APPENDIX H

2025 PEAK HOURLY FLOWS

Design Peak Hourly Flows (5-Year Storm), mgd

Pre-Rehabilitation

	2010	2015	2020	2025
1 Combined Sewer	50.53	50.53	50.53	50.53
2 North Aurora Interceptor	64.44	66.69	68.94	71.19
3 Waubonsie Interceptor	43.72	44.37	45.02	45.67
4 Boulder Hill Interceptor	12.86	13.99	15.12	16.26
5 Oswego Interceptor	11.05	16.58	22.1	27.63
6 Caterpiller Service	2.20	2.20	2.20	2.20
	184.8	194.36	203.91	213.48

Post-Rehabilitation

	2010	2015	2020	2025
1 Combined Sewer	50.53	50.53	50.53	50.53
2 North Aurora Interceptor	45.21	47.77	50.33	52.89
3 Waubonsie Interceptor	25.97	28.18	30.38	31.95
4 Boulder Hill Interceptor	10.25	11.04	11.84	12.74
5 Oswego Interceptor	10.56	14.57	19.99	24.03
6 Caterpiller Service	2.20	2.20	2.20	2.20
	144.72	154.29	165.27	174.34
Satellite Storage Benefit, mgd	40.08	40.07	38.64	39.14

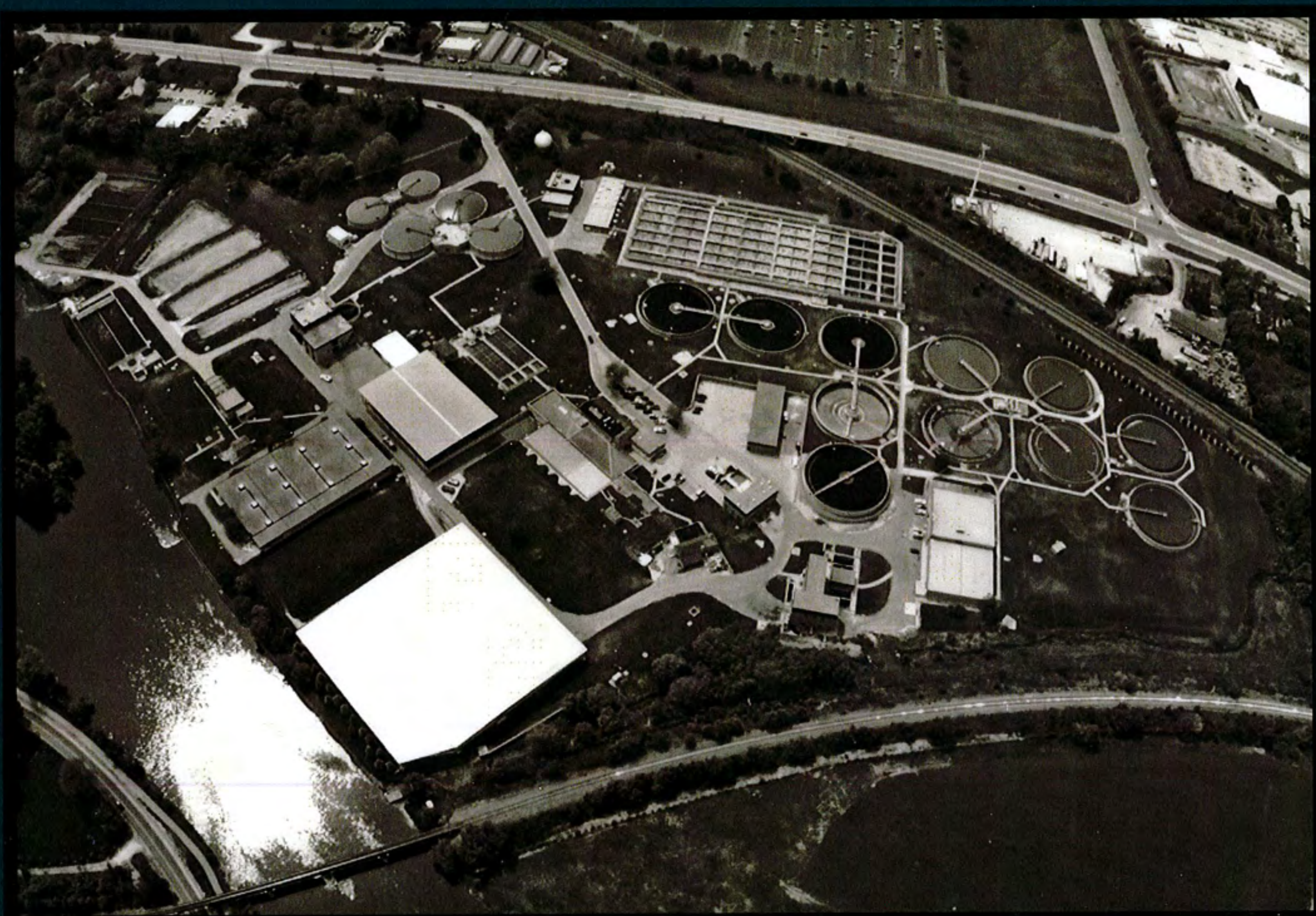
APPENDIX I

ISWS MODELING

EFFECTS OF FMWRD DISCHARGES DURING STORM EVENTS ON FOX RIVER WATER QUALITY

Fox Metro
Water Reclamation District

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



March 31, 2010

Prepared By:

Walter E. Deuchler Associates, Inc.
Consulting Engineers

Modeling Effects of FMWRD Discharges During Storm Events On Fox River Water Quality

DRAFT SUMMARY REPORT

by
Alena Bartosova, William Gillespie, Jory Hecht, and Michal Ondrejcek

Illinois State Water Survey
2204 Griffith Drive
Champaign IL

Report presented to the
Fox Metro Water Reclamation District

March 2010

Abstract

This report describes the development of a water quality model for an eight-mile reach of the Fox River in Aurora, Illinois, and evaluates the impact of the Fox Metro Water Reclamation District (FMWRD) discharges during storm events on water quality in the Fox River. This project focuses on quantifying water quality impacts of proposed modifications at the FMWRD facilities on the Fox River to aid in development of the FMWRD Long Term Control Plan.

A simulation model was developed for the Fox River reach from Sullivan Road Bridge in Aurora to Route 34 Bridge in Oswego within WASP software. The model was calibrated for two storm events and verified for two storm events. In addition, the calibrated model was set to simulate May-October 2008, to validate the model coefficients, and any long term trends that would not be detectable during the short event simulations. The calibrated model was then set to simulate impacts from the FMWRD discharges under existing and proposed conditions. The upstream boundary was shifted from the Sullivan Road Bridge to the Mill Street Bridge. The impact of three design storms (1-year, 5-year, and 10-year) is evaluated for all constituents. The impacts on ammonia nitrogen, total phosphorus, and dissolved oxygen were also evaluated for the 3-month storm. The impact of the "no action" condition on ammonia and dissolved oxygen was evaluated for the 5-year storm. The impact was evaluated from two different perspectives. First, a change from existing to proposed conditions was assessed. Second, a compliance with water quality standards was evaluated for constituents with applicable ambient water quality standards (fecal coliform bacteria and ammonia nitrogen) or a value used to list a constituent as a potential cause of impairment (total suspended solids, nitrate nitrogen, and total phosphorus).

For all constituents, maximum simulated concentrations under proposed conditions are lower than maximum simulated concentrations under existing conditions. Model simulations indicate the proposed FMWRD discharges under the normal treatment level a) do not cause an exceedance of the water quality standard for fecal coliforms for 5-year and smaller storms, b) would likely not cause exceedances of ammonia water quality standards unless pH and temperature reach high values or upstream ammonia concentrations are high, c) would likely cause exceedance of the total phosphorus listing value when no chemical treatment is applied to CEPT and large storms occur during low flows and high phosphorus concentrations in the Fox River upstream of the FMWRD, and d) would not cause exceedances of the total suspended solids and nitrate nitrogen listing values

Acknowledgments

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Any opinions, findings, conclusions, or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of the Fox Metro Water Reclamation District, the Illinois State Water Survey nor the University of Illinois.

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Introduction

The City of Aurora, with a population of 170,855, resides on the Fox River in Kane County[1]. The city was established as a settlement in the late 1830s and 1840s by millwrights that found the Fox River was particularly conducive to the construction of hydropower mills (J. Manger, personal communication, March 30, 2009). They impounded portions of the river with low-head dams and constructed the early lumber, grist, and wool carding mills. Starting in 1886, the municipal drainage system was installed (E. Schoeny, personal communication, March 30, 2009). This system combined stormwater, domestic wastewater, and industrial wastewater for discharge directly into the Fox River.

The combined sewer system and the growth of the city caused the quality of Fox River's water to suffer. Public health problems began to surface, and in 1928 the Fox Metro Water Reclamation District (FMWRD) wastewater treatment plant was constructed to treat the wastewater from the City of Aurora and surrounding areas (E. Schoeny, personal communication, March 30, 2009). Interceptor lines were installed to convey wastewater from the combined sewer system to the treatment plant. In order to avoid sewer backups during intense precipitation events while keeping construction costs low, interceptor lines were sized to collect wastewater flows from the combined sewer system during normal flow conditions, and overflow structures were installed to carry excess stormwater into the adjacent river. The overflow structures contain a weir, such that when the interceptor reaches a certain capacity, the weir is overtopped and the excess flow is diverted to the Fox River. In this manner a mixture of untreated stormwater and wastewater enters the Fox River during intense precipitation events through combined sewer overflows (CSOs).

Though progress has been made to separate stormwater from wastewater, 1,813 acres of the city have stormwater draining to the combined sewer system. Currently, 15 permitted CSOs discharge into the Fox River and one permitted CSO discharges into Indian Creek. These 16 CSOs are owned by the City of Aurora. The FMWRD has one permitted CSO that is designed to limit the influent flow rate within the plant capacity during storm events.

