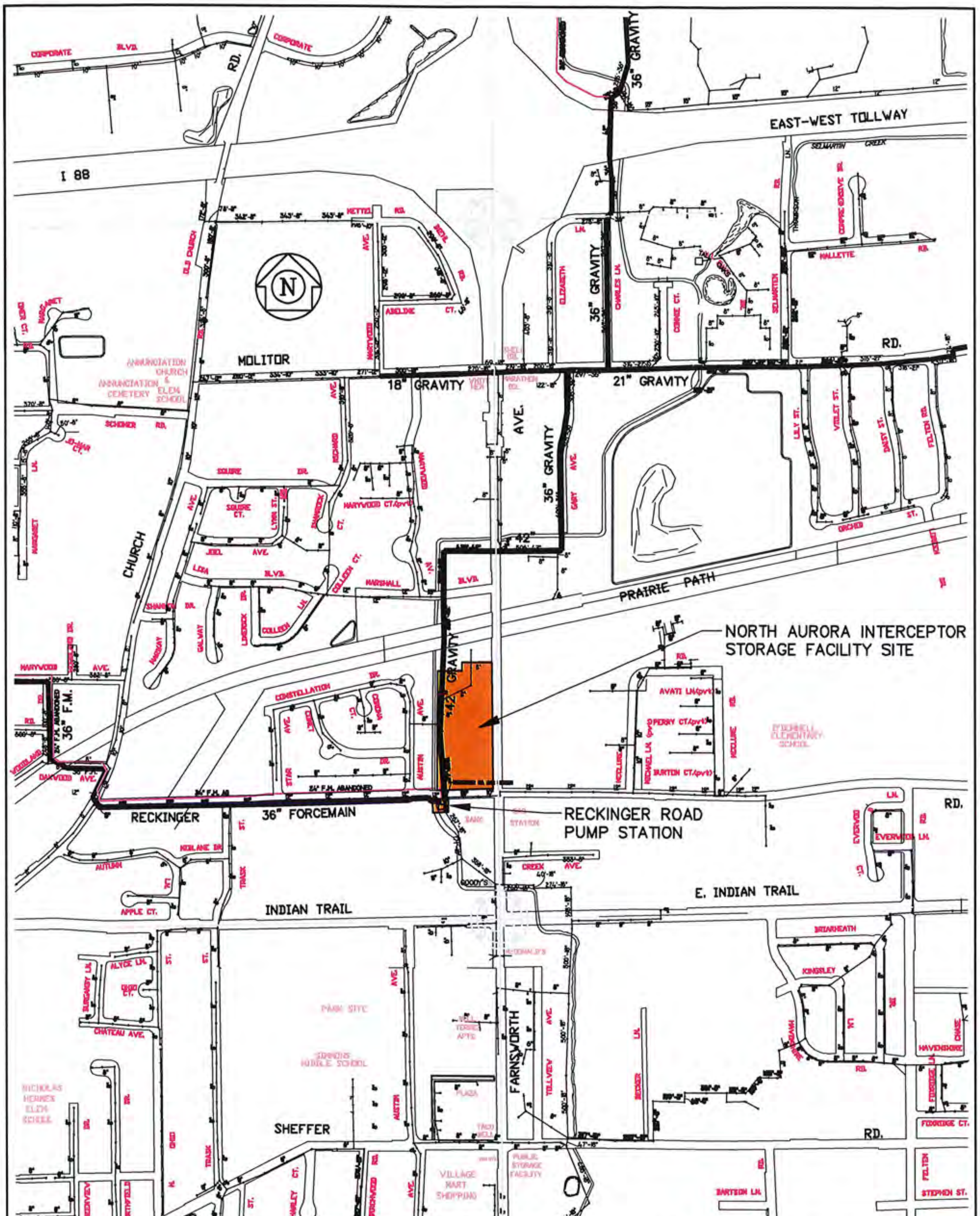
8.2.1.1 North Aurora Interceptor Storage Facility

A site for this storage facility has recently been purchased by FMWRD at the intersection of Farnsworth Road and Reckinger Road (**Figure 8-1**). The peak flows received at the Reckinger Road pump station must be reduced to prevent the North Aurora Interceptor from surcharging during storm events in addition to reducing peak flows at the WWTP. The 2005 Wet Weather Facilities Study (see **Appendix C**) projected that the 5-year peak flow to the pump station in the year 2025 will be 38.8 mgd and that 22.5 mgd of the peak inflow can be "shaved off" during storm events of that magnitude (**Figure 8-2**). The removed inflow is to be stored temporarily and slowly released back into the interceptor when peak flows subside for conveyance to the WWTP for treatment. The storage volume required to "shave off" 22.5 mgd for a 5-year storm event totals 6.4 million gallons (**Figure 8-2**).

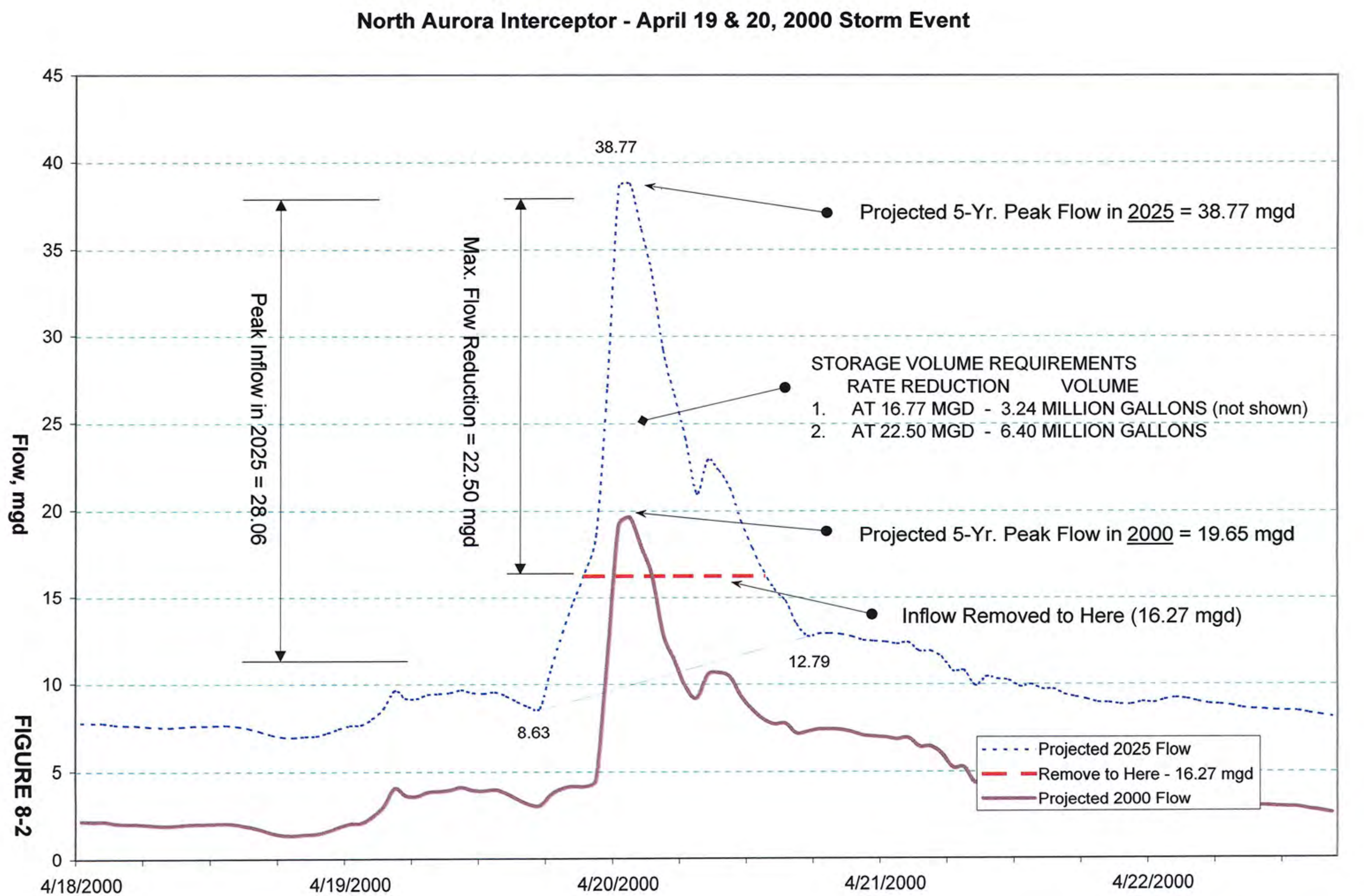
8.2.1.2 *Waubonsie Interceptor Storage Facility*

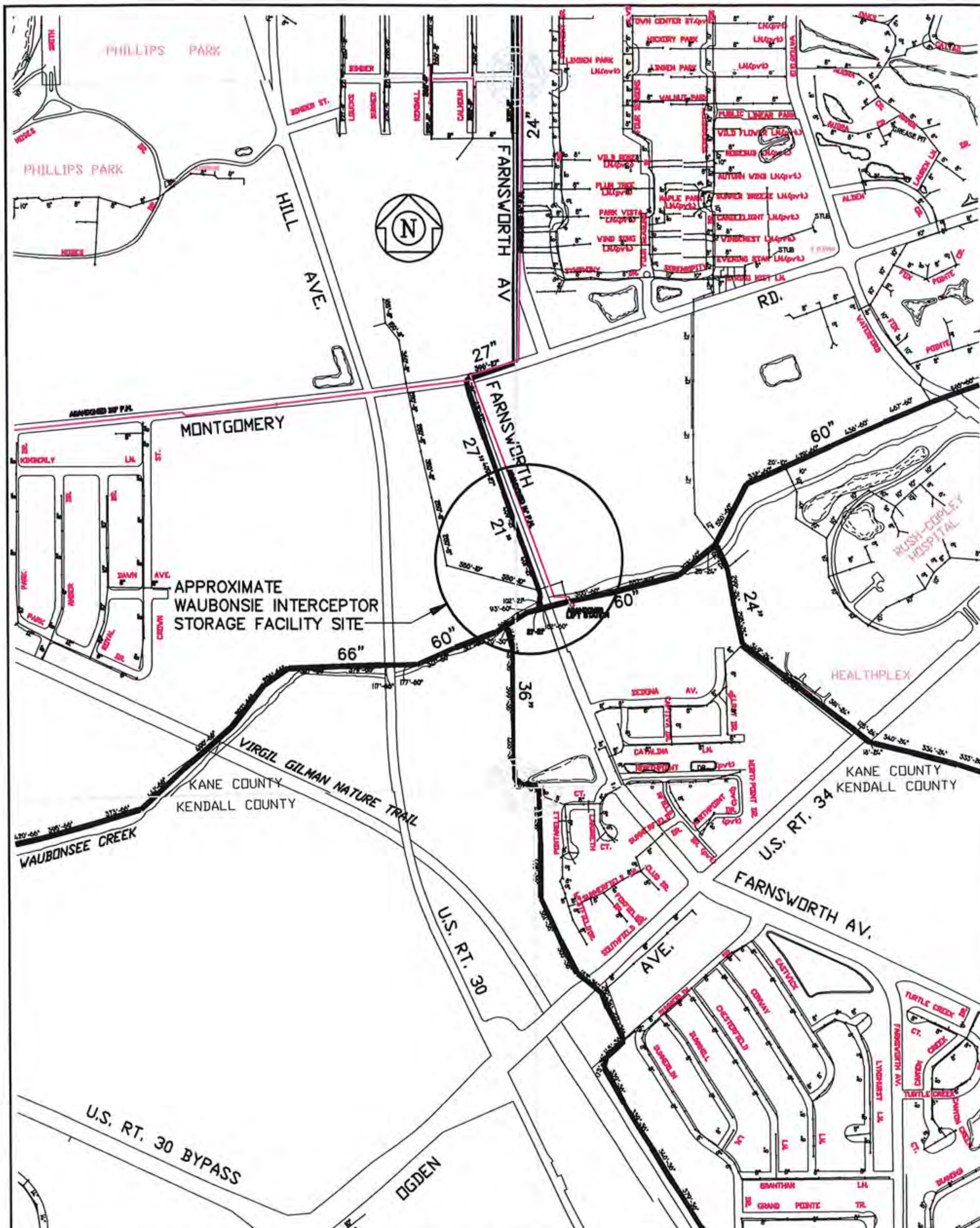
The approximate location for this storage site is shown on **Figure 8-3** near the intersection of the Waubonsie Interceptor with Farnsworth Avenue. The tract of land has not yet been purchased, but negotiations with land owners have commenced.

The peak flows received at this location on the Waubonsie Interceptor must also be reduced to prevent the interceptor from surcharging during storm events in addition to reducing peak flows at the WWTP. The 2005 Wet Weather Facilities Study (see **Appendix C**) projected that the 2025 5-year Waubonsie Interceptor peak flow will be 57.1 mgd and that 25.4 mgd of the peak inflow can be "shaved off" during storm events of that magnitude (**Figure 8-4**). The removed inflow is to be stored temporarily and slowly released back into the interceptor when the flows subside for conveyance to the WWTP for treatment. The storage volume requirement to "shave off" 25.4 mgd for 5-year storm event also totaled 6.4 million gallons (**Figure 8-4**).



WALTER E. DEUCHLER ASSOCIATES, INC. © *Consulting Engineers — Aurora, Illinois*			SHEET OF
REVISIONS F:\ASD\06060-06\FIG 7-1			**FIGURE 8-1**
DESIGNED GL DRAWN JES	APPROVED GL DATE 11/18/09	BOOK — SCALE NTS	JOB NUMBER 111/06060-00
			NORTH AURORA INTERCEPTOR – LOCATION MAP


North Aurora Interceptor - April 19 & 20, 2000 Storm Event
Flow, mgd
45
40
35
30
25
20
15
10
5
0
4/18/2000
4/19/2000
4/20/2000
4/21/2000
4/22/2000
38.77
Projected 5-Yr. Peak Flow in 2025 = 38.77 mgd
Peak Inflow in 2025 = 28.06
Max. Flow Reduction = 22.50 mgd
STORAGE VOLUME REQUIREMENTS
RATE REDUCTION VOLUME
1. AT 16.77 MGD - 3.24 MILLION GALLONS (not shown)
2. AT 22.50 MGD - 6.40 MILLION GALLONS
Projected 5-Yr. Peak Flow in 2000 = 19.65 mgd
Inflow Removed to Here (16.27 mgd)
12.79
8.63
Projected 2025 Flow
Remove to Here - 16.27 mgd
Projected 2000 Flow
FIGURE 8-2



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F:\ASD\06060-06\FIG 8-3				
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FIGURE 8-3

WAUBONSIE INTERCEPTOR - LOCATION MAP

Waubonsie Interceptor - May 11 & 12, 2002 Storm Event

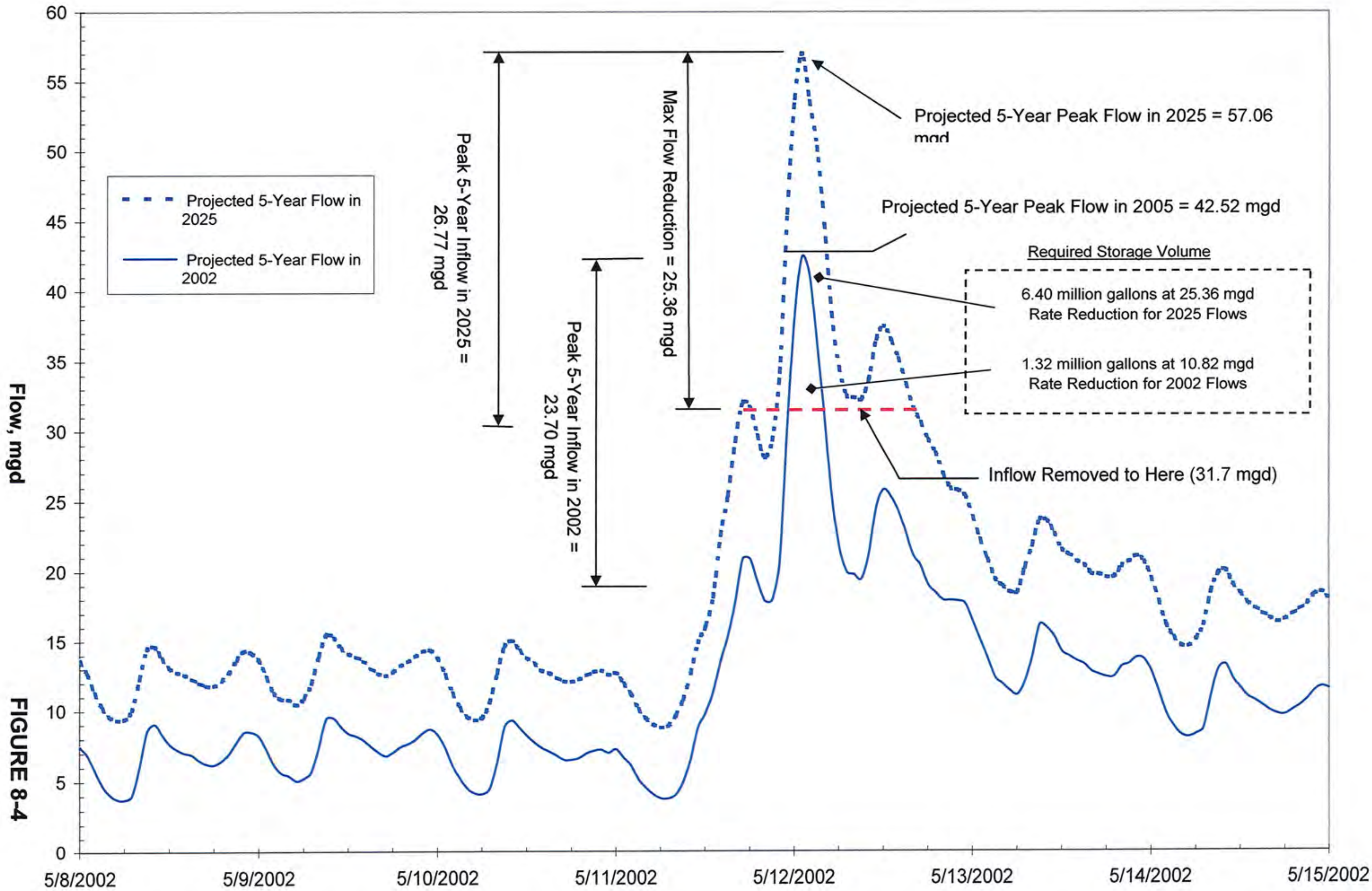


FIGURE 8-4

8.2.2 *Treatment Plant Components*

Treatment plant elements of the recommended plan include upgrades to the existing treatment plant processes, construction of excess wet weather treatment facilities and expansion of the wastewater treatment plant. A review of the excess flow control strategy was conducted as part of the 2005 Master Plan and recommendations were developed in order to improve the reliability and performance of the treatment plant.

The 2005 Master Plan assumed that all future flows to the WWTP would be split and sent to either the existing treatment facilities (to be known as the "North Facility") or to a new southerly addition to the existing facilities (to be known as the "South Facility"). Design considerations for the recommended plant improvements include secondary treatment of a 2025 design average flow (DAF) of 52 mgd, secondary treatment for peak hourly flows of 131 mgd (which is the equivalent of a 3-month storm event) and enhanced primary treatment for a design peak instantaneous flow of 185 mgd, which is the equivalent of a 5-year storm event (assuming approximately 50% reduction of peak inflow).

Additional design provisions in the 2005 Master Plan include phosphorus removal and improved nitrification. The proposed South Facility improvements include both phosphorous reduction to 1 mg/L (monthly average) and Total Nitrogen (TN) reduction to 10 mg/L (monthly average) at a DAF of 23 mgd. Proposed upgrades to the North Facility include only phosphorous reduction to 1 mg/L (monthly average) and denitrification as an enhancement to the phosphorous reduction, resulting in a DAF treatment capacity of 36 mgd at the North Facility. Should TN reduction to 10 mg/L (monthly average) be required at the North Facility, the DAF would need to be re-rated to 29 mgd based on the volume requirement for TN reduction. The previously mentioned 2025 DAF of 52 mgd is based on a capacity of 23 mgd at the South Facility and a re-rated capacity of 29 mgd at the North Facility. However, until TN reduction is required, the DAF capacity of the North Facility is 36 mgd, resulting in a total 2025 DAF capacity of 59 mgd.

The treatment plant elements of the recommended LTCP are summarized as follows:

8.2.2.1 Chemically Enhanced Primary Treatment (CEPT)

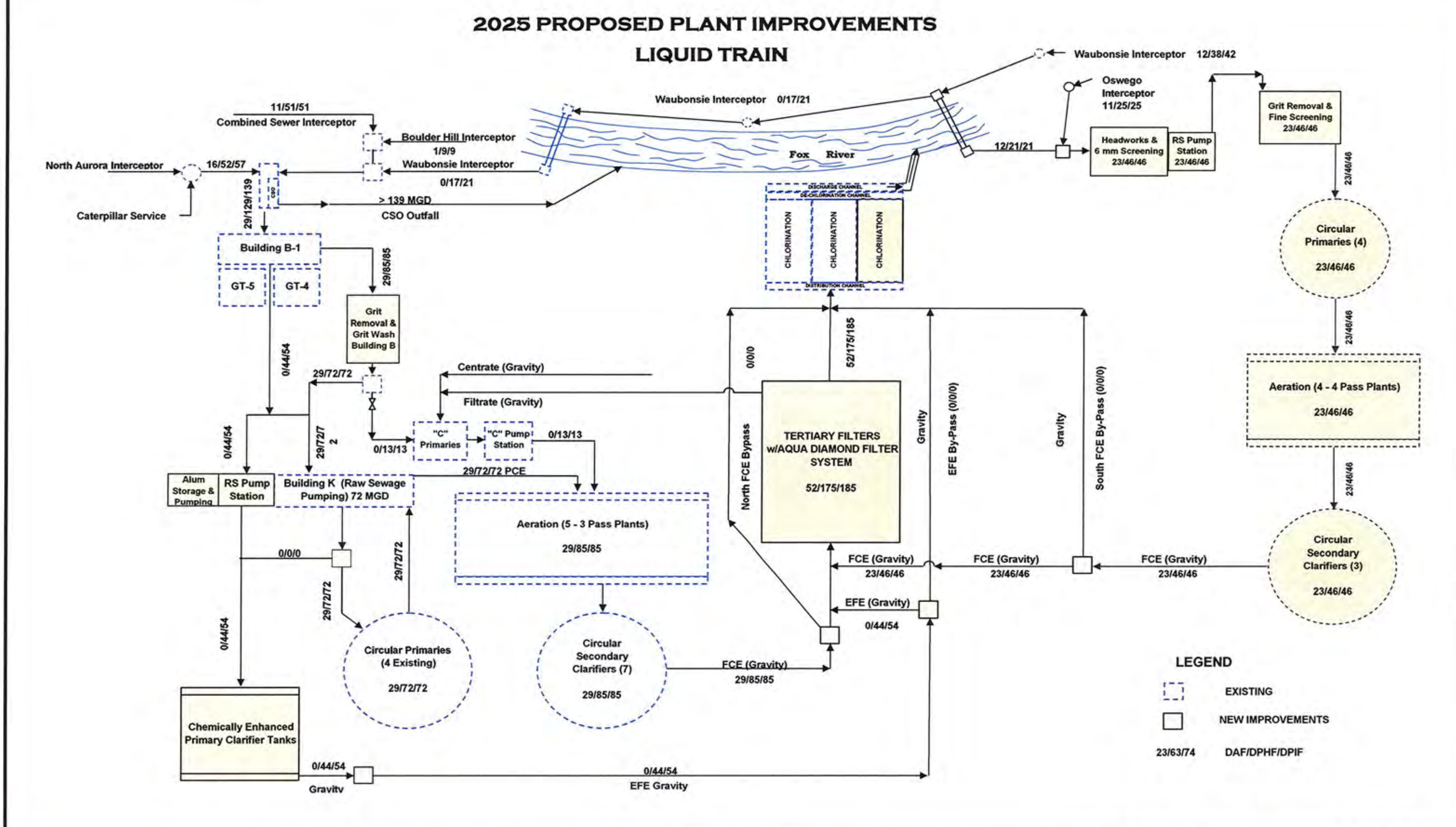
The purpose of the CEPT system is to provide primary treatment to design peak instantaneous 5-year storm flows to the WWTP that are in excess of the existing 85 mgd and future 131 mgd secondary treatment capacity. A new raw sewage pump station (currently under construction) and seven chemically enhanced primary clarifiers (design complete) will be constructed on the north side of the existing North Facility. The purpose of the addition of coagulants to the primary treatment step is to improve solids capture, reduce the HRT requirement, and therefore reduce the required footprint of the structure. Variable speed pumps will handle a wide variety of peak storm flows up to the projected peak 5-year storm instantaneous flows and deliver the water to the new primaries. These improvements will decrease the excessive loading on the existing treatment facilities and will provide up to 54 mgd of additional primary treatment. The captured solids will be returned to the WWTP for full treatment as storm flows subside. The treated effluent from the CEPT will then flow through tertiary filters and disinfection before being discharged through the treated FMWRD Outfall 001.

8.2.2.2 Existing North Facility Upgrades and New South Facility Addition

The 2005 Master Plan recommended the expansion of the WWTP to accommodate peak storm water flows as well as growth in the Facility Planning Area (FPA). By expanding the plant facility to the southern areas of the existing plant site, both hydraulic and organic concerns can be addressed, as well as the capability of nutrient removal. The expansion is planned to be accomplished in six phases between the years 2005 through 2025. Phases 1 and 2 target the hydraulic issues associated with excessive storm flows, while phases 3 through 6 address both the hydraulic and organic concerns associated with growth in the FPA as well as nutrient removal. **Figure 8-5** "2025 Proposed Plant Improvements" depicts the liquid train for the proposed WWTP improvements.

Phase 1 of the treatment plant improvements recommended in the 2005 Master Plan includes the CEPT system discussed above. Phase 1 improvements that support the CEPT system began in 2005 and include a new raw sewage pumping station, 60" diameter gravity sewer, 54" force main, and an expansion to the chlorination/de-chlorination facility. Phase 1 also included construction of the solids handling facilities (TPAD) and the incorporation of a new control system that will improve plant operation and data reporting capability. The control of wet-well levels will be improved by permitting control by an operator at a central location. Phase 1 is planned for completion in 2012.

Facility Planning for Phase 2 began in 2008 and includes the first stage of the South Facility. This improvement will provide additional hydraulic capacity as well as the capability of nutrient removal to the existing plant. This work includes raw sewage pumping, grit removal, primary clarifiers, secondary treatment, final clarifiers and solids thickening.



WALTER E. DEUCHLER ASSOCIATES, INC.
Consulting Engineers - Aurora, Illinois

FIGURE 8-5

FMWRD - LONG TERM CONTROL PLAN
2025 PROPOSED PLANT IMPROVEMENTS

SHEET 1 OF 1

DATE 6/15/2009 | DESIGNED GSL | DRAWN GSL | APPROVED | BOOK | SCALE None | CAD DWG. | JOB NO. 111-06060-00

8.2.2.3 Control System

A new control system (SCADA) on a fiber optic network was recently installed at the existing North Facility. This system monitors the plant mechanical systems, electrical systems and other physical conditions while also providing limited control to several plant processes. It also functions to improve record keeping, time keeping, trending and communications during excess flow events and provides automated controls to facilitate these functions. The SCADA system will continue to be upgraded to allow for further automation and control of plant processes.

8.2.2.4 Tertiary Filtration

The original tertiary filtration system consisted of nine traveling bridge filters. The existing equipment is nearly 30 years old, maintenance intensive and in need of major rebuilding. In the last several years, the FMWRD has retrofitted six of the nine filters with 80 foot-long AquaDiamond cloth media filters and plans to replace two more by 2012.

8.2.3 Solids and Floatables Control

Solids and floatables on the receiving waters come from a number of sources including combined sewers, storm water outfalls, and littering and dumping directly into and along the receiving waters.

Implementation of the recommended control plan will virtually eliminate solids and floatables from FMWRD's CSO discharge because the majority of overflow will be captured and treated for up to a 5-year storm event. The first flush of combined sewer, which contains the vast majority of solids and floatables, will be captured and treated. Overflows from the proposed control system will typically occur near the end of extreme storm events after most of the solids and floatables have been washed from the streets and captured by the control facilities. Flows which exceed the capacity of the recommended control plan will continue to be screened be an existing manually cleaned bar screen prior to discharge through Outfall 002, thus preventing solids and floatables from discharging in to the Fox River.

8.2.4 *Expandability of the Recommended Plan*

The 1994 CSO Control Policy requires that control plans be expandable such that higher levels of control can be implemented if required in the future. The recommended LTCP provides a great deal of flexibility for future expansion including, but not limited to, the following:

- Additional primary tanks to the proposed CEPT system to increase the primary treatment capacity,
- Additional expansion of the South Facility for future growth and peak flows,
- Incorporation of "High Rate Treatment" improvements into the proposed CEPT system to improve primary treatment capability and increase capacity,
- Expansion to or additional of flow equalization basins in wastewater collection systems
- Emergence of new technologies, and
- Combinations of the above.

The selection of a method of expansion would depend on the desired goal and would need to be determined on a case by case basis.

8.2.5 *Other Activities Benefiting CSO Control*

Activities by the City of Aurora (COA) and other municipalities may improve the degree of CSO control provided by the recommended plan. These activities are typically aimed at reducing storm water runoff, but may also include other flow reduction measures. Improvements recommended in the COA LTCP may reduce the hydraulic load on the CSS and the original combined sewer interceptor (OCSI) through the reduction of storm flows in the system and thereby reducing overflows. Currently, the COA has two partial sewer separation projects planned for construction in 2010 and has been requiring new development and redevelopment projects within the CSS area to employ "Inflow Control" and "Low Impact Development" methods. The COA is also considering the addition of combined sewer storage and treatment in the preparation of their LTCP, which may also reduce hydraulic surges in the OCSI during storm events. The FMWRD LTCP conservatively assumed full flow from the OCSI without the benefit of these potential flow reducing improvements.

In addition, the COA and other municipalities within the FMWRD FPA continue to monitor and address I&I within their wastewater collection systems as part of their regular operation and maintenance. I&I analysis, sewer system evaluation surveys and sewer rehabilitation are ongoing efforts undertaken by each of the seven communities served by the FMWRD. The recommended FMWRD LTCP does not take credit for any of these activities due to no firm information as to when or to what degree the activities will be implemented or how effective they may be.

As a result, any degree of implementation or effectiveness of the COA LTCP or I&I reduction by the various communities would serve to improve the level of CSO control provided by the recommended FMWRD LTCP.

8.3 Benefits of Recommended Control Plan

The selected CSO control program is expected to provide significant benefits to the citizens of the District and to all who use and enjoy the Fox River.

8.3.1 CSO Overflow Reduction

The Presumptive Approach in the 1994 CSO Control Policy requires reducing the CSOs to meet one of three criteria, the first of which is no more than an average of four to six overflow events per year. By meeting this criteria there is presumed to be an adequate level of control to meet applicable state and local WQS in the receiving stream. As shown in **Table 8-1,** there will be no CSO discharges up to a 5-year storm event.

Table 8-1

FUTURE AVERAGE AND WET WEATHER FLOW SCENARIOS

	Average	Wet Weather Event Recurrence and Flow			
		3 MONTH	1 YEAR	5 YEAR	10 YEAR
Flow, mgd	52.67	129.54	158.59	174.35	185.55
CSO Discharge, MG	None	None	None	None	0.46

It should be noted that this LTCP provides proposed improvements for treatment of flows up to a 5-year storm recurrence. The projected design maximum flow for a 5-year storm is approximately 185 mgd. Biological/secondary treatment will be provided for up to 131 mgd (85 mgd at the existing North Facility and 46 mgd at the proposed South Facility), which is slightly greater than a 3-month storm recurrence. The remaining 54 mgd will receive treatment through the proposed chemically enhanced primary treatment (CEPT) facility. The effluent from the CEPT system will flow to a junction box were a portion or all of the flow may receive further treatment through the tertiary filters. All flow up to 185 mgd will be chlorinated and de-chlorinated prior to discharge at the treated FMWRD Outfall 001.

In addition to demonstrating reductions in overflows from current levels, USEPA's CSO Control Policy calls for calculating the percentage of combined sewage that is captured for treatment in the combined sewer system. After implementation of the recommended LTCP, the CSO capture rate is predicted to be 98% when calculated using the 2007 through 2009 storm events. This is far in excess of USEPA's guideline of 85% capture under the presumptive approach.