Both the City of Aurora and the FMWRD are required to submit a CSO Long-Term Control Plan (LTCP) to the Illinois Environmental Protection Agency (IEPA). The FMWRD retained the engineering consulting company Walter E. Deuchler Associates, Inc. (WEDA) to prepare the LTCP on their behalf. This study supports the LTCP development, focusing on evaluating impacts of the FMWRD storm discharges on water quality in the Fox River using a computer model capable of simulating the loading of CSO pollutants and the fate of those pollutants within the Fox River. The following constituents were selected for evaluation: fecal coliform bacteria, total suspended solids, ammonia nitrogen, nitrate nitrogen, total nitrogen, total phosphorus, 5-day biochemical oxygen demand (BOD_5), and dissolved oxygen. This report summarizes the model development and anticipated impacts of storm-related discharges from the existing and proposed FMWRD facilities on the Fox River water quality.

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[1] U.S. Census Bureau, 2007 population estimate, http://www.census.gov/

Model Development

Computer Model Selection

The first step is to select the software that will be used for simulation. There are several computer models that can simulate in-stream water quality. To achieve the goals of this project, the selected model needs to simulate the dynamic nature of the Fox River system during storm events as water quality and quantity are constantly changing with varying upstream conditions and intermittent CSO discharges. The water quality parameters modeled and methods through which they are simulated are also significant. The following water quality models were considered and evaluated taking into account cost, developer's support, the model's ability to simulate a hydrodynamic non-steady state on branching rivers with low head dams, and constituents simulated: WASP (Wool et al., 2001 and Wool, 2009), QUAL2K (Champra and Pelletier, 2003), CE-QUAL2-W2 (Cole and Buchak, 1995), EPD-RIV1 (Martin and Wool, 1995), SWMM-TRANSPORT (Rossman, 2009), and DUFLOW (2000).

WASP was selected since it is a free model developed and supported by the United States Environmental Protection Agency (USEPA). WASP is also regularly updated to include current knowledge of in-stream processes. WASP includes several modules. Two of those modules, HEAT and EUTRO, were utilized in this study. The EUTRO module simulates nutrient cycles, including organic matter, algae, and dissolved oxygen. The HEAT module simulates temperature and a general first-order decay constituent used to simulate fecal coliform bacteria. Dissolved oxygen, algae, and temperature were not simulated in this study due to the complexity of the constituent behavior under rapidly changing conditions associated with storm runoff and a lack of observed data.

Segmentation and Model Structure

The study area includes Fox River from the Sullivan Road bridge in Aurora to the Route 34 (Washington Street) pedestrian bridge in Oswego. This 8-mile reach of the Fox River contains 16 sizeable islands, 15 combined sewer overflows, 42 storm drains, two tributaries, a FMWRD effluent discharge and overflow, and a discharge from the Marina sanitary treatment plant (STP). The challenge for model segmentation was to select a segmentation scheme that promoted accurate representation of the river system while also accommodating the CSO inputs. The resulting segmentation consists of 51 segments, of which 32 were utilized to fraction flow around islands.

Each segment was selected with an emphasis on homogeneity of the channel characteristics, consistency of travel time, and location of discharges. Figure 1 shows the study reach segmentation. Waubonsie Creek joins the Fox River just a short distance upstream of Route 34, the model's downstream boundary (Segment 51). Waubonsie Creek was excluded from simulation due to lack of discharge and water quality data as well as an insufficient distance for mixing (Figure 2). Grab samples would not reflect any contribution from this tributary as those are typically collected mid-stream.

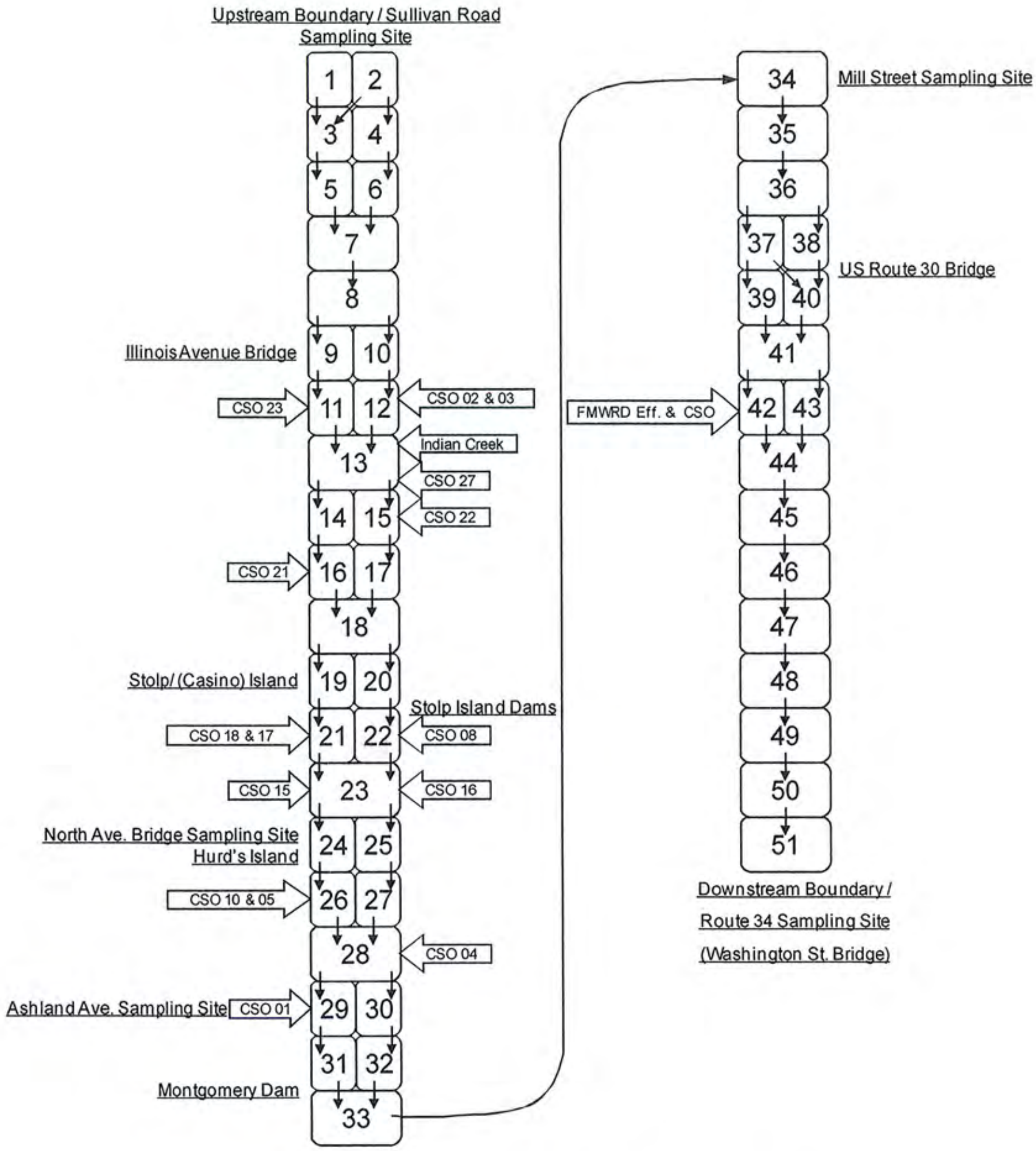


Figure 1. Model segmentation and flow branching

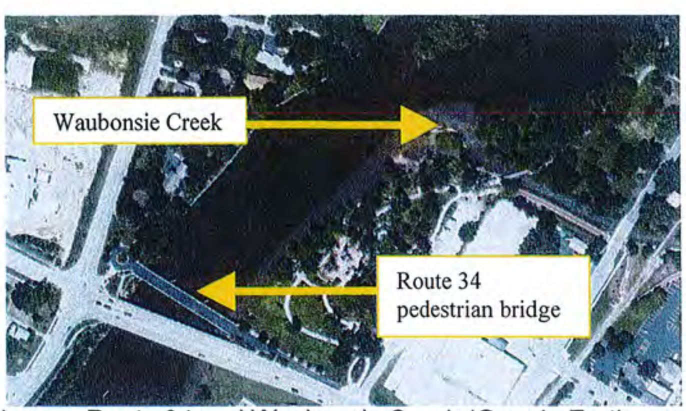


Figure 2. Aerial image, Route 34 and Waubonsie Creek (Google Earth, accessed 4/9/2009)

Modeling Approach

The computer model needs to be calibrated and validated to ensure it simulates realistic conditions in the study reach. Hydraulic coefficients were calibrated using depth and velocity measurements collected at several locations by WEDA and at Mill Street downstream of the Montgomery gage by the USGS. Water quality coefficients were calibrated using data collected by WEDA during two storm events in 2008 and verified using data collected by WEDA during one storm event in 2008 and one in 2009. The calibrated model was also used to simulate water quality for May-October 2008 to evaluate any cumulative impacts and trends. The long-term simulation verified overall model performance under various conditions.

To simulate the impact of the CSOs on the Fox River, the computer models were set to simulate relatively short time periods, typically less than one week, during which CSOs occurred. Hydraulic simulations indicated that the overall retention time of the 8-mile study reach varied from 8 hours during high-flow periods to 24 hours during low-flow periods. Focusing the simulations on CSO discharges from a single precipitation period allowed for a short simulation time step (5 minutes) with more accurate comparison of observed values to model results. This event-calibrated model would be used later in the project to simulate the impact of CSOs under existing conditions and proposed modifications at the FMWRD facilities using a design rain of specified duration and frequency.