8.3.2 *Water Quality*

The effect of the recommended CSO controls on the ability to meet water quality standards were evaluated by modeling the current and future loads attributed to both FMWRD's treated effluent at Outfall 001 and CSO discharges at Outfall 002. Impacts were modeled both at existing and proposed discharge conditions using over sixty different modeling scenarios. The various scenarios included impacts based on varying river conditions (low, average and high), rain conditions (3-month, 1-year, 5-year and 10-year rain events) and upstream boundary concentrations of pollutants in the Fox River (low and high). These conditions were evaluated for several parameters at varying concentration (low, average and high) including fecal coliform, BOD_5, total suspended solids, nitrate, ammonia, total phosphorus and dissolved oxygen. Details of this modeling effort including model development, evaluation of impacts, improvements to water quality and a summary of these modeling efforts can be found in **Appendix I**. As previously noted, modeling efforts are based on the existing boundary conditions at Mill Street as discussed in Section 2 and do not include any changes to the river water quality that may occur upstream of FMWRD as a result of reductions in pollutants to the river that may occur in the future.

Overall, simulations showed that the recommended LTCP will result in an improvement of water quality when compared to water quality resulting from existing conditions for storms of the same return interval. Model simulations indicate that proposed FMWRD discharges under the normal treatment level:

- Do not cause an exceedance of the water quality standard for fecal coliforms during 5-year and smaller storms,
- Would likely not cause exceedances of ammonia water quality standards unless pH and temperature reach high values or ammonia concentrations in the Fox River are high upstream of the FMWRD,
- Would likely cause exceedance of the total phosphorus listing value only when no chemical treatment is applied in CEPT system and large storms occur during low flows and there are high phosphorus concentrations in the Fox River upstream of the FMWRD, and
- Would not cause exceedances of the total suspended solids and nitrate nitrogen listing values.

The goal of the CSO Control Policy is to limit the number of overflows to four to six per year. The FMWRD is providing full biological treatment for all storms of a corresponding return period (3-months) and a partial treatment including full disinfection for all storms with return periods between 3-months and 5-years. Proposed modifications will result in far greater positive effect on Fox River water quality than the minimum required by the CSO Control Policy.

8.3.3 WWTP Effluent Quality

Table 8-2 shows projected influent and effluent for existing and future flows based on 3-month 1-year, 5-year and 10-year rain events.

TABLE 8-2

PROJECTED FUTURE INFLUENT PARAMETERS

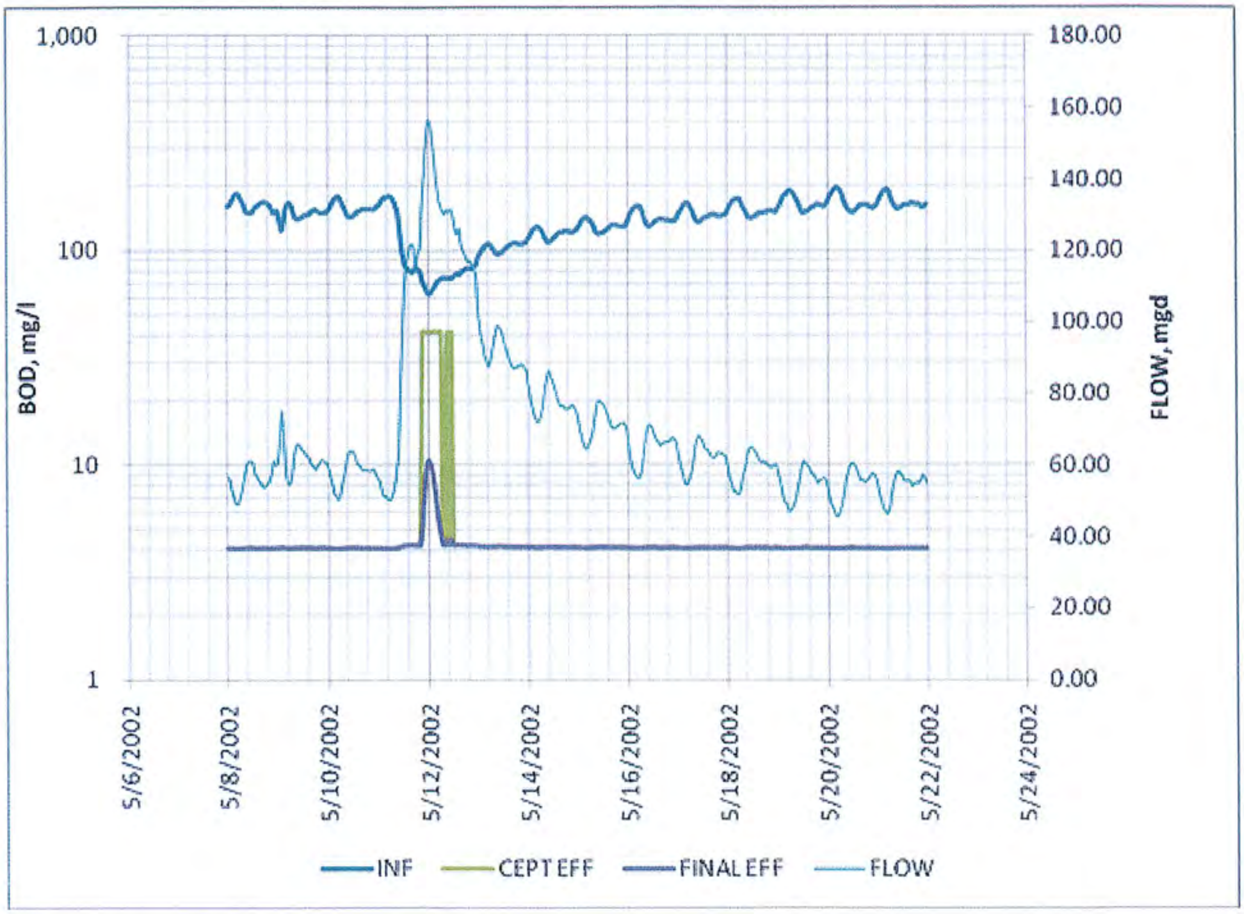
STORM EVENT		DAF	3 Month	1 Year	5 Year	10 Year
FLOW	MGD	**52.62**	**129.54**	**158.59**	**174.35**	**185.55**
BOD	mg/l	175.00	73.00	62.00	58.00	56.00
	lbs/d	76,799	78,867	82,004	84,337	86,659
TSS	mg/l	183.00	77.00	65.00	61.00	59.00
	lbs/d	80,310	83,188	85,972	88,699	91,302
NH3	mg/l	14.97	6.25	5.25	5.10	4.90
	lbs/d	6,570	6,752	6,944	7,416	7,583
ORG-N	mg/l	11.81	4.93	4.14	4.02	3.87
	lbs/d	5,183	5,327	5,478	5,850	5,982
NO3-N	mg/l	0.44	0.18	0.15	0.15	0.14
	lbs/d	193	198	204	218	223
TP	mg/l	6.00	2.52	2.12	1.99	1.93
	lbs/d	2,633	2,723	2,804	2,894	2,987
TN	mg/l	27.22	11.36	9.55	9.27	8.91
	lbs/d	11,946	12,278	12,626	13,484	13,788
PROJECTED EFFLUENT PARAMETERS **(Flow Weighted Based on Treatment Plant Effluent, and CEPT Effluent[1], and CSO Discharge[2])**						
BOD	mg/l	4.10	4.24	10.81	13.46	13.50
	lbs/d	1,799	4,583	14,304	19,578	20,891
TSS	mg/l	3.60	11.37	20.89	24.70	26.57
	lbs/d	1,580	12,284	27,634	35,923	38,632
NH3	mg/l	0.53	0.76	1.64	1.91	2.00
	lbs/d	232	820	2,174	2,778	2,907
ORG-N	mg/l	1.16	1.67	2.28	2.46	2.62
	lbs/d	510	1,805	3,020	3,570	3,810
NO3-N	mg/l	6.24	2.02	1.32	1.08	1.06
	lbs/d	2,739	2,181	1,748	1,573	1,544
TP	mg/l	0.73	1.27	1.31	1.36	1.50
	lbs/d	321	1,372	1,737	1,971	2,186
TN	mg/l	7.93	4.45	5.25	5.45	5.68
	lbs/d	3,481	4,805	6,942	7,921	8,261

[1] CEPT TSS effluent based on Title 35: Section 370 Appendix E. BOD Effluent from CEPT assumed to be 80% of TSS removal. No other removals were approximated for the CEPT. With alum and polymer addition, these removals could be significantly improved.
[2] There will not be a discharge through the permitted CSO Outfall for 3 month, 1 year, and 5 year storms, and for only a 2 hour duration for the 10 year storm.

The effluent from the CEPT process was conservatively assumed to remove only BOD and TSS, and has been designed at a peak hour surface overflow rate of 1,800 gpd/ft². The removal rates were based on Section 370 of the 35 IL Administrative Code Subtitle C, Chapter II that relates surface overflow rate to percent removal, which are based on primary treatment without the addition of chemical. With chemical addition (polymer and alum) much greater removal rates can be achieved. **Figure 8-6** shows influent and effluent BOD for the 1-year storm event.

Figure 8-6

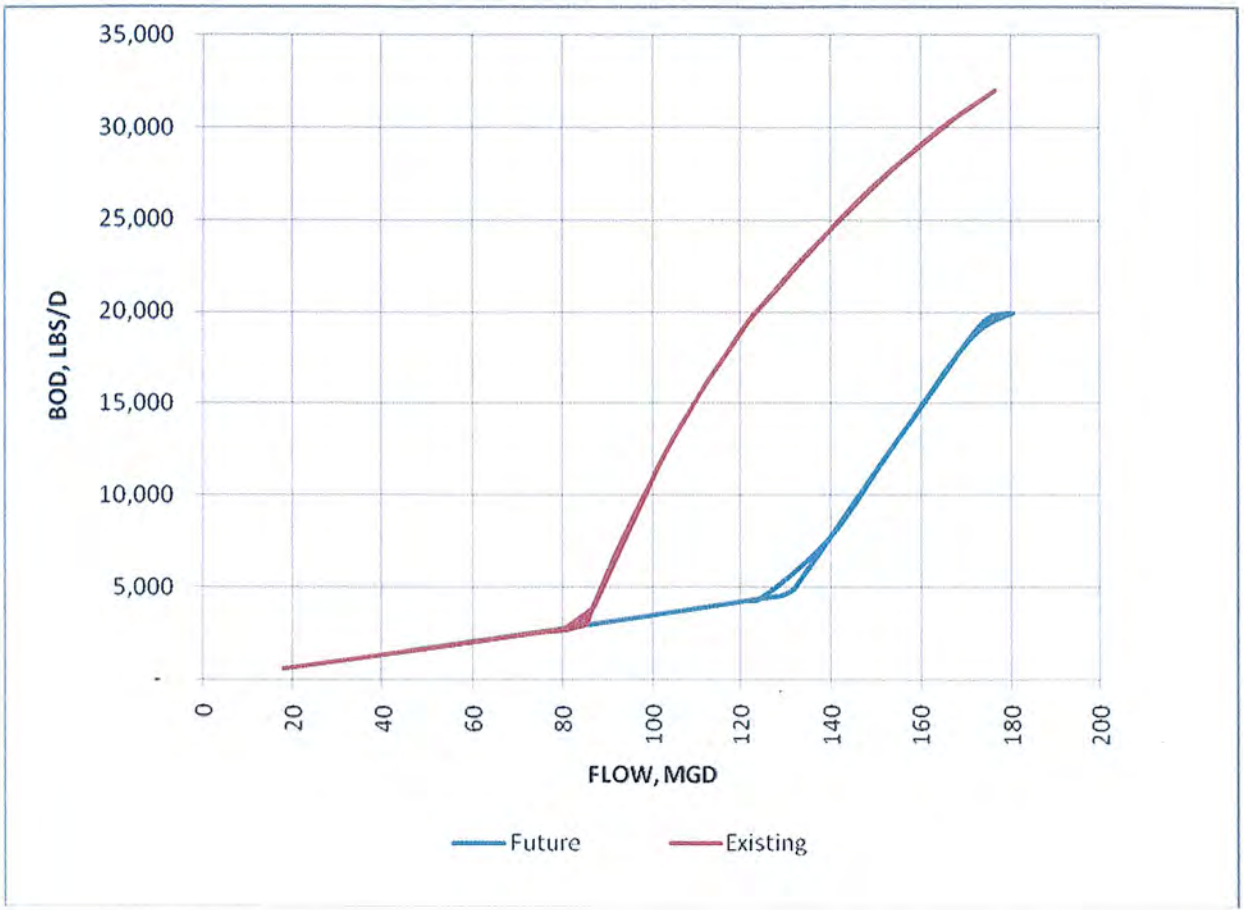
2025 Influent & Effluent BOD – 1-Year Storm Event



Based on the improvments outlined in the 2005 Master Plan, there will be a dramatic decrease in BOD loading to the Fox River as a result of the implementation of this LTCP. **Figure 8-7** illustrates the reduction in effluent BOD_5 loading to the river for existing and future conditions at the 10-year storm. Under existing conditions, there is an uncontrolled CSO discharge to the river at

85 mgd. Under future conditions, there is treatment of this discharge through the CEPT. At 180 mgd, this reduction is equivalent to approximately 38.5%.

Figure 8-7
2025 - Improvement to BOD Discharge



8.4 Opinion of Probable Costs

The major elements of the recommended LTCP and their anticipated costs were developed in preparation of the 2005 Master Plan and the 2005 Wet Weather Facilities Study. These costs have been updated and are summarized in **Table 8-3**.

Table 8-3
Recommended Control Program Elements and Opinion of Probable Costs

Component	Capital Cost Opinion	Annual O & M
System Wide	Jan. 2009 CCI - (11,842.39)	
FEBs ➢ North Aurora Satellite Flow Equalization Basin ➢ Waubonsie Satellite Flow Equalization Basin	$53,400,000	$152,448
FMWRD Wastewater Treatment Plant		
➢ Chemically Enhanced Primary Treatment to be located at the WWTP site. ➢ Waste Treatment Plant Expansion	$53,600,000 $ 150,800,000	$ 159,772 $ 24,333,000
Grand Total	**$257,800,000**	**$24,658,897**

It should be noted that a portion of the above work (±$44 million) has been completed or is presently under construction as part of Phase 1, leaving $213,800,000 yet to be completed. The remaining work will be addressed further in Section 9 – Financial Capability to Implement CSO Controls.

9.0 FINANCIAL CAPABILITY TO IMPLEMENT CSO CONTROLS

9.1 Introduction

As part of developing the LTCP, the ability of the FMWRD to finance the final recommendations needs to be considered. Developing a financing methodology that will be fair and equitable to sewer patrons is one of the most challenging tasks facing CSO communities today. CSO control projects are known to require a large capital investment. Often times these projects are funded with loans that must be repaid over a twenty year period. A detailed affordability analysis is necessary to identify and assess the impact of CSO control costs on the fiscal health of the FMWRD and the impact that implementation of this plan will have on its sewer patrons. Guidance procedures for assessing financial capability as outlined in USEPA's "Combined Sewer Overflows Guidance for Financial Capability Assessment and Schedule Development" have been used in the preparation of this section.

Financing capability must be considered along with environmental issues when determining both the proper and effective CSO control improvements included in a CSO LTCP and the implementation schedule for the selected plan. The CSO Control Policy *"… recognizes that financial considerations are a major factor affecting the implementation of CSO controls …* and *… allows consideration of a permittee's financial capability in connection with the long-term CSO control planning effort, WQS review, and negotiation of enforceable schedules."* The FMWRD should investigate both the total cost of the various alternatives and its ability to absorb the costs.

9.2 Scope of Affordability Analysis

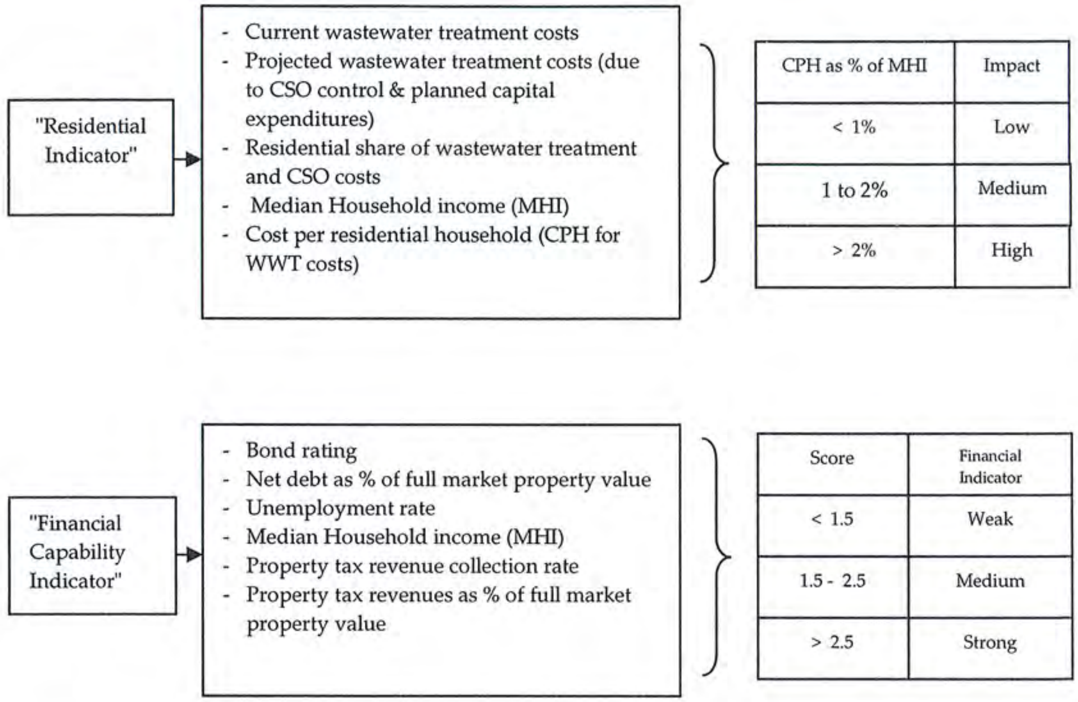
The USEPA's "Guidance for Financial Capability Assessment and Schedule Development" document , presents a two-phased approach to assessing the permittee's financial capability. The first phase identifies the combined impact of wastewater and CSO control costs on individual households served by the FMWRD. The second phase examines the debt, socioeconomic, and financial conditions of the FMWRD. The results of the two-phase analysis are combined in a financial matrix to assess the financial burden of the CSO control costs and establish reasonable schedules to implement the CSO controls.

Phase 1 calculates the "Residential Indicator", which measures the financial impact of current and proposed CSO controls on residential sewer patrons. The indicator will represent the average cost per household (CPH) within the FMWRD for WWTP costs and CSO controls costs as a percentage of the local median household income (MHI). The CPH is used in conjunction with the MHI to estimate residential impacts. USEPA has determined that residential impacts are low if the CPH is less than 1% of the MHI, medium if the CPH is between 1% and 2% of the MHI, and high if the CPH is greater than 2% of the MHI.

Phase 2 assesses the financial condition of the FMWRD by calculating the "Financial Capability Indicator". This indicator measures the debt burden, bond rating, unemployment rate, property tax collection rates, MHI and other factors to develop a numerical score. USEPA has determined that the financial capability is low if the score is less than 1.5, medium if the score is between 1.5 and 2.5, and strong if the score is greater than 2.5.

The Residential and Financial Capability Indicators described above are also shown graphically in **Figure 9-1**:

FIGURE 9-1
EPA's Residential and Financial Capability Indicators



After the residential and financial capability indicators are developed, they are combined into a financial capability matrix. The matrix provides USEPA's assessment of the overall burden associated with funding CSO controls. The financial capability matrix is depicted in **Table 9-1**.

TABLE 9-1
EPA's Financial Capability Matrix

	Residential Indicator (Cost per Household as % of Median Household Income)		
Financial Capability Indicator	Low (Below 1.0%)	Medium (Between 1.0% and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Medium (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

The FMWRD has currently completed the first 5 years of a 20-year capital improvement program as recommended in the 2005 Master Plan, which was initiated to address future growth, CSO control, and potential upcoming nutrient standards. This capital improvement program used a planning period from 2005 to 2025, which has been used extensively throughout this report. However, for the purposes of financial planning presented within this document, a 20-year planning period from 2009 to 2028 has been used. This financial planning period was primarily used for the purpose of developing present worth costs and determining the financial impact to current user rates in implementing the remaining recommended CSO controls.

9.3 Residential Indicator

The residential indicator measures the financial impact of the costs of implementing current and proposed wastewater treatment improvements and CSO controls on a per household basis. The development of this indicator requires the determination of the Median Household Income (MHI) of patron residences in the FMWRD and the Cost Per Household (CPH) for the improvements.

Of all the municipalities served within the FMWRD facility planning area, the City of Aurora (COA) is the largest (accounting for nearly 70% of the total flow to the FMWRD WWTP) and only municipality with a CSS. As such, the COA is also required to develop its own recommended CSO LTCP, estimated costs and financial impact to its patrons. Therefore, the development of the CPH within the FMWRD planning area must examine the CPH within the City of Aurora to ensure that those patrons are being treated fairly and equitably and not subjected to undue economic hardship in the implementation of both the FMWRD and COA recommended CSO controls.

9.3.1 Determination of MHI

According to the U.S. Census Bureau, the estimated MHI for the COA was $62,360 in 2008 (see **Appendix K**). The 2008 MHI was then inflated by the Customer Price Index to 2009 dollars, resulting in an MHI of $62,613. Also, according to the U.S. Census Bureau's 2008 estimate, 11.3% of the residents of Aurora live in poverty, which is defined as a poverty MHI of $26,388 per year.

9.3.2 Development of CPH

The development of the cost per household (CPH) for COA residents within the FMWRD service area takes into consideration the following three cost items for both the FMWRD and COA:

1. Existing wastewater/sewer fees,
2. Future capital costs for non-CSO related wastewater/sewer projects, and
3. Capital costs for implementation of recommended CSO controls.

Financial data pertaining to COA costs was provided by the COA. All financial data pertaining to FMWRD costs was developed from the "Projected Financial Statements and Accountant's Report" prepared in 2009 by Sikich LLP for the FMWRD (see **Appendix L**). All costs are shown as present worth (2009) dollars.

9.3.2.1 Existing Monthly Sewer Charges

The historical water usage per residential customer in the FMWRD service area has averaged 7,800 gallons per month. The existing FMWRD sewer rate is $3.27 per 1000 gallons of water usage, which yields $25.51 per household. For this same average water usage, the COA monthly sewer rate would equal $8.45 for wastewater collection/conveyance plus a $3.45 flat fee for stormwater (which is used for sewer separation projects). Therefore, the total average monthly bill for a residential customer in the COA is $37.41 ($25.51 + $8.45 + $3.45), which equals 0.72% of MHI.

9.3.2.2 *Future Costs for Non-CSO Improvements*

Both the FMWRD and COA have planned capital improvement programs to address future capital costs associated with wastewater infrastructure growth and system improvements, in addition to complying with potential new regulatory mandates. For example, the FMWRD's 20-year capital improvement program includes capital projects such as WWTP and interceptor system component upgrades, a new laboratory facility and treated effluent reuse facilities. The future capital improvement costs for these non-CSO related projects must be included in the financial impact determination as both the FMWRD and COA must pay for these wastewater responsibilities over and above the cost associated with CSO control.

FMWRD has estimated their capital improvement projects over the next 20 years to cost $127,300,000. Converting these costs to present worth service fees to eliminate debt using a 6.5% interest rate, 20-year bond repayment schedule and current total of 75,325 FMWRD residential customers results in a monthly fee of $12.79.

COA has estimated their capital improvement projects over the next 20 years to cost $41,000,000. Converting these costs to present worth service fees to eliminate debt using a 6.5% interest rate, 20-year bond repayment schedule and current total of 45,187 COA residential customers results in a monthly fee of $6.86.

Therefore, the total of these additional future costs for a residential customer in the COA are estimated to be $19.65 ($12.79 + $6.86), which equals 0.38% of MHI.

9.3.2.3 *Costs for Selected LTCP Improvements*

The recommended CSO controls for the FMWRD as described in Section 8 is estimated to cost $257,800,000. However, approximately $44,000,000 of this total has been completed or is presently under construction as part of Phase 1 of the 2005 Master Plan. Funding for these improvements are already incorporated in the existing FMWRD monthly sewer charges discussed in Section 9.3.2.1 through previous sewer rate increases. Therefore, approximately $213,800,000 of the recommended FMWRD CSO controls remains to be funded. Converting these costs to present worth service fees to eliminate debt using a 6.5% interest rate, 20-year bond repayment schedule and current total of 75,325 FMWRD residential customers results in a monthly fee of $21.47.

COA has estimated their recommended CSO controls to cost $120,300,000. Converting these costs to present worth service fees to eliminate debt using a 6.5% interest rate, 20-year bond repayment schedule and current total of 45,187 COA residential customers results in a monthly fee of $20.14.

Therefore, the total costs for both recommended CSO controls for a residential customer in the COA are estimated to be $41.61 ($21.47 + $20.14), which equals 0.80% of MHI.

A summary of the total CPH and determination of the Residential Indicator are shown in **Table 9-2.**

Table 9-2

Residential Indicator Determination

1 Calculate existing monthly sanitary sewer charges / patron Use 7800 gals per meter per month			
	FMWRD	$25.51	
	COA Wastewater Collection / Conveyance	$8.45	
	COA Stormwater	$3.45	
	Sub-Total		$37.41
2 Calculate Future Costs for Non-CSO Improvements / patron			
	FMWRD	$12.79	
	COA Wastewater Collection / Conveyance	$6.86	
	Sub-Total		$19.65
3 Calculate Costs for CSO LTCP Improvements / patron			
	FMWRD	$21.47	
	COA	$20.14	
	Sub-Total		$41.61
4 Calculate actual % of COA MHI			
	2009 COA MHI =	$62,613	
	2009 COA poverty MHI =	$26,388	
	Total CPH per month		**$98.67**
	Total CPH per year		$1,184.04
	% of COA MHI		**1.89%**
	% of COA poverty MHI		**4.49%**

9.4 Financial Capability Indicator

The financial capability indicator score is determined by evaluating the existing debt burden, socioeconomic conditions, and financial operations of the FMWRD. The FMWRD's ability to issue new debt to finance the desired wastewater treatment plant and CSO control improvements was assessed by determining bond ratings and overall debt as a percentage of full market value in the FPA. Socioeconomic conditions within the FPA were assessed by examining the current unemployment rate and MHI. The ability of the FMWRD to manage financial operations was evaluated by determining the property tax collection rate and property tax revenues as a percentage of full market property value. A value range for each of the indicators described above is presented in the following discussion and characterizes whether the residential patrons are in a "Weak", "Mid-Range" or "Strong" position to bear the cost to finance the proposed debt burden, socioeconomic conditions, and financial operations of the FMWRD. This cost position rating is relative to national benchmarks described in the USEPA guidance document.

9.4.1 *Debt Indicators*

The debt indicators described below were assessed to determine the FMWRD's current debt burden conditions and their ability to issue new debt.

- Bond Rating – General obligation (GO) bonds are typically the primary long-term debt funding mechanism for most local governments that are repaid with revenues generated typically from property taxes. GO bond ratings reflect financial and socioeconomic conditions experienced by the local government as a whole. Revenue Bond ratings, by comparison, reflect the financial conditions and management capability of the local government. This bond type is repaid with revenues typically generated from user fees. Bond ratings are typically issued by one of the following firms: Moody's, Standard & Poors or Fitch after a thorough analysis of the local governments' current financial conditions.

  According to criteria in the guidance document, the rating of the most recent bonds issued by the FMWRD is to be used to determine a bond rating indicator for the proposed capital improvements. The FMWRD has not had a bond issue since 1978 and has not had a bond rating since then. However, the 1978 bond rating was AA. This translates into a "Strong" financial indicator because the rating is between AAA-A per the USEPA guidance document.

- Overall Debt as a Percent of Full Market Value – The overall debt indicator discussed herein is debt that is to be repaid by property taxes from within the FMWRD service area. It excludes debt that is repaid by special user fees (e.g. revenue debt). Currently, the FMWRD does not have debt that is to be repaid with property taxes, however, the FMWRD is authorized by state law to use GO bonds to finance long-term improvements if needed.

  This indicator provides a measure of the debt burden on residents within the FMWRD service area and measures the ability of the FMWRD to issue additional debt. It includes debt issued directly by the FMWRD and debt of overlapping entities such as counties, cities and villages, school districts, park districts, etc. This indicator compares the level of debt owed by the service area population with the full market value of real property and serves as a measure of financial wealth within the FMWRD. **Table 9-3** shows a compilation of the debt of overlapping political jurisdictions.

  As exhibited in **Table 9-3**, the overall net debt is found to be 1.12% when comparing the net debt to the full market value. This is a "Strong" financial indicator because the local debt is less than 2% of the full market property value per the USEPA guidance document.

Table 9-3
Overall Net Debt as a Percent of Full Market Property Value

		Line No.
° Direct Net Debt (G.O. Bonds Excluding Double-Barreled Bonds)	$ 0	401
° Debt of Overlapping Entities (Proportionate Share of Multijurisdictional Debt)	$ 2,811,373,017	402
° Overall Net Debt (Lines 401 + 402)	$ 2,811,373,017	403
° Market Value of Property	$ 251,428,229,523	404
° Overall Net Debt as a Percent of Full Market Property Value (Line 403 divided by Line 404 x 100)	1.12%	405

9.4.2 *Socioeconomic Indicators*

- Unemployment Rate – The unemployment rate as of November 2009 in the COA was 12.2%. The national unemployment rate was 9.8%. The financial indicator for the local rate of unemployment would be considered "Weak" because the local rate is greater than 1% above the national average per the USEPA guidance document.

- Median Household Income

  As previously discussed, the MHI for the COA in 2009 was determined to be $62,613. The national average MHI in November 2009 was approximately $64,000. A financial indicator of "Mid-Range" is determined because the local MHI is within than 25% of the national average per the USEPA guidance document.

9.4.3 *Financial Management Indicators*

- Property Tax Revenues as a Percent of Full Market Property Value – The amount of property tax burden that political entities may place upon their constituents is limited by state law. The burden is measured by dividing the annual property tax revenue by the value of real property and property tax collection rate within the political boundaries. This financial indicator is sometimes referred to as the "property tax burden" since it indicates the funding capacity available to support debt based upon the wealth of the political entity. It will also reflect the effectiveness of management in providing community services. The property tax burden is presented below in **Table 9-4**.

Table 9-4
Property Tax Revenues as a Percent of Full Market Value

		Line No.
◦ Full Market Value of Real Property	$ 251,428,229,523	701
◦ Property Tax Revenues	$ 1,359,676,668	702
◦ Property Tax Revenue as a Percent of Full Market Value	0.54078%	703

The worksheet above calculated a property tax burden of 0.54%, which is below the national average of 2%, indicating a rating of "Strong" per the USEPA guidance document.

- Property Tax Revenue Collection Rate – The property tax revenue collection rate is an indicator of the efficiency of the tax collection system and the acceptability of tax levels to the residents of the FMWRD. **Table 9-5** lists the individual county collection rates.

Table 9-5
Tax Revenue Collection Rate

	County	Collection Rate, %
1.	Kane	99.79%
2.	Kendall	99.55%
3.	DuPage	99.69%
4.	Will	99.74%
	Weighted Average	99.69%

The weighted tax collection rate of 99.69% is above the national average of 98% indicating a rating of "Strong" per the USEPA guidance document.

9.4.4 *Analyzing Permittee Financial Capability Indicators*

Ratings of the six indicators discussed in the previous sections are used to generate an overall score of the FMWRD's financial capability. Each indicator is given a numeric value of either 1, 2 or 3 based on a rating of "Weak", "Mid-Range" or "Strong", respectively. The total sum of the ratings is divided by the total number of indicators to determine the Financial Capability Indicator of the FMWRD. This is summarized in **Table 9-6**

Table 9-6
Summary of FMWRD Financial Capability Indicators

Indicator (from EPA Worksheet)	Actual Score for Median Household Incomes	Score	Line No.
Bond Rating (in 1978)	AA – Strong between AAA-A	3	901
Overall Net Debt as a Percent of Full Market Property Value	1.12% - Strong below National Average of 2%	3	902
Unemployment Rate (Nov. 2009)	12.2% - Weak >1% above National Average of 9.8%	1	903
Median Household Income (2009)	$62,613 - Midrange within 25% of National MHI	2	904
Property Tax Revenues as a Percent of Full Market Property Value	0.54% - Strong below National Average of 2%	3	905
Property Tax Revenue Collection Rate	99.69% - Strong - above National Average of 98%	3	906
Permittee Indicators Score (Sum of Lines 901-906 ÷ Number of Entries)	6 Entries	**2.5**	907

Therefore, the financial capability indicator score for the FMWRD has been determined to be 2.5.