Initially, three time periods were chosen when CSOs occurred and water quality data were collected for CSOs and Fox River stations. July 7-12, 2008 and August 3-6, 2008 data were used to calibrate the model. The model was then verified using September 1-4, 2008 data. Figure 3-Figure 5 show flows in the Fox River at Route 34 pedestrian bridge during the simulated time periods and times when water quality samples were collected at the same location. Figure 6 then shows when CSOs stopped discharging, when the discharged flow would be expected to pass through the Route 34 sampling site, and times when water quality samples were collected at Route 34 for days when CSOs discharged during simulated periods. While travel times include only transport without additional effects of dispersion or stormwater contribution, these figures indicate most water quality samples were collected after the CSO discharge passed through the sampling site, catching the receding portion of the pollutograph at best (note the gap between the travel-time lines and sample markers; they overlap only for the 8/4/2008 event and the 8/7/2009 intensive sampling event). Simulated CSO events occurred at night, making river sampling difficult to accomplish within the needed time-frame considering the relatively short travel time.

To alleviate this problem, an intensive sampling for a limited number of constituents (fecal coliform bacteria, total phosphorus, total suspended solids, and ammonia nitrogen) was conducted by WEDA on August 7, 2009. This sampling was limited to three bridges on the Fox River (Sullivan Street, Mill Street, and Route 34), but separate samples were collected from east, west, and middle portions of the channel at 15-20-minute intervals. Separate analyses across the channel were designed to evaluate the level of mixing as simulations of 2008 periods indicated incomplete mixing at some locations. Although samples were analyzed for ammonia nitrogen, the laboratory detection limit was too high ()0.1 mg/l and majority of data was reported as below detection limit. Figure 7 indicates samples at Route 34 were taken during the rising portion of the hydrograph during intensive sampling.