9.5 Combined Residential and Financial Capability Matrix

The Residential Indicator and the Financial Capability Indicators are combined in the Financial Capability Matrix (see **Table 9-1**) to evaluate the level of financial burden that CSO controls might impose on the FMWRD. The Median Household Residential Indicator score is given on line 1001 and the Financial Capability Indicator is given in line 1002 of **Table 9-7**. The Financial Capability Matrix indicated that implementation of the CSO control would be a "Medium Burden" for COA residents with a median household income level. However, the Financial Capability Matrix also indicates that implementation of the CSO control would be a "High Burden" for COA residents with a poverty income level. This translates to over 20,000 residents that will be disproportionately financially impacted by the future CSO programs.

Table 9-7

FINANCIAL CAPABILITY MATRIX OVERALL SCORE

For Median Household Incomes		Line No.
◦ Residential Indicator Score	1.89 %	1001
◦ Permittee Financial Capability Indicators Score	2.5	1002
◦ Financial Capability Matrix Category	Medium Burden	1003

For Poverty Level Incomes		Line No.
◦ Residential Indicator Score	4.49 %	1001a
◦ Permittee Financial Capability Indicators Score	2.5	1002a
◦ Financial Capability Matrix Category	High Burden	1003a

Overall, assuming moderate growth, the FMWRD would have to raise its sewer rates approximately 5% each year for the next 20 years to fully fund this CSO LTCP program, providing that bonds/loans can be secured. This is also assuming that all funding sources would remain consistent. Given the financial challenges of the economic climate in the past two years (2008 and 2009) and continued widespread economic hardship, funding of this program may be difficult.

9.6 CSO Schedule Development

Permittee's with combined sewer systems are expected to develop long-term control plans (LTCPs) that include public participation, monitoring of CSOs and their impacts, evaluation and selection of control alternatives, and implementation schedules for long-term controls. Among other components, the LTCP contains dates for the implementation and financing schedules to design and construct the needed CSO controls. The implementation schedule may be phased based on the relative importance of adverse impacts on WQS and designated uses, priority projects identified in the long-term plan, and on a permittee's financial capability. The following environmental and financial considerations may affect the phasing of an implementation schedule for CSO controls:

- Eliminating overflows to sensitive areas
- Use impairment
- Financial Capability
- Grant and loan availability
- Previous and current sewer user fees and rate structures
- Other viable funding mechanisms and sources of funding

The following discussion provides more information on environmental and financial considerations that affect the implementation schedule for CSO controls.

9.6.1 *Environmental Considerations*

The LTCP must give the highest priority to "sensitive areas," and the implementation schedule should sequence projects to mitigate impacts on sensitive areas as early as possible. It was determined in Section 4 that FMWRD Outfall 002 is not located within a sensitive area. In addition, the LTCP should also give priority to receiving waters that experience recurring adverse impacts from CSOs on aquatic life, human health or aesthetics. The State of Illinois has identified the Fox River as impaired and has placed it on Illinois' 303(d) list, however, CSOs are one of many contributors to the impairment.

9.6.2 *Primary Financial Considerations*

- Financial Capability

The development of the implementation schedule for CSO control is an important and significant part of the overall LTCP. The USEPA guidance document has presented the following general scheduling boundaries as exhibited in **Table 9-8.**

Table 9-8
Financial Capability General Scheduling Boundaries

Financial Capability Matrix	Implementation Period
Low Burden	Normal Engineering / Construction
Medium Burden	Up to 10 years
High Burden	Up to 15 years * * (Schedule up to 20 years based on negotiation with EPA and state NPDES authorities)

As previously discussed, the Financial Capability Matrix indicates that implementation of the recommended CSO controls would be a "Medium Burden" for the general population and a "High Burden" for residents at or below poverty level. This would translate to an implementation period of 10 to 15 years as defined in **Table 9-8**.

As discussed throughout this report, the LTCP has been developed from the 2005 Master Plan, which identified six separate phases. The time period identified in the 2005 Master Plan was from 2005 to 2025. Most of the elements identified in Phase 1 are under construction with the final contract anticipated to be bid and under construction by the Fall of 2010. The remaining phases are currently on schedule to be completed over the next 15 years. However, this plan will be one of the largest single public works projects in the FMWRD and experience shows that it is neither feasible nor practicable to establish firm time requirements for the various elements that make up a project of this magnitude and complexity.

9.6.3 *Secondary Financial Considerations*

As a part of the master planning process, the FMWRD has considered the various funding options available for the selected improvements. Those considered options include revenue and general obligation bonds, grants and loans, and the resultant sewer user fees required to pay back the debt. An implementation schedule was developed that will match the aggressive construction schedule with available funding.

- Grant and Loan Availability

A relatively limited amount of grant funding is still available (primarily to economically disadvantaged municipalities), and is usually based upon the severity of a grantee's problems. Grant money is typically administered through State agencies such as the IEPA, and through various Federal agencies such as the Rural Development Administration, and the Economic Development Administration. However, the direct Federal Grant program for wastewater treatment and infrastructure has been replaced with the State Revolving Loan Fund (SRLF) subsidized low-interest loan program. This SRLF program's "seed money" is furnished by the federal government to the states, and the states administer their own individual SRLF program, with oversight provided by the USEPA.

Over the past few years, the FMWRD has prepared and submitted loan applications for SRLF monies as administered by the IEPA for the projects listed under Phase 1 of the 2005 Master Plan. The Phase 1 projects have been funded and are under permit review or construction at this time. Furthermore, it is the intention of the FMWRD to continue to fund Phase 2 through Phase 6 projects with IEPA SRLF loans.

- <u>Sewer User Fees</u>

The 2010 sewer user fee for patrons of the FMWRD is currently set at the rate of \$3.27 per 1000 gallons of water purchased from the community in which they live. The average usage per meter has been 7,800 gallons per month in the past several years. The total number of meters in the year 2009 was 78,998 and is projected to be 102,023 by the year 2025.

As mentioned previously, this report has used the existing operating costs as listed in the "Projected Financial Statements and Accountant's Report" (see **Appendix L**). The projected costs listed in that report for the year 2009 have been shown in **Table 9-9** below as existing costs under "Projected Annual Costs". **Table 9-9** also lists the Annual Reserve amount that is realized each year, as well as the accumulated total reserve that develops as time passes. When the proposed sewer user fees and the projected annual expenses are extended to the planning year 2028, the total reserve calculates to be over \$40,000,000. Existing debt service reserves are dedicated to existing loans, and will not provide the debt coverage required for the proposed new SRF Loans.

Table 9-9
Sewer User Fee Projection

Year	2009	2010	2011	2012	2013
Rate Increase (%)		5%	5%	5%	5%
CHARGE PER 1000 GALLONS	$3.11	$3.27	$3.43	$3.60	$3.78
Estimated No. of Sewer Connections	78,998	79,398	80,198	81,398	82,998
Average Sewer Bill (for usage only)	$22.51	$24.69	$26.06	$27.90	$29.30
Total Charges for Services	$23,583,851	$25,962,674	$28,101,929	$35,328,578	$33,374,871
Projected Annual Costs	$24,770,958	$32,600,429	$26,404,300	$29,507,248	$30,838,495
Annual Reserve	($1,187,107)	($6,637,755)	$1,697,629	$5,821,330	$2,536,376
Total Reserve	($1,187,107)	($7,824,862)	($6,127,233)	($305,903)	$2,230,472

As demonstrated above, the patrons of the FMWRD will see substantial rate increases each year (approximately 5% per year) for twenty years to implement the LTCP and the needed collection system and WWTP improvements. Please note that **Table 9-9** does not address the debt reserve requirements of the new loans.

As discussed earlier, the financial impact on the average patron is classified as a "Medium Burden", while the impact on the lower income patrons is classified as a "High Burden". To ease the financial burden on the low income patrons, the FMWRD has elected to use a 20-year phased approach for the implementation of CSO controls and other needed Wastewater Treatment Plant improvements, with the CSO control implementation being initiated first.

9.6.4 *Uncertainty of New Rate Impact*

The development of rate impacts herein is based upon many assumptions that must be reevaluated frequently. The assumptions were used in a manner appropriate for this planning document and are predicated on existing economic and demographic conditions remaining unchanged in the foreseeable future. However, as the economic and demographic conditions change from year to year, the application of rates to the patrons of the FMWRD must change also. Some of the conditions that must be monitored are described below:

- Water Consumption - The rate impacts analysis has assumed that metered water consumption is maintained at the current usage over the long term. Water meters are often considered to be the cash registers of the utility and are not maintained for accuracy by the FMWRD, but rather by the municipalities served. Also, rate increases are often accompanied with diminished usage by the patrons, especially a 5% increase each year for at least 20 years.

- Cost Estimates - The estimates used in this report reflect the level of planning and engineering completed to date and may not equal the final cost of these projects.

- Interest Rates - This rate impact analysis assumes that the FMWRD will be able to borrow for future projects at no greater than a 6.5% interest rate.

- Future Regulatory Requirements - The current regulatory requirements have been used to develop cost projections for CSO controls described in the analysis. If future discharge permits tighten the water quality limits for discharge into the Fox River, the cost of treatment at the plant will increase, and possibly diminish the extent of funding available for the CSO controls.

- Uncertainty of the Rate of Population Growth - The recent decline of the economy and the housing market has slowed the number of hook-up requests to the FMWRD. While this report has attempted to conservatively account for this change, the forecasted number of new connections is uncertain.

10 IMPLEMENTATION SCHEDULE

The National CSO policy requires that an implementation schedule be provided in the LTCP. A schedule for implementing the selected control plan was developed using the following priorities:

- Projects that can be implemented quickly should be moved ahead in the schedule.
- Projects that provide the greatest environmental benefit should be a priority.
- Projects that benefit sensitive areas should be a priority.

Other considerations used in developing priorities included construction sequencing requirements, funding source limitations and financial impacts to user rates and patrons. Based on these considerations, a sequencing of projects was developed. An implementation schedule was then developed for each project. The implementation schedule typically included the following steps:

- Facility Planning – This step was completed in development of the 2005 Master Plan and defined the function and interaction of the system. Facility Plan Updates will be required for subsequent phases identified in the 2005 Master Plan.
- Preliminary design and land acquisitions – These were commenced in 2006 and included geotechnical investigations and the development of proposed facility siting and pipeline alignments. It also included acquiring land and easements necessary for construction of the various improvements. These activities determined the basis for design, established system hydraulics, located pumping stations and other elements needed to define the system function and interaction of the system as well as the required construction sequence and phasing.
- Design – This step includes the preparation of final designs and contract documents (plans and specifications) to obtain bids for construction. The design

of all Phase 1 improvements identified herein and in the 2005 Master Plan has been completed. Design of Phase 2 improvements is currently underway.

- Permitting and Approvals – This step entails obtaining the necessary permits and approvals for construction from regulatory agencies having jurisdiction over the work. These may vary depending on the type and location of the project. Contract 3 of Phase 1 was submitted at the end of March, 2010 to IEPA for review and permit.

- Bidding – This step includes advertising the various projects for bids, procuring bids, awarding a construction contract, and issuing a notice to proceed to the construction contractor indicating that work can begin. Contract 3 of Phase 1 is scheduled to be bid July, 2010 and is anticipated to be funded through a loan from the IEPA state revolving loan fund program.

- Construction – This entails the actual building of the facility. Both the TPAD project and Contract 1 project identified in Phase 1 are currently under construction and anticipated to be completed by the fall of 2010.

- Place in Operation – At this milestone, the facility is operational and is performing the function for which it was intended. Construction may extend beyond this milestone for such items as landscaping, final cleanup, punch list items or to address claims arising during construction.

- Post Construction Monitoring – Upon successful implementation of the LTCP, post construction water quality monitoring will be conducted to ascertain the effectiveness of the CSO controls and to verify compliance with WQS and protection of designated uses.

10.1 Basis For LTCP Development and Implementation Schedule

The LTCP has been developed from the 2005 Master Plan, which identified six separate phases. Phase 1 of the plan is presently being implemented and the remaining phases have been developed at this stage to a conceptual level. Basic capacities of the remaining phases have been established for the facilities, general locations have been selected and appurtenant support facilities identified. Also, the general hydraulic operation of the system has been formulated, interfaces with existing facilities considered and potential construction sequencing reviewed.

The overall probable time requirement for implementing a LTCP of this magnitude is approximately twenty years. The time period identified in the 2005 Master Plan was from 2005 to 2025. This time requirement is principally dictated by the necessary construction sequencing and limitations of available funding sources. In addition, there is a wide-array of institutional, legal and technical factors which also control time requirements for implementation of the LTCP. This plan will be one of the largest single public works projects in the FMWRD and experience shows that it is neither feasible nor practicable to establish firm time requirements for the various elements that make up a project of this magnitude and complexity in a highly urbanized environment. The preliminary schedule for the LTCP is shown in **Figure 10-1**. As previously stated, the FMWRD began implementing Phase 1 improvements and is currently on schedule.

Figure 10-1
CSO Controls Implementation Schedule

No.		Activity	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	**SYSTEM WIDE COMPONENTS**																					
	Phase 1	North Aurora Flow Equalization Basin			1																	
		Waubonsie Flow Equalization Basin																				
	Phase 2	North Aurora Flow Equalization Basin							2	2	2	2										
		Waubonsie Flow Equalization Basin					2															
	Phase 3	North Aurora Flow Equalization Basin										3	3	3								
		Waubonsie Flow Equalization Basin										3	3	3								
	Phase 4	North Aurora Flow Equalization Basin													4	4	4					
		Waubonsie Flow Equalization Basin													4	4	4					
	Phase 5	North Aurora Flow Equalization Basin															5	5	5			
		Waubonsie Flow Equalization Basin															5	5	5			
	Phase 6	North Aurora Flow Equalization Basin																				
		Waubonsie Flow Equalization Basin																	6	6	6	
2	**WASTEWATER TREATMENT PLANT**																					
	Phase 1	**North Facility - Stage 1**																				
		TPAD	1	1	1	1	1															
		Contracts 1&2 (K2 & Chlor.)		1	1	1	1	1														
		Contract 3 - CEPT				1	1	1	1													
	Phase 2	**South Facility - Stage 1**						2	2	2	2	2	2	2								
		North Facility - Stage 2						2	2	2	2	2	2	2								
	Phase 4	**South Facility - Stage 2**												5	5	5	5					
		North Facility - Stage 3												5	5	5	5					
	Phase 6	**South Facility - Stage 3**																6	6	6	6	6
		North Facility - Stage 4																6	6	6	6	6

LEGEND
- Procurement
- Design
- Construction

Time requirements in the implementation schedule have been based on information compiled during the planning process, experience with similar projects and estimates of future and field conditions. There are a number of uncertainties associated with the time requirements included in the implementation plan and schedules. As the implementation process moves forward, it will be necessary to identify and resolve such uncertainties and to adjust time requirements. Additionally, changes in laws, requirements or regulations could occur during implementation of the LTCP necessitating different time requirements than anticipated. The principal criteria, standards, regulations, laws, guidelines and assumptions upon which elements of the LTCP and schedule are based include, but may not be limited to, those listed below. Changes to any of the following may require modification of the LTCP and the implementation schedule:

- The Clean Water Act, 1994 CSO Policy and EPA guidance for CSOs and for performing water quality standard reviews and revisions.
- BOD and TSS TMDLs for the Fox River as they currently exist (January, 2010).
- Results of the water quality assessment of the Fox River by the Fox River Study Group
- FMWRD's NPDES Permit (Expiration Date March 31, 2012).
- Future judicial or administrative orders.
- The financial capability of FMWRD remains equal to or better than that indicated in the financial capability assessment.
- FMWRD bond's rating remains equal to or better than that indicated in the financial capability assessment.
- Interest rates for bonding are not higher than that indicated in the financial capability assessment.
- All approvals, permits, land acquisitions and easements can be obtained in the time frames shown in the implementation schedule.
- Facility plan updates. The purpose of a facility plan is to perform special engineering studies (such as hydraulic design, functional design, system operational design, interaction and interface studies, configuration design,

geotechnical investigations and right-of-way investigations) necessary to develop the LTCP projects in more detail so preliminary designs can be prepared. Based on the results of the investigations and studies, facility plan update findings may require revision to time requirements and the project schedule. Subsequent changes in the findings of facility plan updates may require additional modifications of the schedule. These are fundamental assumptions upon which the LTCP and schedule are based.