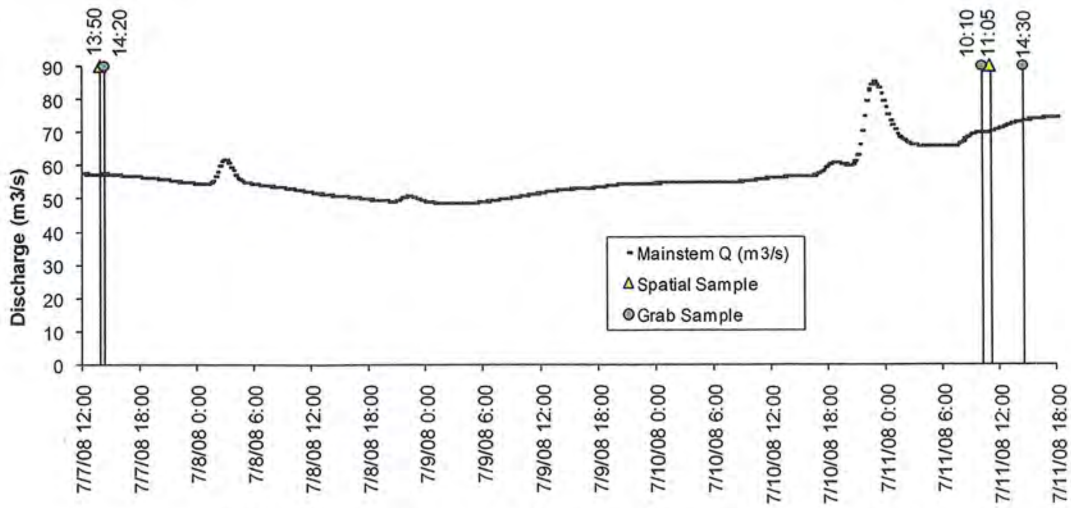


Figure 3. Sampling timeline 7/7-11/2008 at Route 34 pedestrian bridge

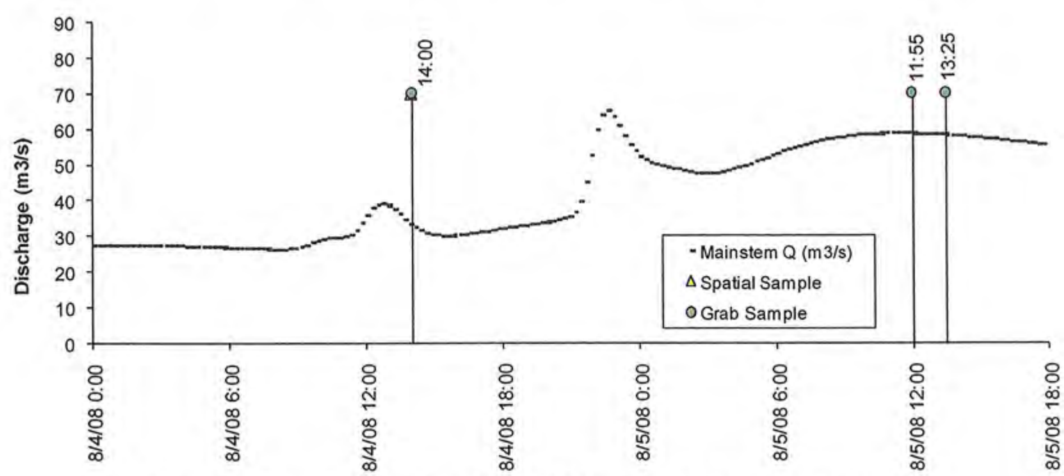


Figure 4. Sampling timeline 8/4-5/2008 at Route 34 pedestrian bridge

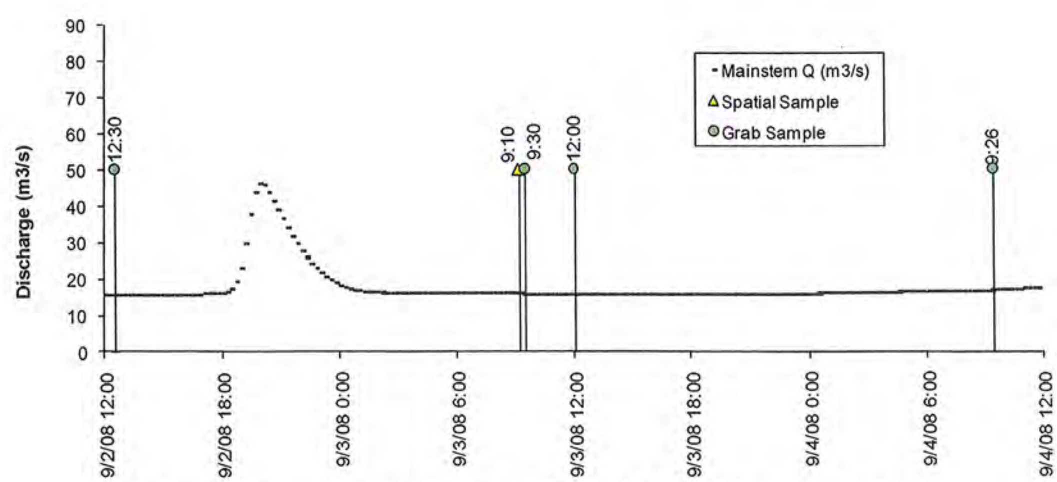


Figure 5. Sampling timeline 9/2-4/2008 at Route 34 pedestrian bridge

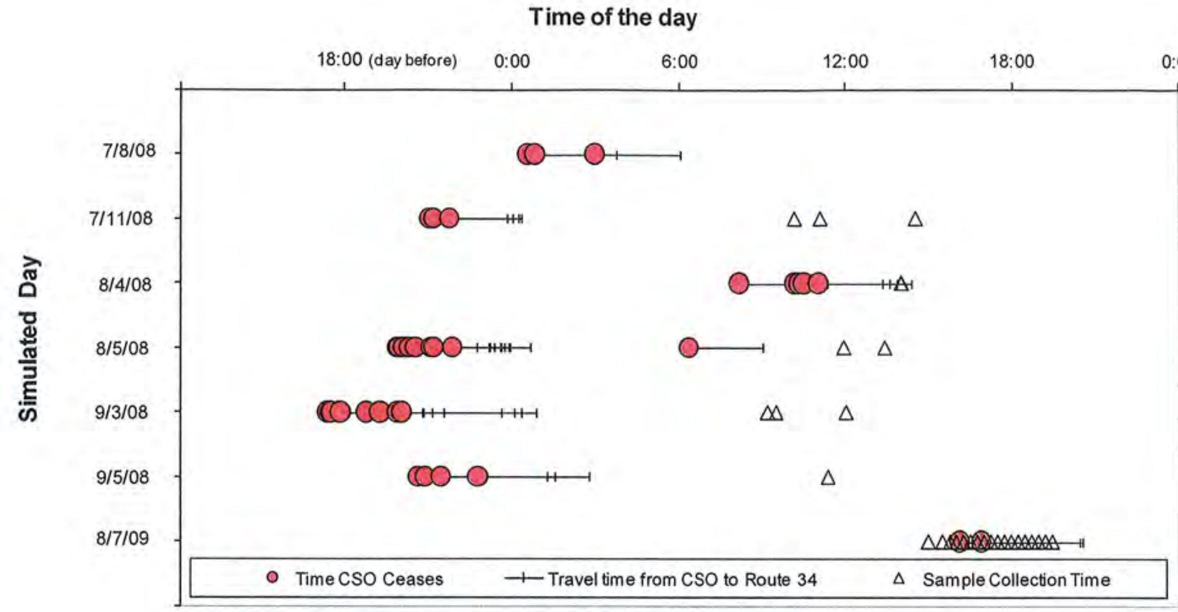


Figure 6. Timing of CSOs passing through Route 34 and sampling times

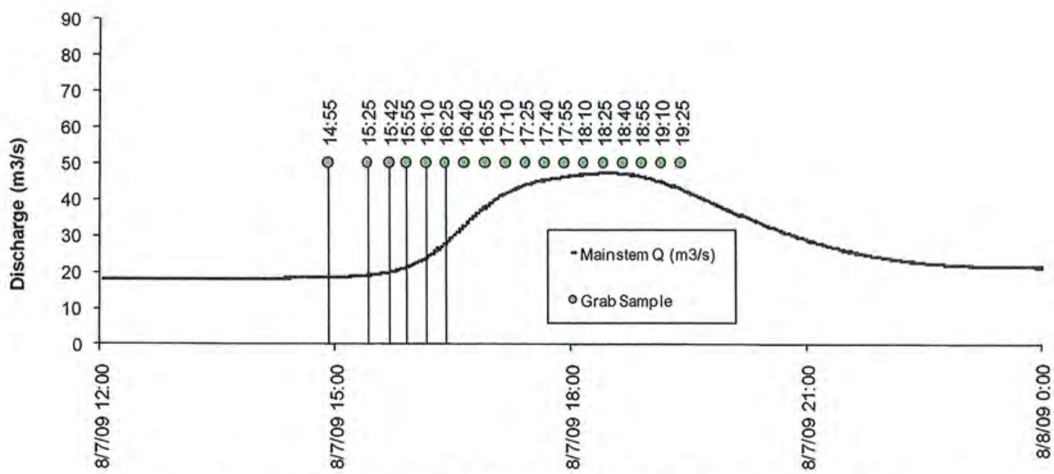


Figure 7. Sampling timeline 8/7-8/2009 at Route 34 pedestrian bridge

Data Sources

Computer simulation models are data intensive. For each simulated period, complete information on water quality and quantity is needed for the Fox River, the Indian Creek, all Aurora CSO discharges, the FMWRD effluent and CSO, the Marina STP, and storm drains. WEDA operates gages at the North Aurora Dam and an adjacent mill race on the Fox River and at an abandoned railroad bridge on Indian Creek just east of Route 25 (Broadway Street, Aurora). Since there are no significant discharges between North Aurora Dam and the study upstream boundary at Sullivan Road Bridge, the discharge at North Aurora Dam is combined with the discharge from the adjacent mill race and is used directly as a model input at Sullivan Road Bridge.

Water quality sampled by WEDA at Sullivan Road Bridge and at the abandoned railroad bridge on Indian Creek is also entered directly as model inputs at these locations. While discharge is available at 5-minute intervals, water quality data are collected at much more infrequent and irregular intervals. For event-based simulated periods, a simple interpolation routine is used by WASP to provide concentration information for time periods without observed values. For summer 2008 simulation, water quality data were analyzed for any flow and seasonal variations and where appropriate, relationships were developed to provide missing concentrations at critical points in time (e.g., significant change in flow).

The FMWRD provided average daily discharge information for the treated effluent and the start time, duration, and total volume for discharges through its CSO. Self-reported average monthly discharge data from the Discharge Monitoring Report (DMR) were downloaded from EnviroFacts (USEPA, 2009) to provide water quantity and quality information for Marina STP.

CSO Inputs

All Aurora's active CSOs are equipped with a flow meter recording data in 5-minute intervals. Automated samplers were installed at the seven largest or most active CSOs, collecting water quality data at pre-determined time intervals during a CSO discharge. When a CSO without automated sampler discharged during the simulated period, the discharged load was estimated using the "CSO Load Estimator" tool. This tool uses build-up and wash-off equations to develop a relationship between a load discharged from a CSO and CSO discharge characteristics such as peak discharge, duration of discharge, and time from a previous discharge:

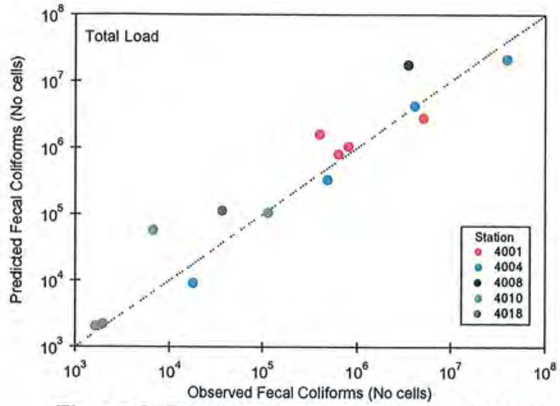
$$P_t = \{(I/\xi)(1-\exp(-\xi D)) + P(0)\exp(-\xi D)\}(1-\exp(-Krt))$$

where P_t is the amount of pollutants washed out of the system after time t, I is the sum of all inputs, ξ is the removal coefficient, D is the time since the last CSO event, $P(0)$ is the initial amount of pollutants in storage at first discharge, r is the maximum discharge intensity, and K is the wash-off coefficient. Assuming that $P(0)$ is zero and that all CSO outlets have the same characteristics, the constants I, ξ, and K were found for simulated constituents using data from fully monitored CSOs (Table 1). Figure 8 compares actual loads calculated from observed concentrations and loads estimated using the build-up and wash-off equations above for ammonia nitrogen and fecal coliforms. Each individual CSO discharge is represented by a point, colored by a corresponding CSO pipe. The points are evenly scattered along the 1:1 line indicating a good fit and no bias with respect to total load. The full equation was then applied to CSOs where only discharge is recorded.

The total load for each unmonitored CSO calculated using the build-up and wash-off equation was then distributed over the duration of the CSO discharge using fractional volume and load relationships. Cumulative load and volume were calculated for the monitored CSOs and divided by total load and volume for each CSO discharge, respectively, to determine fractional loads and volumes. Figure 9 shows the fractional relationships for ammonia nitrogen with a best fit line. A sharp increase from (0,0) point would indicate that a higher proportion of the load was discharged at the beginning of the CSO (first flush).

Table 1. Optimized coefficients for total CSO load calculations

Constituent	*I [kg/day]*	*ξ [1/day]*	*K [s/day/m3]*
BOD_5	813610	43.948	0.30018
Fecal coliform	8.49E+09	55.15	0.434
Total suspended solids	2.73E+06	47.061	0.38306
Organic nitrogen	49384	39.493	0.61969
Ammonia nitrogen	2084.9	15.724	1.0459
Nitrite nitrogen	901.34	11.871	0.094968
Nitrate nitrogen	43.852	4.5656	10.712
Kjeldahl nitrogen	57204	38.649	0.60588
Total phosphorus	18604	42.894	0.34839
Dissolved phosphorus	313.22	73.558	8.583



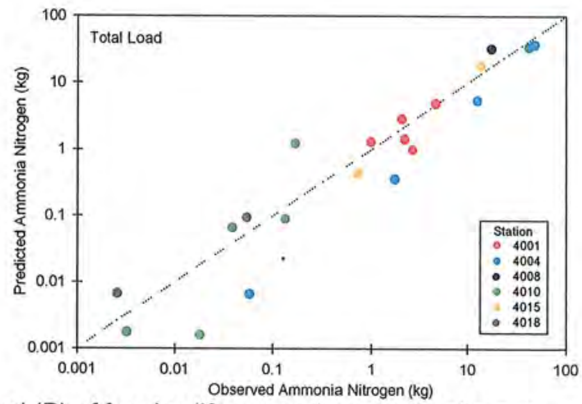


Figure 8. Predicted versus observed total load (P) of fecal coliforms and ammonia nitrogen

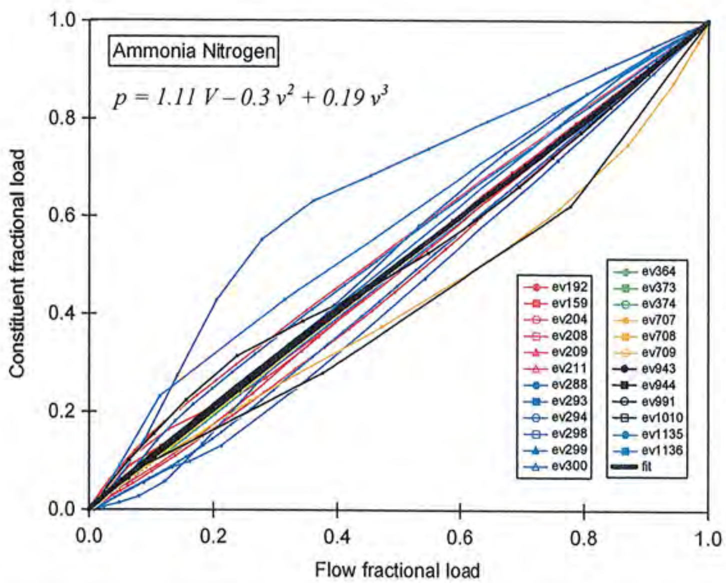


Figure 9. Fractional load (p) of ammonia nitrogen as a function of fractional volume (v) discharged

Stormwater Contribution

The study reach also contains 43 stormwater drainage outfalls that contribute water and pollutant loadings to the Fox River. Total contributions from storm drains during simulated periods had to be estimated to properly calibrate the model. In 2008, WEDA collected several water quality samples from three storm drains in different areas near their outfalls to Fox River. In 2009, this monitoring was enhanced by installing a gage that provides stage and discharge information during runoff events. These data enabled site-specific estimation of loads and volumes released to the Fox River in the study area.

Precipitation data were obtained from the rain gage located at and operated by WEDA. The WEDA office is centrally located within the project area. The data for each simulated time period were divided into intervals of consistent intensities. The intensity for each time interval was used to estimate the peak discharge using the rational equation. Although the rational equation is not recommended for watersheds over 200 acres in size, it provides an acceptable method for purposes of this study since the contributing area (9,735 acres) is divided into 43 discharge points. In-depth hydrologic analysis for this highly urbanized area would be beyond the scope of this project.

The peak runoff rates used to create the runoff hydrographs were calculated by the rational formula:

$$Q = CC_f IA,$$

where Q is the peak runoff in ft^3/s, C is the runoff coefficient, C_f is the frequency factor, I is the intensity in inch/hour, and A is the watershed area in acres (Debo and Reese, 2003). The widely accepted runoff coefficients were developed for storms with intensities in the 5-year to 10-year return interval range. Storms during the simulated time periods include those with return intervals of much less than 5 years. The frequency factor allowed for a more accurate prediction of the actual peak runoff. A water balance and hydrologic analysis validated the stormwater volume and peak runoff approximated using the rational method. The time of concentration was calculated for the project watershed with the Federal Aviation Administration (FAA) formula:

$$t_c = \frac{0.39(1.1 - C)L^{\frac{1}{2}}}{S^{1/3}}$$

where C is the runoff coefficient, L is the length of flow path in feet, and S is the average slope (FAA, 1970). Peak runoff values and the resulting hydrograph were adjusted for storms shorter than time of concentration. The calculated stormwater volume for each time interval was distributed proportionally across individual storm drain outfalls based on the contributing area, or, when unknown, on pipe cross-sectional areas assuming pipes are sized properly to carry runoff from their respective contributing areas.

Water quality data collected by WEDA at the stormwater outfalls were analyzed for any patterns with respect to storm duration (first flush effect). Data for any distinct periods were then processed to determine 25^{th}, 50^{th}, and 75^{th} percentiles to represent widely variable stormwater quality. All three values were used in simulations representing low, medium, and high concentrations, respectively. The results from these simulations were compared in the same chart to evaluate variability due to varying stormwater quality.

Model Calibration and Verification

Both graphical and statistical measures were used during calibration to evaluate how well the model simulates water quality in the Fox River. For each water quality sample, percent error was calculated as *(Simulated – Observed) / (Observed) *100%* using a simulation with 50th percentile concentrations for stormwater quality. Average and median percent errors for each station are given in Table 2 for calibration and Table 3 and Table 4 for verification. Ideally, the error would be zero. A negative number shows underestimation while positive numbers show an overestimation. The median error is not affected by a presence of a large value, positive or negative, while the mean error can be especially for a small sample size. For fecal coliform bacteria, the percent error was also calculated for logarithms of simulated and observed values. Fecal coliform values can vary significantly even between two samples taken at the same location and time (duplicate samples). Bartosova et al. (2010) showed variation between duplicate samples can often be 40%. Calculating the percent error from logarithmically transformed values evaluates error in the order of magnitude.

The limited number of observed data during most simulated periods was unfortunately collected outside the time period when Fox River water quality was affected by CSO discharges. It is extremely difficult to time a sample collection in a system with relatively short travel times especially when exact times of CSO discharges are not known before sampling is initiated. The data on the FMWRD treated effluent are only available as daily averages that do not describe diurnal or storm-related changes in discharged volume and loads during the event. Stormwater discharges were estimated from a single precipitation station and under simplifying assumptions. All these factors contribute to the final accuracy of simulation.

For illustration, graphical comparisons of simulated and observed data for fecal coliform bacteria are shown in Figure 10 through Figure 12. Four simulation results are shown for each simulated period: 25th, 50th, and 75th percentile for concentrations of pollutants in stormwater, and a hypothetical case with no stormwater discharge to isolate the effects of CSOs. While observed values at the receding portion of the pollutograph on July 11, 2008 (Figure 10a) follow simulations rather well, the increased concentration at that time was caused by stormwater contributions as indicated by the "no stormwater" simulation. Also note the second peak in Figure 10b for the "no stormwater" simulation; the sustained increase in fecal coliform bacteria was mostly due to the FMWRD CSO that was actively discharging on August 5, 2008. Direct comparison of observed and simulated values is presented for summer 2008 using the 50th percentiles for stormwater concentrations (Figure 12).

The "no stormwater" simulations indicate that water quality samples collected during the calibration events represent conditions before any CSO discharge occurred and after it has passed through the monitoring location, reflecting upstream conditions or effects of stormwater. Sampling during validation events was more successful. The lack of data during the peak of the pollutograph make it impossible to verify peak simulated values by field observations. However, they are the best estimates by the model mostly determined by mixing as travel time is short.

During the intensive sampling event, samples were taken and analyzed separately at three different locations for each sampling site characterizing concentration at the east, middle, and west sections of Fox River. The lowest and the highest observed values are plotted together with a geometric mean of all three values to show the variation of fecal coliform bacteria within a cross-section (Figure 11b). While there is a lot of variation in the highest observed values (order of magnitude), simulated values follow the observed mean rather well.

Table 2. Average percent error at Route 34 - Calibration

Constituent	*Simulated Period*	*Number of Samples*	*Statistic*	*Station*			
				North Ave.	*Ashland Ave.*	*Mill St.*	*Route 34*
BOD_5	7/8/2008	3	Mean	-3%	-4%	-11%	-18%
			Median	-1%	-1%	-11%	-21%
	8/4/2008	3	Mean	8%	-13%	-4%	-2%
			Median	3%	-19%	4%	7%
TSS	7/8/2008	3	Mean	-10%	-6%	-18%	-30%
			Median	-17%	-10%	-22%	-29%
	8/4/2008	3	Mean	13%	-1%	-5%	-2%
			Median	3%	1%	-5%	-4%
NH3,4	7/8/2008	4	Mean	20%	26%	44%	84%
			Median	47%	40%	50%	83%
	8/4/2008	3	Mean	-5%	-15%	-9%	17%
			Median	-10%	-17%	-12%	14%
NO3	7/8/2008	4	Mean	7%	-2%	-5%	87%
			Median	-3%	-10%	-4%	65%
	8/4/2008	3	Mean	-30%	-25%	-15%	3%
			Median	-30%	-24%	-22%	6%
TN	7/8/2008	3	Mean	13%	3%	4%	18%
			Median	8%	-8%	-2%	11%
	8/4/2008	3	Mean	-12%	-10%	-5%	-5%
			Median	-12%	-10%	-9%	0%
TP	7/8/2008	4	Mean	7%	2%	3%	61%
			Median	5%	3%	4%	63%
	8/4/2008	3	Mean	4%	-1%	-2%	2%
			Median	5%	-2%	-3%	17%
FC	7/8/2008	3	Mean	-32%	-8%	3%	38%
			Median	-32%	-13%	3%	27%
	8/4/2008	3	Mean	56%	-15%	-13%	-19%
			Median	25%	0%	0%	-22%
	On logarithmic scale						
	7/8/2008	3	Mean	-6%	-2%	0%	3%
			Median	-6%	-3%	0%	4%
	8/4/2008	3	Mean	5%	-3%	-3%	-3%
			Median	3%	0%	0%	-4%

Table 3. Average percent error at Route 34 – Validation

Constituent	*Simulated Period*	*Number of Samples*	*Statistic*	*Station* *North Ave.*	*Ashland Ave.*	*Mill St.*	*Route 34*
BOD_5	Summer 08	51	Mean	20%	7%	10%	12%
			Median	1%	-2%	1%	8%
	9/2/2008	3	Mean	-17%	-18%	-18%	-21%
			Median	-20%	-23%	-26%	-24%
TSS	Summer 08	51	Mean	2%	0%	-2%	-5%
			Median	3%	1%	-3%	-7%
	9/2/2008	3	Mean	13%	8%	21%	24%
			Median	8%	4%	28%	34%
NH3,4	Summer 08	46	Mean	40%	24%	62%	133%
			Median	26%	10%	45%	99%
	9/2/2008		Mean	32%	54%	110%	260%
			Median	27%	7%	103%	299%
NO3	Summer 08	48	Mean	33%	-1%	1%	51%
			Median	-1%	0%	1%	32%
	9/2/2008		Mean	17%	21%	23%	268%
			Median	16%	21%	25%	280%
TN	Summer 08	45	Mean	4%	0%	-1%	21%
			Median	0%	-1%	-1%	15%
	9/2/2008		Mean	12%	13%	13%	88%
			Median	15%	15%	16%	88%
TP	Summer 08	47	Mean	13%	14%	11%	25%
			Median	3%	4%	4%	16%
	9/2/2008		Mean	16%	22%	25%	48%
			Median	7%	9%	14%	55%
FC	Summer 08	46	Mean	125%	29%	54%	56%
			Median	-22%	-17%	-15%	-15%
	9/2/2008	5	Mean	-53%	-46%	-2%	87%
			Median	-50%	-50%	-20%	30%
	On logarithmic scale						
	Summer 08	46	Mean	1%	-1%	1%	0%
			Median	-5%	-3%	-3%	-3%
	9/2/2008	5	Mean	-15%	-12%	-4%	4%
			Median	-12%	-12%	-5%	7%

Table 4. Average percent error – Intensive sampling event on 8/7/2009

	Number of Samples	*Statistic*	*Mill Street West*	*Mill Street Middle*	*Mill Street East*	*Route 34 West*	*Route 34 Middle*	*Route 34 East*
BOD_5	18	Mean	-0.4%	2.4%	-5.9%	14.1%	-1.5%	-7.4%
		Median	-2.4%	2.6%	-6.1%	12.1%	-0.3%	-5.9%
TSS	18	Mean	7%	2%	-4%	0%	-11%	-21%
		Median	8%	4%	-3%	1%	-14%	-19%
TP	18	Mean	5%	16%	8%	-43%	80%	98%
		Median	3%	4%	4%	-44%	83%	94%
FC	18	Mean	103%	113%	35%	-1%	106%	115%
		Median	1%	-7%	-12%	-20%	-47%	-10%
	On logarithmic scale							
	18	Mean	2%	5%	0%	-4%	-2%	-1%
		Median	0%	-1%	-2%	-3%	-8%	-2%