- Land is acquired or easements or rights to use the land are obtained from landowners without unreasonable restrictions for the facilities necessary to complete the LTCP.
- Changes in technology related to new innovative plant processes, construction conditions and construction methods of the control facilities.
- Impacts to siting, operation or other functional requirements of the control facilities.
- The actual costs of CSO control projects (based on construction bids or conditions encountered during construction which alter costs) that change the financial capability basis.
- Technical, legal and institutional conditions which require more time than anticipated or planned.
- Inflation or reoccurrence of widespread economic recession/hardships.
- And other unknowns.

10.2 CSO Reduction Versus Time

It will not be necessary to wait until the completion of the entire program to realize the benefits of the LTCP. CSO reduction will occur regularly throughout implementation of the program as facilities are brought on line. Significant reductions in CSO discharges will occur early on in the program with the completion of the Phase 1 improvements. Upon completion of Contract 3 (sometime in 2012), the existing WWTP facility will be capable of providing chemically enhanced primary treatment (CEPT), tertiary filtration and disinfection for up to an additional 54 mgd of excess wet weather flow. This, in conjunction with the existing treatment capacity of 85 mgd, will increase the treatment capability of the existing facilities to 139 mgd, which is greater than the existing 3-month storm conditions and nearly the existing 1-year storm conditions (see **Table 5-3** in Section 5.2.3). Thus, the FMWRD facilities would provide a level of protection of nearly a 1-year storm by 2012 and statistically reducing CSO overflows to between 1 to 4 events per year.

Additional reductions in CSO will occur as the phases of the flow equalization basin segments are made operational. The full benefit will be realized sometime in 2025 as the final stage of the new WWTP facilities are placed into service.

11.0 POST CONSTRUCTION MONITORING

11.1 Introduction

The 1994 USEPA CSO Control Policy requires that a post construction water quality monitoring program be developed to verify compliance with water quality standards and protection of designated uses as well as ascertain the effectiveness of CSO controls. The monitoring program described in this section will utilize existing monitoring programs and will supplement these to determine the performance of the selected CSO controls and their effects on water quality.

11.2 Overview of Approach

Post construction monitoring will replicate the collection system flow monitoring, biological monitoring, water quality monitoring and modeling programs discussed in Sections 2.2.4, 2.2.5 and 2.3. The results of these previous studies will serve as a baseline of the both the collection system and the Fox River in the vicinity of FMWRD Outfall 002 under pre-construction conditions. Baseline conditions will be used for comparison purposes to ascertain the effectiveness of the implemented CSO controls. All of the receiving water post construction monitoring activities will be performed in accordance with either the sampling/testing approach that was approved by the IEPA for the Fox River Study Group or the Quality Assurance Project Plan (QAPP) prepared by WEDA and DEI (see **Appendix D**). The QAPP may be amended, as needed, to include sampling protocol changes and other changes such as monitoring locations and frequencies.

Sampling of the Fox River will continue to verify upstream boundary conditions and monitor improvements to water quality downstream of the WWTP. In addition to field sampling and analysis, the combined sewer system and receiving water models will continue to be used to analyze results. This will be useful in relating measured conditions to the average year performance levels predicted in the LTCP.

It is anticipated that monitoring will continue throughout implementation of the LTCP. Also, since compliance monitoring may occur many years after approval of the LTCP, the availability and scope of current monitoring locations will be ascertained periodically during the monitoring program to determine if they are still relevant.

11.3 Types of Monitoring

FMWRD and WEDA will continue to monitor water quality conditions along the Fox by performing river sampling depending on weather conditions. Bridge sampling will continue to be performed within the study area in accordance with the procedures outlined in the QAPP (see **Appendix D**). At a minimum, parameters analyzed will include BOD, TSS, ammonia, total phosphorus, fecal coliform, total nitrogen and chlorophyll-a. The frequency of the sample collection will be performed as needed.

Data sondes will be used to collect continuous reading for pH, dissolved oxygen (DO), temperature and conductivity in select locations from April through October as river levels permit. The locations of these sondes may vary depending on river conditions. However, one sonde will be permanently located upstream of the FMWRD CSO Outfall 002 and treated effluent outfall 001 and one sonde permanently located downstream of these outfalls.

In addition, biological studies including macroinvertebrate studies, fish studies and mussel surveys will also be performed periodically in accordance with the procedures outlined in the QAPP.

As required by the FMWRD NPDES permit (IL0020818), monitoring of plant influent, effluent and CSO discharges will continue. In addition, rain gages will be maintained for the collection of rainfall data and other weather conditions for reporting purposes.

Samples from CSO discharges at Outfall 002 during weekdays will be collected and analyzed. During winter months, the automatic sampler will be removed and grab samples will be taken, if possible. The CSO discharge sampling will be tailored to capture the first flush of the discharge. These samples will be analyzed at a minimum for BOD, TSS, ammonia, total phosphorus, fecal coliform, and total nitrogen. In addition, COA CSO discharges and storm sewer discharges will be sampled during select wet weather events in order to assess river water quality conditions upstream of FMWRD.

Long term compliance monitoring will also be performed consisting of: 1) continuous flow monitoring within the CSS and of the five major interceptors entering the WWTP, 2) CSO diversion rates to the CEPT system and 3) measuring storage levels in the off-line flow equalization basins.

Table 11-1 summarizes the types of monitoring to be performed.

Table 11-1
Post Construction Monitoring

Monitoring Type	Location	Frequency
Rain Fall Monitoring	- 1 gage at WEDA - 1 gage at FMWRD	- Continuous
CSO Overflow Monitoring (Flow & Volume)	- All 16 COA OVF Locations - Influent, Effluent and CSO Outfall 002 at FMWRD - Storm Sewer Locations	- Continuous
CSO Overflow and Storm Sewer Sampling	- 1 sampling station at Fox Metro Outfall 002 - Select COA CSOs and storm sewers	- During an overflow event - As determined
Receiving water monitoring-DO	- D.O. monitors	- Continuous from April to October
Receiving Water Chemistry Monitoring	- Use data from other existing programs - Data collected by FMWRD - Bridge sampling	- Frequency of existing programs - Weekly - Monthly
Biological Sampling	- Use data from other existing programs - Data collected by WEDA	- Frequency to be determined - As determined from April to October

11.4 Existing Data Sources

Along with the above described monitoring types, monitoring and modeling efforts being conducted by the Fox River Study Group (FRSG) will also be used for assessing compliance. The physical parameters measured at each of the FRSG stations are temperature, DO, pH, and conductivity. The water chemistry parameters include TSS, TKN, ammonia, nitrate, nitrite, total and dissolved phosphorus, orthophosphate, BOD_5, fecal coliform and chlorophyll. Samples will continue to be collected once per month by the FRSG for the foreseeable future.

12 WATER QUALITY STANDARDS REVIEW

12.1 Introduction

The purpose of the LTCP, per the USEPA 1994 CSO Control policy and guidance, is to develop, evaluate, and select CSO control alternatives that are sufficient to reach compliance with and attainment of the existing water quality standards and designated uses of the receiving waters. The same USEPA policy recognizes that if the alternatives to be implemented in the LTCP will not result in compliance with those water quality standards, and when chemical, physical or economic factors appear to preclude attainment of the standards, then the data collected in the LTCP development may be used to support revisions to the water quality standards *"including adoption of uses that better reflect the water quality that can be achieved with an affordable level of CSO control."*

12.2 National Regulatory Background

In 1994, the USEPA published its CSO Control Policy (Policy). Subsequently, enactment of the Wet Weather Quality Act in December 2000 resulted in the CSO Control Policy being made law by incorporating the Policy into the Clean Water Act (CWA) at Section 402(q).

The goal of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In general, the national goal of the CWA states that receiving stream water quality standards should *"provide for the protection and propagation of fish, shellfish, and wildlife and for recreation in and on the waters."* The water quality standards have three (3) components:

1) Designated Uses - The nations waters are typically designated to be fishable and swimmable. In the vicinity of the FMWRD, the Fox River has been designated for General Use, which includes the support for aquatic life and primary contact recreation.

2) Water Quality Standards - To support the designated uses stated above, the IPCB established water quality criteria for the Fox River that contain both numeric limits and narrative descriptions for toxics in toxic amounts. The Fox River in the vicinity of the FMWRD does not currently meet these limits at all times and in all places. Therefore, the state has identified the river as impaired and has placed on Illinois' 303(d) list.

3) Antidegradation Policy – An antidegradation policy is intended to protect existing uses of waters, maintain the quality of waters with quality that is better than WQS and prevent the unnecessary deterioration of these waters. An antidegradation policy was established by the IPCB under Section 302.105 of the 35 IL Administrative Code Subtitle C, Chapter I.

A key principle in the USEPA Policy is the *"review and revision, as appropriate, of water quality standards and their implementation procedures when developing CSO control plans to reflect site-specific impacts of CSOs"*. Additionally, pursuant to subsection 402(q)(2) of the Clean Water Act, the USEPA has developed guidance to facilitate the conduct of water quality and designated use reviews for municipal combined sewer overflow receiving waters. The guidance can be applied to the evaluation of LTCPs for control of CSO discharges.

12.3 Ongoing Water Quality Monitoring and Assessments

The FMWRD is a member and major contributor to the Fox River Study Group

(FRSG). The mission of the FRSG is to bring together a diverse coalition of stakeholders to work together to preserve and/or enhance water quality in the Fox River watershed. The activities of the Fox River Study Group include, but are not limited to, the following:

- Participation in water quality monitoring efforts in the Fox River watershed;
- Development of a computer model of the Fox River watershed;
- Maintenance of the computer model as a management tool to promote efficient use of taxpayer and private money on watershed projects, assess the effect of various development options throughout the watershed, educate stakeholders, evaluate management priorities, identify sensitive regions within the watershed, and develop continuing monitoring programs;
- Development of a plan to preserve and/or enhance the water quality of the Fox River; and
- Promotion, as needed, of the adoption of the watershed plan by appropriate entities who have the authority for its implementation

Because the Fox River is impaired by a number of pollutants, therefore requiring development of a TMDL, it is anticipated that the FRSG model will be utilized for this purpose.

12.4 LTCP Modeling of Water Quality Under Wet Weather Conditions

Extensive mathematical modeling together with economic and water quality benefit comparisons have been conducted as part of development of the LTCP. The studies focused on long term controls that would reduce overflows and strike a balance between costs and benefits. The LTCP was selected as a plan that offers an effective combination of costs, benefits and environmental protection. However, although greatly reduced, CSO discharges may still exist under the LTCP and water quality provisions will need to be adopted that accommodate wet weather discharges from the combined sewer system. FMWRD has chosen a presumptive approach to meet water quality standards by limiting their combined sewer overflows to less than four per year. Impacts using the chosen LTCP were modeled and evaluated by the Illinois State Water Survey (ISWS) and are discussed in detail in **Appendix I**.

In summary, a model using WASP software was calibrated and verified to simulate the effect of various design storms on the Fox River water quality under both existing conditions at FMWRD and proposed conditions after CSO controls have been implemented as described in this LTCP. Mill Street was defined as the upstream boundary condition and impacts to the Fox River from the existing and proposed WWTP conditions were evaluated for water quality at Route 34 (Washington Street), Oswego downstream of FMWRD's outfalls. Specific parameters were evaluated for a 1-year, 5-year and 10-year design storm event including: BOD_5, TSS, fecal coliforms, ammonia nitrogen, nitrate nitrogen, total nitrogen, total phosphorus and dissolved oxygen (based on total oxygen demand). In addition, impacts from a 3-month design storm event were evaluated for ammonia, total phosphorus and dissolved oxygen. The impact of "no action" condition on ammonia nitrogen and dissolved oxygen was also evaluated for the 5-year storm.

Impacts were evaluated from two different perspectives. First, changes from existing conditions to proposed conditions were assessed. Second, compliance with applicable water quality standards was evaluated for simulated constituents with applicable ambient water quality standards and IEPA adopted thresholds (used during stream impairment evaluations) for constituents with no water quality standards. Modeling procedures and results are discussed in detail in **Appendix I**.

Overall, simulations showed that the recommended LTCP CSO controls will result in an improvement of water quality when compared to water quality resulting from existing conditions for storms of the same return interval. Model simulations indicate that proposed FMWRD discharges under the normal treatment level:

- Do not cause an exceedance of the water quality standard for fecal coliforms during 5-year and smaller storms,
- Would likely not cause exceedances of ammonia water quality standards unless pH and temperature reach high values or ammonia concentrations in the Fox River are high upstream of the FMWRD,
- Would likely cause exceedance of the total phosphorus listing value only when no chemical treatment is applied in the CEPT system and large storms occur during low flows and there are high phosphorus concentrations in the Fox River upstream of the FMWRD, and
- Would not cause exceedances of the total suspended solids and nitrate nitrogen listing values.

The goal of the CSO Control Policy is to limit the number of overflows to four to six per year. The FMWRD is providing full biological treatment for all storms of a corresponding return period (3-months) and a partial treatment including full disinfection for all storms with return periods between 3-months and 5-years. Proposed modifications will result in far greater positive effect on Fox River water quality than the minimum required by the CSO Control Policy.

The findings show that implementation of the LTCP CSO controls can meet water quality standards in accordance with the CSO Control Policy. The findings also show that on average, the LTCP would be protective of the beneficial uses of the receiving waters. Additionally, the findings show that pollution sources other than discharges from the FMWRD's CSO outfall can cause impairment to the receiving waters. Other pollution sources in the watershed include storm sewer systems and nonpoint source discharges. These watershed-wide sources would have to be substantially reduced to reach the equivalent degree of protection that can be achieved by FMWRD's LTCP. The sources of the contaminants that comprise the other pollution sources have not been completely identified or documented.

Cost effective and reliable technical programs to effectively reduce the impact of the other pollution sources may not be available for the foreseeable future. Besides the technical uncertainties of reduction of the other pollution sources, a significant component of these sources originates in political jurisdictions outside the FMWRD. Given the history and experience of dealing with diverse pollution sources and other political jurisdictions, the results of future efforts to control these sources cannot be predicted with any degree of certainty.

The CSO studies have shown that the benefits of the FMWRD LTCP are reliable and implementable.

12.5 Future Use Attainability Analysis

Wet weather discharge provisions may need to be provided to accommodate LTCP implementation. The wet weather discharge provisions would need to recognize that there will be CSO discharges when the capacity of the LTCP control facilities is exceeded. Under one approach, the LTCP could be accommodated without changing the water quality standards. This approach may involve the interpretation by regulatory agencies that the proposed LTCP meets the current water quality standards. Such an interpretation could be made in the regulatory agencies' approval of the LTCP.

Another approach would involve incorporating provisions in the water quality standards to accommodate the remaining discharges after the capacity of the LTCP is exceeded. This approach may require a use attainability analysis (UAA) and/or modification or additions to the uses in the water quality standards. A UAA is a structured scientific assessment of the physical, chemical, biological, and socioeconomic factors affecting attainment of a designated use. The FMWRD reserves the right to perform a UAA in support of a request to modify WQS, if necessary, to reflect wet weather urbanized effects on the Fox River.

APPENDIX A

NPDES PERMIT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 – (217) 782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601 – (312) 814-6026

217/782-0610 ROD R. BLAGOJEVICH, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

RECEIVED

FEB 08 2007

FEB 23 2007

WALTER E. DEUCHLER ASSOCIATES, INC.

Fox Metro Water Reclamation District
682 State Route 31
Oswego, Illinois 60543

Re: Fox Metro Water Reclamation District
Fox Metro WRD Wastewater Treatment Plant
NPDES Permit No. IL0020818
Final Permit

Gentlemen:

Attached is the final NPDES Permit for your discharge. The Permit as issued covers discharge limitations, monitoring, and reporting requirements. Failure to meet any portion of the Permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the Permit as they relate specifically to your discharge.

The Agency has begun a program allowing the submittal of electronic Discharge Monitoring Reports (eDMRs) instead of paper Discharge Monitoring Reports (DMRs). If you are interested in eDMRs, more information can be found on the Agency website, http://epa.state.il.us/water/edmr/index.html. If your facility is not registered in the eDMR program, a supply of preprinted paper DMR Forms for your facility will be sent to you prior to the initiation of DMR reporting under the reissued permit. Additional information and instructions will accompany the preprinted DMRs upon their arrival.