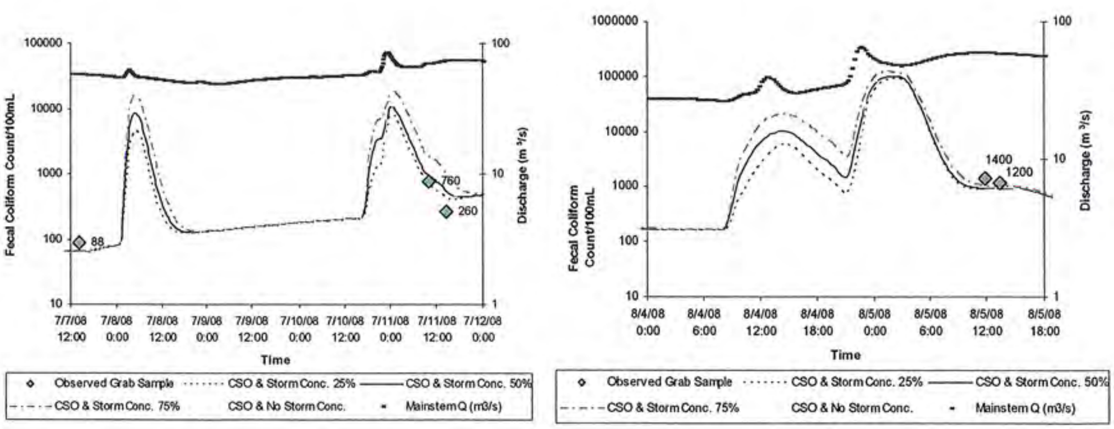


Figure 10. Fecal coliform calibration a) 7/8/2008-7/10/2008 and b) 8/4-5/2008; at Route 34 Bridge

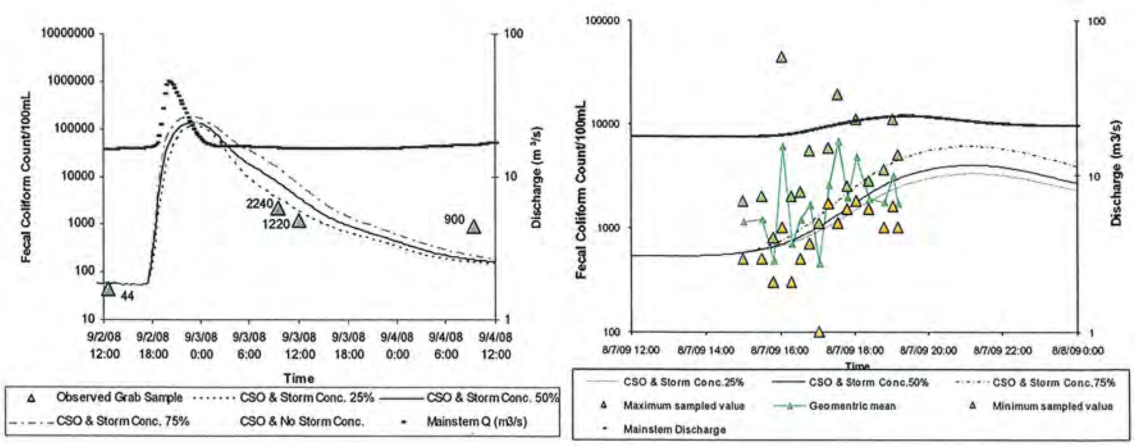


Figure 11. Fecal coliform validation a) 9/2-4/2008 and b) 8/7-8/2009; at Route 34 Bridge

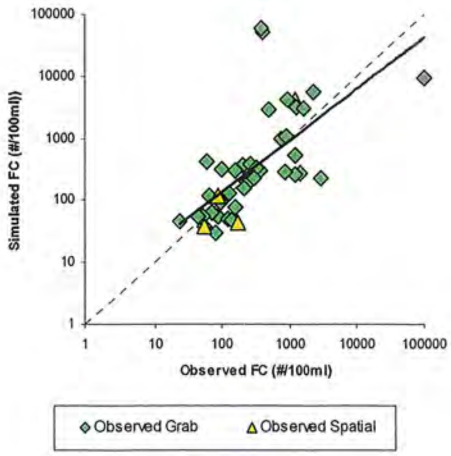


Figure 12. Fecal coliform validation for summer 2008 at Route 34 Bridge

Figure 13 presents the mean and median errors graphically for each constituent and monitoring location separately. Overall, about half of the errors are within ±10% and most of the errors are within ±30%. Ammonia nitrogen consistently shows the largest departure from observed data for all locations. Route 34 also shows errors for nitrate nitrogen and total phosphorus are larger than for other locations. Fox River at the Route 34 location exhibits strong cross-sectional variation for some constituents caused by incomplete mixing of FMWRD discharges as confirmed by intensive sampling conducted by WEDA. Since only the first sample during a storm sampling was collected as a spatial composite, all additional (grab) samples do not necessarily reflect the average water quality in the cross section simulated by the model. The incomplete mixing then results in a large error at Route 34. The model is expected to simulate higher concentrations of ammonia nitrogen, nitrate nitrogen, and total phosphorus than indicated by observed values when used to for design storm simulations.

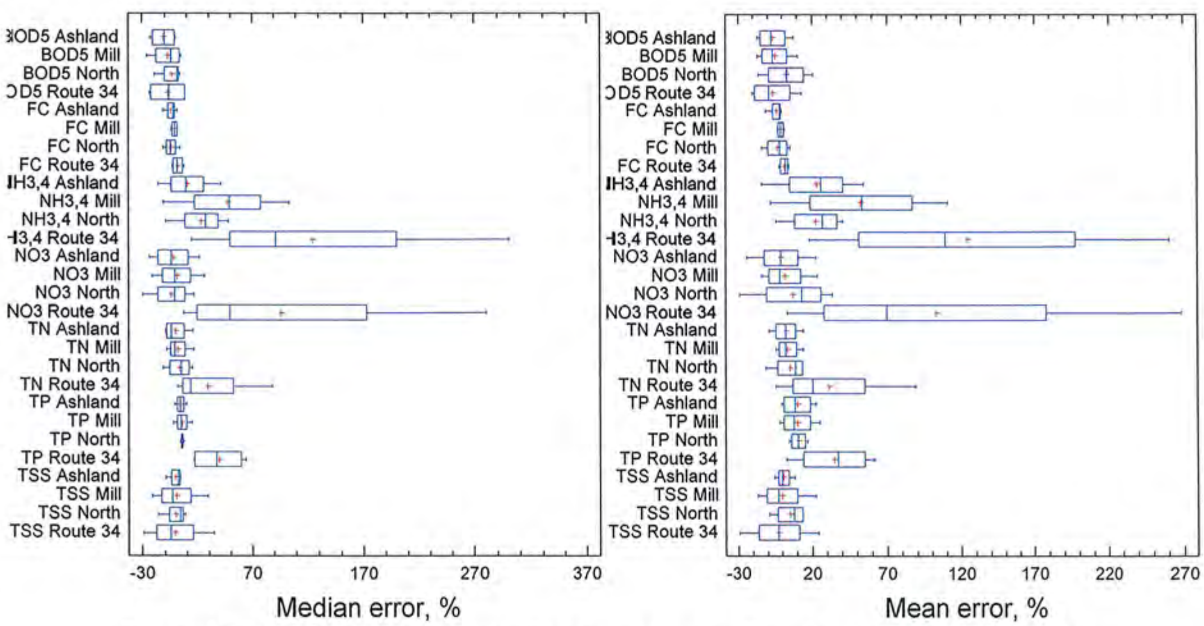


Figure 13. Range of mean and median errors by constituent and monitoring location

Evaluating Impact

Design Storm Approach

The calibrated and verified model was set to simulate the effects of design storms on Fox River water quality under existing and proposed conditions at the FMWRD. While the model was calibrated using all sources discharging into the study reach, only the FMWRD discharges were included in the design rain simulations, focusing evaluation of any impacts only on the evaluated source. The study reach was adjusted for impact simulation. Mill Street located upstream of FMWRD and just downstream of Montgomery Dam was considered an upstream boundary instead of Sullivan Road. Changes in water quality caused by the FMWRD discharges and compliance with water quality standards were evaluated at Route 34 (Washington Street Bridge), located downstream from the FMWRD discharges.

Three design storms were simulated for all constituents: 1-year, 5-year, and 10-year. An additional storm (3-month) was simulated for ammonia and total phosphorus. The input data to the model representing quantity and quality of discharge from the FMWRD for all outfalls were provided by WEDA as a time series for each design storm. The total outflow from the FMWRD facilities is shown in Figure 14. The model simulates eight days (5/9-5/16/2002) with the first day excluded from evaluation to allow the model to achieve a stable state and to minimize effects from initial conditions. The storm was starting to affect the FMWRD discharge at 10 a.m. on May 11. The impact from increased dry weather flow under proposed conditions reflecting anticipated increased service area was not evaluated as it is not relevant for the purpose of the LTCP.