The attached Permit is effective as of the date indicated on the first page of the Permit. Until the effective date of any re-issued Permit, the limitations and conditions of the previously-issued Permit remain in full effect. You have the right to appeal any condition of the Permit to the Illinois Pollution Control Board within a 35 day period following the issuance date.

Should you have questions concerning the Permit, please contact Don Netemeyer at the telephone number indicated above.

Sincerely,

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:DGN:06042603.dlk

Attachment: Final Permit

cc: Records
Walter E. Deuchler Associates, Inc.
Compliance Assurance Section
Des Plaines Region
US EPA
NIPC
City of Aurora

NPDES Permit No. IL0020818

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date: March 31, 2012

Issue Date: February 8, 2007
Effective Date: April 1, 2007

Name and Address of Permittee:

Fox Metro Water Reclamation District
682 State Route 31
Oswego, Illinois 60543-8500

Facility Name and Address:

Fox Metro WRD Wastewater Treatment Plant
682 State Route 31
Oswego, Illinois
(Kendall County)

Receiving Waters: Fox River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:DGN:06042603.dlk

NPDES Permit No. IL0020818

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 42 MGD (design maximum flow (DMF) of 85 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS MG/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**	3503 (7089)		7006 (14,178)	10		20	2 Days/Week	Composite
Suspended Solids	4203 (8507)		8407 (17,014)	12		24	2 Days/Week	Composite
Dissolved Oxygen	Monitor						1 Day/Week	Grab
pH	Shall be in the range of 6 to 9 Standard Units						2 Days/Week	Grab
Fecal Coliform***	The monthly geometric mean shall not exceed 200 per 100 mL and no more than 10% of the samples collected shall exceed 400 per 100 mL (May through October)						5 Days/Week	Grab
Chlorine Residual***						0.05	5 Days/Week	Grab
Ammonia Nitrogen as (N)								
March-May/Sept-Oct.	525 (1063)	1331 (2694)	1541 (3119)	1.5	3.8	4.4	2 Days/Week	Composite
June-Aug.	525 (1063)	--	1121 (2268)	1.5	--	3.2	2 Days/Week	Composite
Nov.-Feb.	701 (1418)	--	1541 (3119)	2.0	--	4.4	2 Days/Week	Composite

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 7.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a geometric mean and as a percentage of samples exceeding 400 per 100 mL.

pH shall be reported on the DMR as a minimum and a maximum.

Dissolved oxygen shall be reported on the DMR as a minimum.

Chlorine Residual shall be reported on the DMR as daily maximum.

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Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency	Sample Type
Flow (MGD)	Continuous	*IRT
BOD_5	2 Days/Week	Composite
Suspended Solids	2 Days/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

*Indicating, Recording, Totalizing

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Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws, regulations, or judicial orders. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

SPECIAL CONDITION 6. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 7. Fecal Coliform limits for discharge point 001 are effective May thru October. Sampling of Fecal Coliform is only required during this time period.

The total residual chlorine limit is applicable at all times. If the Permittee is chlorinating for any purpose during the months of November through April, sampling is required on a daily grab basis. Sampling frequency for the months of May through October shall be as indicated on effluent limitations, monitoring and reporting page of this Permit.

SPECIAL CONDITION 8. This Permit may be modified to include requirements for the Permittee on a continuing basis to evaluate and detail its efforts to effectively control sources of infiltration and inflow into the sewer system and to submit reports to the IEPA if necessary.

SPECIAL CONDITION 9.

A. Publicly Owned Treatment Works (POTW) Pretreatment Program General Provisions

1. The Permittee shall implement and enforce its approved Pretreatment Program which was approved on May 29, 1985 and all approved subsequent modifications thereto. The Permittee shall maintain legal authority adequate to fully implement the Pretreatment Program in compliance with Federal (40 CFR 403), State, and local laws. The Permittee shall:

   a. Carry out independent inspection and monitoring procedures at least once per year, which will determine whether each significant industrial user (SIU) is in compliance with applicable pretreatment standards;

   b. Perform an evaluation, at least once every two (2) years, to determine whether each SIU needs a slug control plan. If needed, the SIU slug control plan shall include the items specified in 40 CFR § 403.8 (f)(2)(v);

   c. Update its inventory of Industrial Users (IUs) at least annually and as needed to ensure that all SIUs are properly identified, characterized, and categorized;

   d. Receive and review self monitoring and other IU reports to determine compliance with all pretreatment standards and requirements, and obtain appropriate remedies for noncompliance by any IU with any pretreatment standard and/or requirement;

   e. Investigate instances of noncompliance, collect and analyze samples, and compile other information with sufficient care as to produce evidence admissible in enforcement proceedings, including judicial action;

   f. Require development, as necessary, of compliance schedules by each industrial user for the installation of control technologies to meet applicable pretreatment standards; and,

   g. Maintain an adequate revenue structure for continued operation of the Pretreatment Program.

2. The Permittee shall issue/reissue permits or equivalent control mechanisms to all SIUs prior to expiration of existing permits or prior to commencement of discharge in the case of new discharges. The permits at a minimum shall include the elements listed in 40 CFR § 403.8(f)(1)(iii).

3. The Permittee shall develop, maintain, and enforce, as necessary, local limits to implement the prohibitions in 40 CFR § 403.5 which prohibit the introduction of specific pollutants to the waste treatment system from any source of nondomestic discharge.

Special Conditions

4. In addition to the general limitations expressed in Paragraph 3 above, applicable pretreatment standards must be met by all industrial users of the POTW. These limitations include specific standards for certain industrial categories as determined by Section 307(b) and (c) of the Clean Water Act, State limits, or local limits, whichever are more stringent.

5. The USEPA and IEPA individually retain the right to take legal action against any industrial user and/or the POTW for those cases where an industrial user has failed to meet an applicable pretreatment standard by the deadline date regardless of whether or not such failure has resulted in a permit violation.

6. The Permittee shall establish agreements with all contributing jurisdictions, as necessary, to enable it to fulfill its requirements with respect to all IUs discharging to its system.

7. Unless already completed, the Permittee shall within six (6) months of the effective date of this Permit submit to USEPA and IEPA a proposal to modify and update its approved Pretreatment Program to incorporate Federal revisions to the general pretreatment regulations. The proposal shall include all changes to the approved program and the sewer use ordinance which are necessary to incorporate the regulations commonly referred to as PIRT and DSS, which were effective November 16, 1988 and August 23, 1990, respectively. This includes the development of an Enforcement Response Plan (ERP) and a technical re-evaluation of the Permittee's local limits.

8. The Permittee's Pretreatment Program has been modified to incorporate a Pretreatment Program Amendment approved on November 21, 1997. The amendment became effective on the date of approval and is a fully enforceable provision of your Pretreatment Program.

   Modifications of your Pretreatment Program shall be submitted in accordance with 40 CFR § 403.18, which established conditions for substantial and nonsubstantial modifications.

B. Reporting and Records Requirements

1. The Permittee shall provide an annual report briefly describing the permittee's pretreatment program activities over the previous calendar year. Permittees who operate multiple plants may provide a single report providing all plant-specific reporting requirements are met. Such report shall be submitted no later than April 28 of each year, and shall be in the format set forth in IEPA's POTW Pretreatment Report Package which contains information regarding:

   a. An updated listing of the Permittee's industrial users.

   b. A descriptive summary of the compliance activities including numbers of any major enforcement actions, (i.e., administrative orders, penalties, civil actions, etc.), and the outcome of those actions. This includes an assessment of the compliance status of the Permittee's industrial users and the effectiveness of the Permittee's Pretreatment Program in meeting its needs and objectives.

   c. A description of all substantive changes made to the Permittee's Pretreatment Program. Changes which are "substantial modifications" as described in 40 CFR § 403.18(c) must receive prior approval from the Approval Authority.

   d. Results of sampling and analysis of POTW influent, effluent, and sludge.

   e. A summary of the findings from the priority pollutants sampling. As sufficient data becomes available the IEPA may modify this Permit to incorporate additional requirements relating to the evaluation, establishment, and enforcement of local limits for organic pollutants. Any permit modification is subject to formal due process procedures pursuant to State and Federal law and regulation. Upon a determination that an organic pollutant is present that causes interference or pass through, the Permittee shall establish local limits as required by 40 CFR § 403.5(c).

2. The Permittee shall maintain all pretreatment data and records for a minimum of three (3) years. This period shall be extended during the course of unresolved litigation or when requested by the IEPA or the Regional Administrator of USEPA. Records shall be available to USEPA and the IEPA upon request.

3. The Permittee shall establish public participation requirements of 40 CFR 25 in implementation of its Pretreatment Program. The Permittee shall at least annually, publish the names of all IU's which were in significant noncompliance (SNC), as defined by 40 CFR § 403.8(f)(2)(vii), in the largest daily paper in the municipality in which the POTW is located or based on any more restrictive definition of SNC that the POTW may be using.

Special Conditions

4. The Permittee shall provide written notification to the Deputy Counsel for the Division of Water Pollution Control, IEPA, 1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 within five (5) days of receiving notice that any Industrial User of its sewage treatment plant is appealing to the Circuit Court any condition imposed by the Permittee in any permit issued to the Industrial User by Permittee. A copy of the Industrial User's appeal and all other pleadings filed by all parties shall be mailed to the Deputy Counsel within five (5) days of the pleadings being filed in Circuit Court.

C. Monitoring Requirements

1. The Permittee shall monitor its influent, effluent and sludge and report concentrations of the following parameters on monitoring report forms provided by the IEPA and include them in its annual report. Samples shall be taken at quarterly intervals at the indicated detection limit or better and consist of a 24-hour composite unless otherwise specified below. Sludge samples shall be taken of final sludge and consist of a grab sample reported on a dry weight basis.

STORET CODE	PARAMETER	Minimum detection limit
01097	Antimony	0.07 mg/L
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01012	Beryllium	0.005 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hex - grab not to exceed 24 hours)*	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00718	Cyanide (grab) (weak acid dissociable)	5.0 ug/L
00720	Cyanide (grab) (total)	5.0 ug/L
00951	Fluoride*	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)*	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L
71900	Mercury (effluent grab using USEPA Method 1631 or equivalent)***	1.0 ng/L**
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)*	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01059	Thallium	0.3 mg/L
01092	Zinc	0.025 mg/L

*Influent and effluent only
** 1 ng/L = 1 part per trillion
*** Other approved methods may be used for influent (composite) and sludge

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined including all oxidation states. Where constituents are commonly measured as other than total, the phase is so indicated.

2. The Permittee shall conduct an analysis for the one hundred and ten (110) organic priority pollutants identified in 40 CFR 122 Appendix D, Table II as amended. This monitoring shall be done annually and reported on monitoring report forms provided by the IEPA and shall consist of the following:

   a. The influent and effluent shall be sampled and analyzed for the one hundred and ten (110) organic priority pollutants. The sampling shall be done during a day when industrial discharges are expected to be occurring at normal to maximum levels.

      Samples for the analysis of acid and base/neutral extractable compounds shall be 24-hour composites.

      Five (5) grab samples shall be collected each monitoring day to be analyzed for volatile organic compounds. A single analysis for volatile pollutants (Method 624) may be run for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than one (1) mL of each grab included in the composite.

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Special Conditions

Wastewater samples must be handled, prepared, and analyzed by GC/MS in accordance with USEPA Methods 608, 624 and 625 of 40 CFR 136 as amended and applicable.

b. The sludge shall be sampled and analyzed for the one hundred and ten (110) organic priority pollutants. A sludge sample shall be collected concurrent with a wastewater sample and taken as final sludge.

   Sampling and analysis shall conform to USEPA Methods 624 and 625 and/or USEPA SW-846 Test Methods for Evaluating Solid Wastes unless an alternate method has been approved by IEPA.

c. Sample collection, preservation and storage shall conform to approved USEPA procedures and requirements.

3. In addition, the Permittee shall monitor any new toxic substances as defined by the Clean Water Act, as amended, following notification by the IEPA.

4. Permittee shall report any noncompliance with effluent or water quality standards in accordance with Standard Condition 12(e) of this Permit.

5. Analytical detection limits shall be in accordance with 40 CFR 136. Minimum detection limits for sludge analyses shall be in accordance with 40 CFR 503 and USEPA SW-846 for solid wastes.

SPECIAL CONDITION 10. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced for BOD_5, $CBOD_5$, suspended solids, ammonia and pH due to sustained compliance. The IEPA will require that the influent and effluent sampling frequency for these parameters be increased to 5 days/week if effluent deterioration occurs due to increased wasteload, operational, maintenance or other problems. The increased monitoring will be required Without Public Notice when a permit modification is received by the Permittee from the IEPA.

SPECIAL CONDITION 11. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 12. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

1. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Except as noted here and in the IEPA document "Effluent Biomonitoring and Toxicity Assessment", testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved, the following tests are required:

   a. Fish - 96 hour static LC_{50} Bioassay using fathead minnows (Pimephales promelas).

   b. Invertebrate 48-hour static LC_{50} Bioassay using Ceriodaphnia.

2. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Samples must be collected in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit.

3. Reporting - Results shall be reported according to EPA/600/4-90/027F, Section 12, Report Preparation, and shall be submitted to IEPA, Bureau of Water, Compliance Assurance Section within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.

4. Toxicity Reduction Evaluation - Should the results of the biomonitoring program identify toxicity, the IEPA may require that the Permittee prepare a plan for toxicity reduction evaluation and identification. This plan shall be developed in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, and shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan for toxicity reduction evaluation within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days or other such date as contained in a notification letter received from the IEPA.

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Special Conditions

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 13. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 23 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 14.

AUTHORIZATION OF
COMBINED SEWER AND TREATMENT PLANT DISCHARGES

The IEPA has determined that at least a portion of the collection system consists of combined sewers. References to the collection system and the sewer system refer only to those parts of the system which are owned and operated by the Permittee unless otherwise indicated. The Permittee is authorized to discharge from the overflow(s)/bypass(es) listed below provided the diversion structure is located on a combined sewer and the following terms and conditions are met:

Discharge Number	Location	Receiving Water
002	STP Headworks	Fox River

Treatment Requirements

1. All combined sewer overflows and treatment plant bypasses shall be given sufficient treatment to prevent pollution and the violation of applicable water quality standards. Sufficient treatment shall consist of the following:

   a. Treatment as described in PCB 85-224 and dated July 13, 1988 shall be provided. The terms and conditions of this Board Order are hereby incorporated by reference as if fully set forth herein; and,

   b. Any additional treatment, necessary to comply with applicable water quality standards and the federal Clean Water Act, including any amendments made by the Wet Weather Water Quality Act of 2000.

Special Conditions

2. All CSO discharges authorized by this Permit shall be treated, in whole or in part, to the extent necessary to prevent accumulations of sludge deposits, floating debris and solids in accordance with 35 Ill. Adm. Code 302.203 and to prevent depression of oxygen levels.

3. Overflows during dry weather are prohibited. Dry weather overflows, if discovered, shall be reported to the IEPA pursuant to Standard Condition 12(e) of this Permit (24 hour notice).

4. The collection system shall be operated to optimize transport of wastewater flows and to minimize CSO discharges.

5. The treatment system shall be operated to maximize treatment of wastewater flows.

Nine Minimum Controls

6. The Permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994. The nine minimum controls are:

   a. Proper operation and maintenance programs for the sewer system and the CSOs (Compliance with this Item shall be met through the requirements imposed by Paragraph 8 of this Special Condition);

   b. Maximum use of the collection system for storage (Compliance with this Item shall be met through the requirements imposed by Paragraphs 1, 4, and 8 of this Special Condition);

   c. Review and modification of pretreatment requirements to assure CSO impacts are minimized (Compliance with this Item shall be met through the requirements imposed by Paragraph 9 of this Special Condition);

   d. Maximization of flow to the POTW for treatment (Compliance with this Item shall be met through the requirements imposed by Paragraphs 4, 5, and 8 of this Special Condition);

   e. Prohibition of CSOs during dry weather (Compliance with this Item shall be met through the requirements imposed by Paragraph 3 of this Special Condition);

   f. Control of solids and floatable materials in CSOs (Compliance with this Item shall be met through the requirements imposed by Paragraphs 2 and 8 of this Special Condition);

   g. Pollution prevention programs which focus on source control activities (Compliance with this Item shall be met through the requirements imposed by Paragraph 6 of this Special Condition, **See Below**);

   h. Public notification to ensure that citizens receive adequate information regarding CSO occurrences and CSO impacts (Compliance with this Item shall be met through the requirements imposed by Paragraphs 7 and 12 of this Special Condition); and,

   i. Monitoring to characterize impacts and efficiency of CSO controls (Compliance with this Item shall be met through the requirements imposed by Paragraphs 10 and 11 of this Special Condition).