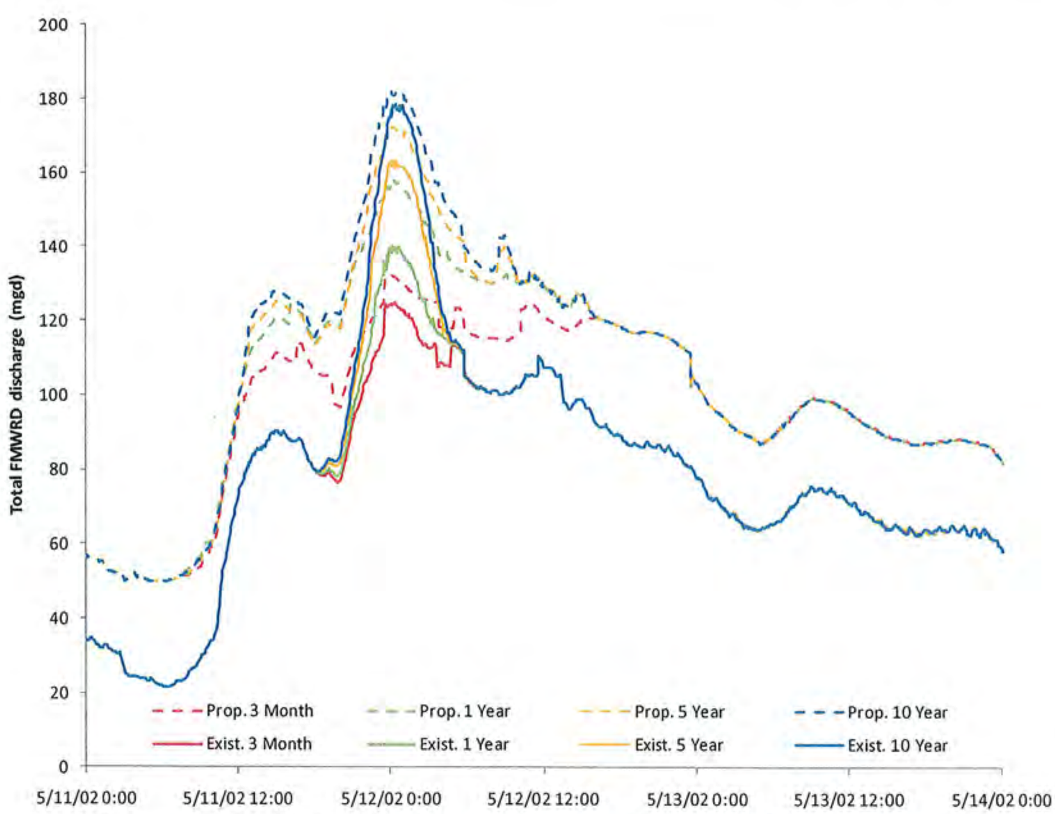


Figure 14. Existing and proposed discharges from the FMWRD facilities

The selected dates have no relevance for the impact evaluation as a range of temperatures or other conditions was considered in interpreting simulated concentrations. Any dates discussed with respect to simulations are to be understood as modeling dates. The design storm model uses a constant temperature during simulations (16°C). Sensitivity analysis was conducted for 10 additional temperatures varying from 1.5°C to 32°C. The maximum difference was for BOD: 6 percent (%) for the lowest temperature and -10% for the highest temperature. Ammonia nitrogen simulations showed 4% for the lowest temperature and -2% for the highest temperature. All other evaluated constituents stayed within 1%. Such variation is acceptable and makes it unnecessary to evaluate simulations at other temperatures.

Under existing conditions, influent waste and stormwater is treated at the FMWRD facility until its capacity is reached. When the inflow is higher than the design peak hourly flow (85 mgd, or 3.72 m^3/s), the excess flows directly to the Fox River through the FMWRD CSO. The proposed conditions include two major additions to the existing facilities: a full-treatment expansion with a design peak hourly flow of 46 mgd (2.02 m^3/s) and a chemically enhanced primary treatment (CEPT) facility with a design peak hourly flow of 44 mgd (1.93 m^3/s). The CEPT is used to disinfect and partially treat the excess flow before discharging it into the Fox River when inflow exceeds the full-treatment design peak hourly flow of 131 mgd (5.74 m^3/s). Figure 15 shows a portion of the discharge that does not receive the full treatment (i.e., discharge above 131 mgd). Figure 16 shows a portion of the discharge that is completely untreated (i.e., CSO discharge). A "no action" condition was evaluated for selected constituents using the 5-year design storm, showing the impact of future discharges under existing treatment conditions. A portion of the discharge that does not receive the full treatment (i.e., discharge above 85 mgd) for the "no action" condition using a 5-year storm is shown in Figure 17. A portion of the discharge that is completely untreated (i.e., CSO discharge) is then shown in Figure 18.

Table 5 lists peak hourly discharges through individual FMWRD facilities under existing and proposed conditions for all four design storms. Table 6 lists total volumes discharged through individual FMWRD facilities for the duration of the storm (4 days and 18 hours). The storm discharge occurred between 10 a.m. on 5/11/2002 and 4 a.m. on 5/16/2002. There is a significant discharge through the FMWRD CSO under existing conditions and even more under the "no action" condition for future discharges. Under proposed conditions, both peak rate and total volume discharged through the FMWRD CSO are significantly reduced because proposed modifications at the FMWRD are designed to process all inflow for up to a 5-year storm. For a 10-year storm, 3% of total incoming volume does not receive full treatment and only 0.1% of incoming volume is discharged untreated through the CSO under the proposed conditions.

Several scenarios were simulated for each condition (Table 7). Although CSOs occur under wet weather conditions, they do not necessarily coincide with high flows in the Fox River, as the storm(s) causing CSOs may be local. Two flows in the Fox River were selected: a low flow, Q-25 (statistically, 25% of days the Fox River flow is lower or equal to Q-25), representing conditions when the FMWRD discharges would have a larger impact, and a medium flow, Q-50 (statistically, 50% of days the Fox River flow is lower or equal to Q-50), representing more common conditions. For each flow, low and high water quality concentrations were assumed in the river calculated as the 25th and 75th percentile of observed values at Mill Street in Aurora. Numerical values for 25th, 50th, and 75th percentiles used in simulations are shown in Table 8. These four combinations represent a most probable range of impacts for each design storm. High flow was not simulated as the impact of the FMWRD discharge decreases with increasing flow in the Fox River due to the dilution effect.

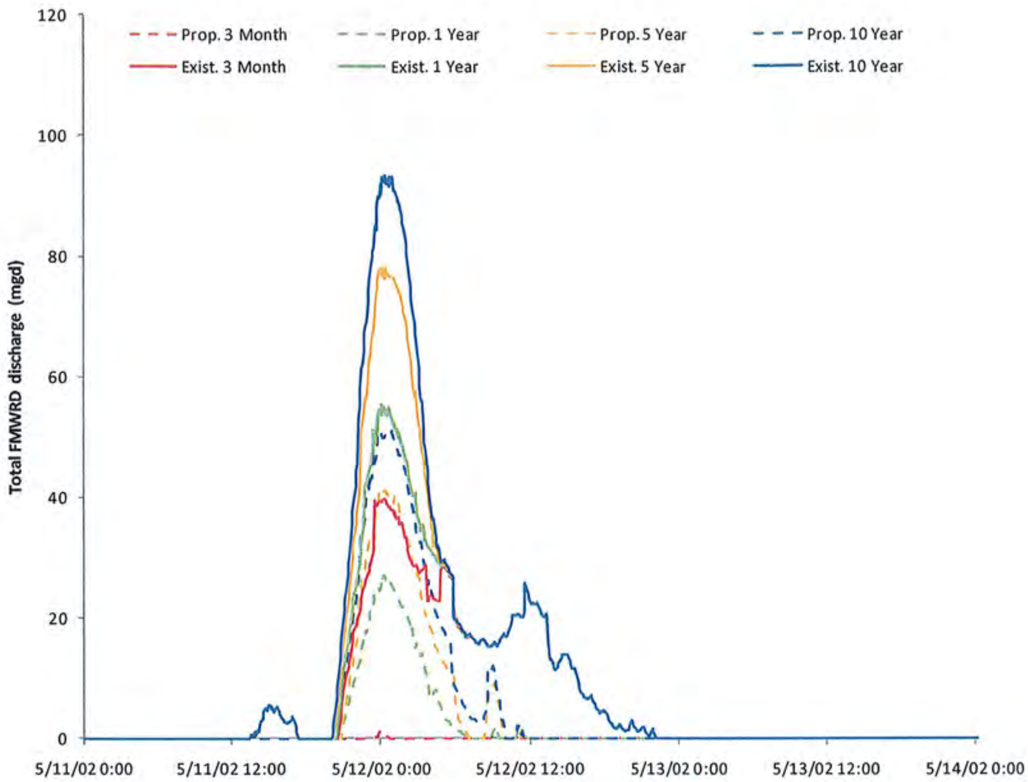


Figure 15. Existing and proposed discharges above the full treatment FMWRD design hourly peak flow