A pollution prevention plan (PPP) shall be developed by the Permittee unless one has already been prepared for this collection system. Any previously-prepared PPP shall be reviewed, and revised if necessary, by the Permittee to address the items contained in Chapter 8 of the U.S. EPA guidance document, Combined Sewer Overflows, Guidance For Nine Minimum Controls, and any items contained in previously-sent review documents from the IEPA concerning the PPP. Combined Sewer Overflows, Guidance For Nine Minimum Controls is available online at http://www.epa.gov/npdes/pubs/owm0030.pdf. The PPP (or revised PPP) shall be presented to the general public at a public information meeting conducted by the Permittee within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the pollution prevention plan complies with the requirements of this Permit and that the public information meeting was held. Such documentation shall be submitted to the IEPA within twelve (12) months of the effective date of this Permit and shall include a summary of all significant issues raised by the public, the Permittee's response to each issue, and two (2) copies of the "CSO Pollution Prevention Plan Certification" one (1) with original signatures. This certification form is available online at http://www.epa.state.il.us/water/permits/waste-water/forms/cso-pol-prev.pdf. Following the public meeting, the Permittee shall implement the pollution prevention plan within one (1) year and shall maintain a current pollution prevention plan, updated to reflect system modifications, on file at the sewage treatment works or other acceptable location and made available to the public. The pollution prevention plan shall be submitted to the IEPA upon written request. The Permittee may coordinate the development/review of the PPP and the public meeting with the City of Aurora.

Sensitive Area Considerations

7. Pursuant to Section II.C.3 of the federal CSO Control Policy of 1994, sensitive areas are any water likely to be impacted by a CSO discharge which meet one or more of the following criteria: (1) designated as an Outstanding National Resource Water; (2) found to contain shellfish beds; (3) found to contain threatened or endangered aquatic species or their habitat; (4) used for primary contact recreation; or, (5) within the protection area for a drinking water intake structure.

The Permittee shall provide information sufficient for the IEPA to make a determination pursuant to Section II.C.3 of the federal CSO Control Policy of 1994 as to which of the CSOs are authorized for discharge in this Permit discharge into Sensitive Areas. Failure to provide information sufficient for the IEPA to make this determination in the long-term control plan could result in a determination that some or all of the CSOs discharge into a sensitive area. Should the IEPA conclude that any of the CSOs listed in this Special Condition discharge to a sensitive area, the Permittee shall adress these CSOs through the long-term control plan and either relocate, control, or treat discharges from these outfalls. If none of these options are possible, the Permittee shall submit adequate justification as to why these options are not possible. Such justification shall be in accordance with Section II.C.3 of the National CSO Control Policy and shall be updated every five (5) years and submitted with the NPDES renewal application as required by the federal CSO Control Policy of 1994.

Operational and Maintenance Plans

8. The IEPA reviewed and accepted a CSO operational and maintenance plan "CSO O&M plan" on May 21, 1997 prepared for this sewerage system. The Permittee shall review and revise, if needed, the CSO O&M plan to reflect system changes.

The CSO O&M plan shall be presented to the general public at a public information meeting conducted by the Permittee within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the CSO O&M plan complies with the requirements of this Permit and that the public information meeting was held. Such documentation shall be submitted to the IEPA within twelve (12) months of the effective date of this Permit and shall include a summary of all significant issues raised by the public, the Permittee's response to each issue, and two (2) copies of the "CSO Operational Plan Checklist and Certification", one (1) with original signatures. Copies of the "CSO Operational Plan Checklist and Certification" are available online at http://www.epa.state.is.us/water/permits/waste-water/forms/cso-checklist.pdf. Following the public meeting, the Permittee shall implement the CSO O&M plan within one (1) year and shall maintain a current CSO O&M plan, updated to reflect system modifications, on file at the sewage treatment works or other acceptable location and made available to the public. The CSO O&M plan shall be submitted to the IEPA upon written request. The Permittee may coordinate the review of the CSO O&M and the public meeting with the City of Aurora.

The objectives of the CSO O&M plan are to reduce the total loading of pollutants and floatables entering the receiving stream and to ensure that the Permittee ultimately achieves compliance with water quality standards. These plans, tailored to the local governments's collection and waste treatment systems, shall include mechanisms and specific procedures where applicable to ensure:

a. Collection system inspection on a scheduled basis;

b. Sewer, catch basin, and regulator cleaning and maintenance on a scheduled basis;

c. Inspections are made and preventive maintenance is performed on all pump/lift stations;

d. Collection system replacement, where necessary;

e. Detection and elimination of illegal connections;

f. Detection, prevention, and elimination of dry weather overflows;

g. The collection system is operated to maximize storage capacity and the combined sewer portions of the collection system are operated to delay storm entry into the system; and,

h. The treatment and collection systems are operated to maximize treatment.

Sewer Use Ordinances

9. The Permittee, within six (6) months of the effective date of this Permit, shall review and where necessary, modify its existing sewer use ordinance to ensure it contains provisions addressing the conditions below. If no ordinance exists, such ordinance shall be developed and implemented within six (6) months from the effective date of this Permit. Upon completion of the review of the sewer use ordinance(s), the Permittee shall submit two (2) copies of a completed "Certification of Sewer Use Ordinance Review", one (1) with original signatures. Copies of this certification form can be obtained online at http://www.epa.state.is.us/water/permits/waste-water/forms/sewer-use.pdf. The Permittee shall submit copies of the sewer use ordinance(s) to the IEPA upon written request. Sewer use ordinances are to contain specific provisions to:

   a. prohibit introduction of new inflow sources to the sanitary sewer system;

   b. require that new construction tributary to the combined sewer system be designed to minimize and/or delay inflow contribution to the combined sewer system;

   c. require that inflow sources on the combined sewer system be connected to a storm sewer, within a reasonable period of time, if a storm sewer becomes available;

   d. provide that any new building domestic waste connection shall be distinct from the building inflow connection, to facilitate disconnection if a storm sewer becomes available;

   e. assure that CSO impacts from non-domestic sources are minimized by determining which non-domestic discharges, if any, are tributary to CSOs and reviewing, and, if necessary, modifying the sewer use ordinance to control pollutants in these discharges; and,

   f. assure that the owners of all publicly owned systems with combined sewers tributary to the Permittee's collection system have procedures in place adequate to ensure that the objectives, mechanisms, and specific procedures given in Paragraph 8 of this Special Condition are achieved.

The Permittee shall enforce the applicable sewer use ordinances.

Long-Term Control Planning and Compliance with Water Quality Standards

10. a. Pursuant to Section 301 of the federal Clean Water Act, 33 U.S.C. § 1311 and 40 CFR § 122.4, discharges from the CSOs, including the outfalls listed in this Special Condition and any other outfall listed as a "Treated Combined Sewage Outfall", shall not cause or contribute to violations of applicable water quality standards or cause use impairment in the receiving waters. In addition, discharges from CSOs shall comply with all applicable parts of 35 Ill. Adm. Code 306.305(a), (b), (c), and (d).

   b. The Permittee shall develop a Long-Term CSO Control Plan (LTCP) for assuring that the discharges from the CSOs (treated or untreated) authorized in this Permit comply with Paragraph 10.a above and all applicable standards, including water quality standards. Two (2) copies of the LTCP shall be submitted to the IEPA within thirty-six (36) months of the effective date of this Permit. The LTCP shall contain all applicable elements of Paragraph 10.c below including a schedule for implementation and provisions for re-evaluating compliance with applicable standards and regulations after implementation. The LTCP shall be:

      1. Consistent with Section II.C.4.a.i of the Policy; or,
      2. Consistent with either Section II.C.4.a.ii, Section II.C.4.a.iii, or Section II.C.4.b of the Policy and be accompanied by data sufficient to demonstrate that the LTCP, when completely implemented, will be sufficient to meet water quality standards.

   c. Pursuant to the Policy, the required components of the LTCP include the following:

      1. Characterization, monitoring, and modeling of the Combined Sewer System (CSS);
      2. Consideration of Sensitive Areas;
      3. Evaluation of alternatives;
      4. Cost/Performance considerations;
      5. Revised CSO Operational Plan;
      6. Maximizing treatment at the treatment plant;
      7. Implementation schedule;
      8. Post-Construction compliance monitoring program; and
      9. Public participation.

The Permittee shall coordinate the development and implementation of the LTCP with the City of Aurora. Following submittal of the LTCP, the Permittee shall respond to any initial IEPA review letter in writing within ninety (90) days of the date of such a review letter, and within thirty (30) days of any subsequent review letter(s), if any. Implementation of the LTCP shall be as indicated by IEPA in writing or other enforceable mechanism.

d. The IEPA recognizes the Fox River Study Group (FRSG) is currently working on funding mechanisms to gather data and to develop and calibrate a model to determine appropriate limitations and permit requirements for dischargers to the Fox River. The implementation schedule for the LTCP shall give priority to controlling, treating, or eliminating CSOs which discharge into areas where primary contact activities occur and to other areas that may be considered sensitive pursuant to Section II.C.3 of the federal CSO Control Policy. The LTCP implementation schedule may also allow for the Permittee to verify by appropriate methods, including use of the FRSG-developed model after it is calibrated, and to ensure that the selected CSO control alternatives are adequate to meet water quality standards and to protect the designated uses in the receiving waters. The length of the implementation schedule shall also be based upon financial considerations pursuant to Section II.C.8 of the federal CSO Control Policy and on the USEPA guidance document, *Combined Sewer Overflows--Guidance for Financial Capability Assessment and Schedule Development*. This document is available online at http;//www.epa.gov/npdes/pubs/csocf.pdf. Other guidance documents can be found at http://cfpub.epa.gov/npdes/cso/guidedocs.cfm.

Monitoring, Reporting and Notification Requirements

11. The Permittee shall monitor the frequency of discharge (number of discharges per month) and estimate the duration (in hours) of each discharge from each outfall listed in this Special Condition. Estimates of storm duration and total rainfall shall be provided for each storm event.

    For frequency reporting, all discharges from the same storm, or occurring within 24 hours, shall be reported as one. The date that a discharge commences shall be recorded for each outfall. Reports shall be in the form specified by the IEPA and on forms provided by the IEPA. These forms shall be submitted to the IEPA monthly with the DMRs and covering the same reporting period as the DMRs. Parameters (other than flow frequency), if required in this Permit, shall be sampled and reported as indicated in the transmittal letter for such report forms.

12. A public notification program in accordance with Section II.B.8 of the federal CSO Control Policy of 1994 shall be developed employing a process that actively informs the affected public. The program shall include at a minimum public notification of CSO occurrences and CSO impacts, with consideration given to including mass media and/or Internet notification. The Permittee shall also consider posting signs in waters likely to be impacted by CSO discharges at the point of discharge and at points where these waters are used for primary contact recreation. Provisions shall be made to include modifications of the program when necessary and notification to any additional member of the affected public. The program shall be presented to the general public at a public information meeting conducted by the Permittee. The Permittee shall conduct the public information meeting within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the public information meeting was held, shall submit a summary of all significant issues raised by the public and the Permittee's response to each issue and shall identify any modifications to the program as a result of the public information meeting. The Permittee shall submit the public information meeting documentation to the IEPA and implement the public notification program within twelve (12) months of the effective date of this Permit. The Permittee shall submit copies of the public notification program to the IEPA upon written request. The Permittee may coordinate the development of the public notification plan and the public meeting with the City of Aurora.

13. If any of the CSO discharge points listed in this Special Condition are eliminated, or if additional CSO discharge points, not listed in this Special Condition, are discovered, the Permittee shall notify the IEPA in writing within one (1) month of the respective outfall elimination or discovery. Such notification shall be in the form of a request for the appropriate modification of this NPDES Permit.

Special Conditions

Summary of Compliance Dates in this CSO Special Condition

14. The following summarizes the dates that submittals contained in this Special Condition are due at the IEPA (unless otherwise indicated):

Submission of CSO Monitoring Data (Paragraph 11)	15th of every month
Elimination of a CSO or Discovery of Additional CSO Locations (Paragraph 13)	1 month from discovery or elimination
Control (or Justification for No Control) of CSOs to Sensitive Areas (Paragraph 7)	3 months from IEPA notification
Certification of Sewer Use Ordinance Review (Paragraph 9)	6 months from the effective date of this Permit
Conduct Pollution Prevention, OMP, and PN Public Information Meeting (Paragraphs, 6, 8 and 12) **No Submittal Due with this Milestone**	9 months from the effective date of this Permit
Submit Pollution Prevention Certification, OMP Certification, and PN Information Meeting Summary (Paragraphs, 6, 8 and 12)	12 months from the effective date of this Permit
Submit CSO Long-Term Control Plan (Paragraph 10)	36 months from the effective date of this Permit

All submittals listed in this Special Condition can be mailed to the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: CSO Coordinator, Compliance Assurance Section

All submittals hand carried shall be delivered to 1021 North Grand Avenue East.

Reopening and Modifying this Permit

15. The IEPA may initiate a modification for this Permit at any time to include requirements and compliance dates which have been submitted in writing by the Permittee and approved by the IEPA, or other requirements and dates which are necessary to carry out the provisions of the Illinois Environmental Protection Act, the Clean Water Act, or regulations promulgated under those Acts. Public Notice of such modifications and opportunity for public hearing shall be provided.

SPECIAL CONDITION 15. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) Forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee may choose to submit electronic DMRs (eDMRs) instead of mailing paper DMRs to the IEPA. More information, including registration information for the eDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/edmr/index.html.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Permittees not using eDMRs shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue Eas
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: Compliance Assurance Section, Mail Code # 19

SPECIAL CONDITION 16. This Permit may be modified to include alternative or additional final effluent limitations or other requirements pursuant to an approved Total Maximum Daily Load (TMDL) Study or upon completion of an alternate Fox River Water Quality Study.

The permittee may continue to perform an instream water quality study of the Fox River in order to obtain site specific data for pH and temperature downstream of the treatment plant Outfall 001. The study, if performed, shall be conducted in accordance with the Site Specific Fox River Ammonia-Nitrogen Water Quality Study Project Plan which was approved by the Agency on May 26, 2004.

Attachment H

Standard Conditions

Definitions

t means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

_ency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

ɔan Water Act (formerly referred to as the Federal Water Pollution Control Act) means b. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for i-suing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and ɔosing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 :he Clean Water Act.

USEPA means the United States Environmental Protection Agency.

lly Discharge means the discharge of a pollutant measured during a calendar day or any -hour period that reasonably represents the calendar day for purposes of sampling. For llutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average ·asurement of the pollutant over the day.

ıximum Daily Discharge Limitation (daily maximum) means the highest allowable daily uischarge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable erage of daily discharges over a calendar month, calculated as the sum of all daily ;charges measured during a calendar month divided by the number of daily discharges ɔasured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable 'erage of daily discharges over a calendar week, calculated as the sum of all daily ;charges measured during a calendar week divided by the number of daily discharges ɔasured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution waters of the State. BMPs also include treatment requirements, operating procedures, and actices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage ıum raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

ab Sample means an individual sample of at least 100 milliliters collected at a randomly-lected time over a period not exceeding 15 minutes.

24 Hour Composite Sample means a combination of at least 8 sample aliquots of at least 0 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-ur period.

8 Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour -riod.

ɔw Proportional Composite Sample means a combination of sample aliquots of at least ıu0 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(5) **Proper operation and maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency, upon request, copies of records required to be kept by this permit.

(9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency, upon the presentation of credentials and other documents as may be required by law, to:

   (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

   (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

   (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

   (d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records.**

   (a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

   (b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. This period may be extended by request of the Agency at any time

   (c) Records of monitoring information shall include:

      (1) The date, exact place, and time of sampling or measurements;

      (2) The individual(s) who performed the sampling or measurements;

      (3) The date(s) analyses were performed;

      (4) The individual(s) who performed the analyses;

      (5) The analytical techniques or methods used; and

      (6) The results of such analyses.

   (d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified.

   (a) **Application.** All permit applications shall be signed as follows:

      (1) **For a corporation:** by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation;

      (2) **For a partnership or sole proprietorship:** by a general partner or the proprietor, respectively; or

      (3) **For a municipality, State, Federal, or other public agency:** by either a principal executive officer or ranking elected official.

   (b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

      (1) The authorization is made in writing by a person described in paragraph (a); and

      (2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

      (3) The written authorization is submitted to the Agency.