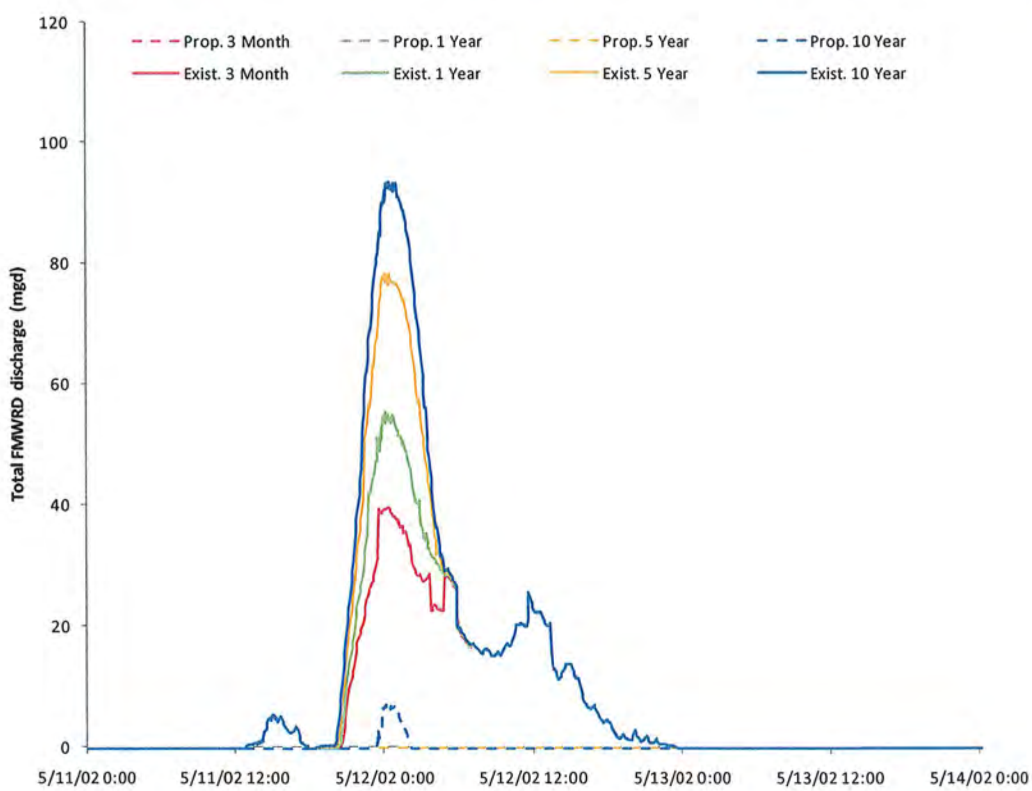


Figure 16. Existing and proposed discharges through the FMWRD CSO

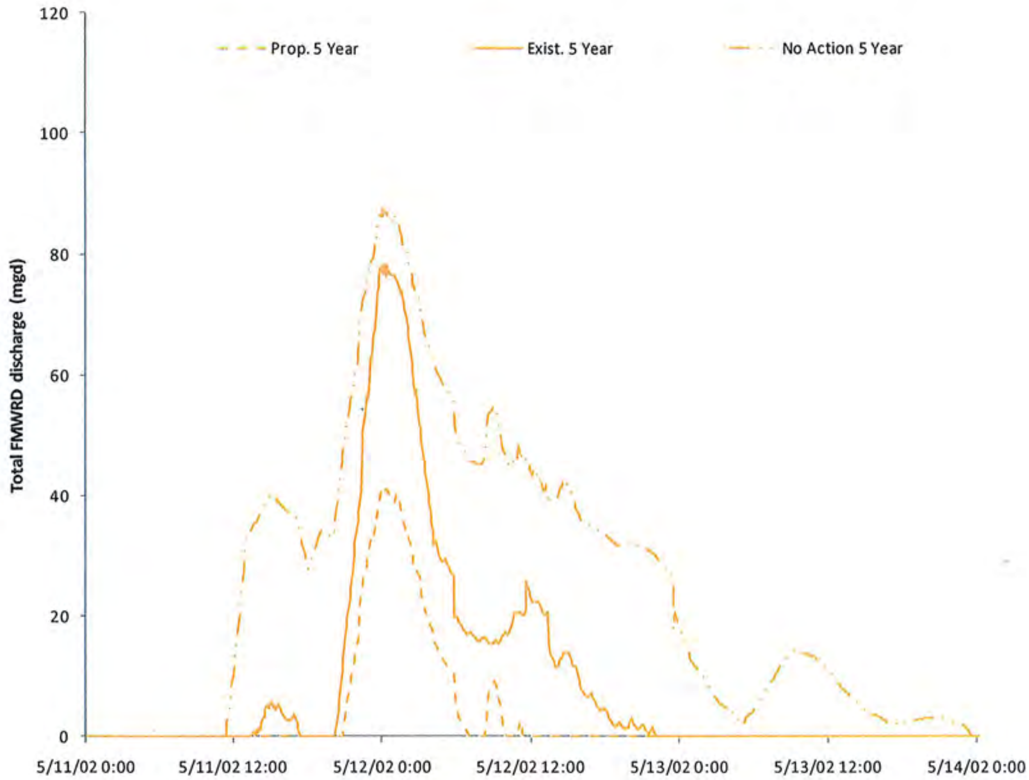


Figure 17. Existing, proposed, and "no action" discharges above the full treatment FMWRD capacity for 5-year storm

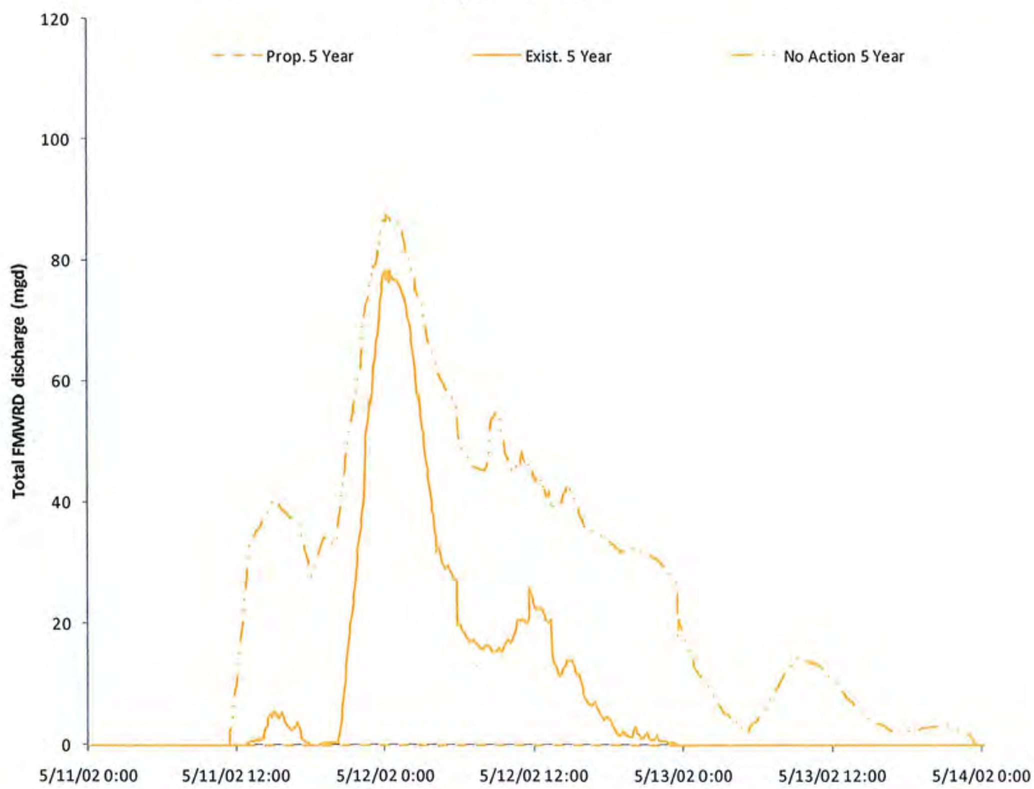


Figure 18. Existing, proposed, and "no action" discharges through the FMWRD CSO for 5-year storm

Table 5. Peak discharges through individual FMWRD facilities, mgd (m3/s)

Design storm	Total	Treated effluent	CEPT	CSO
Existing Condition				
Design peak hourly flow		85 (3.72)	N/A	
3-month	125 (5.47)	85 (3.72)	N/A	40 (1.74)
1-year	140 (6.15)	85 (3.72)	N/A	55 (2.43)
5-year	163 (7.15)	85 (3.72)	N/A	78 (3.43)
10-year	179 (7.83)	85 (3.72)	N/A	94 (4.10)
Proposed Condition				
Design peak hourly flow		131 (5.74)	44 (1.93)	
3-month	132 (5.80)	131 (5.74)	1 (0.06)*	-
1-year	158 (6.93)	131 (5.74)	27 (1.19)	-
5-year	172 (7.55)	131 (5.74)	41 (1.91)	-
10-year	182 (7.98)	131 (5.74)	44 (1.93)	7 (0.31)
No-action on proposed condition				
Design peak hourly flow		85 (3.72)	N/A	
3-month	132 (5.78)	85 (3.72)	N/A	47 (2.08)
1-year	157 (6.88)	85 (3.72)	N/A	73 (3.21)
5-year	171 (7.49)	85 (3.72)	N/A	87 (3.83)
10-year	181 (7.93)	85 (3.72)	N/A	97 (4.25)

Note: * This volume will be temporarily stored in CEPT and later rerouted through the full treatment.

Table 6. Total volumes discharged through individual FMWRD facilities, mil. gallons (mil. m^3)

Design storm	Total	Treated effluent	CEPT	CSO
Existing condition				
3-month	325 (1.23)	306 (1.16)	N/A	18.9 (0.07)
1-year	329 (1.25)	306 (1.16)	N/A	22.5 (0.09)
5-year	334 (1.27)	306 (1.16)	N/A	27.7 (0.10)
10-year	338 (1.28)	306 (1.16)	N/A	31.0 (0.12)
Proposed condition				
3-month	431 (1.63)	429 (1.62)	0.03 (<.01)*	-
1-year	449 (1.70)	441 (1.67)	5.52 (0.02)	-
5-year	453 (1.72)	441 (1.67)	9.84 (0.04)	-
10-year	458 (1.73)	442 (1.67)	12.7 (0.05)	0.5 (<.01)
No-action on proposed condition				
3-month	431 (1.63)	376 (1.42)	N/A	53.3 (0.20)
1-year	449 (1.70)	376 (1.42)	N/A	70.6 (0.27)
5-year	453 (1.72)	376 (1.42)	N/A	75.3 (0.29)
10-year	458 (1.73)	376 (1.42)	N/A	79.9 (0.30)

Note: Volume discharged during the storm only (10 a.m. on 5/11/2002–4 a.m. on 5/16/2002)
* This volume will be temporarily stored in CEPT and later rerouted through the full treatment.

Table 7. List of scenarios

Scenario	*Constituents*	*FMWRD* *Concentration*	*Condition*	*Storm*	*Flow*	*Fox* *Concentration*
1	All	MID	Existing	1yr	LOW	HI
2						LOW
3					MID	HI
4						LOW
5				5yr	LOW	HI
6						LOW
7					MID	HI
8						LOW
9				10yr	LOW	HI
10						LOW
11					MID	HI
12						LOW
13					HI	HI
14			Proposed	1yr	LOW	HI
15						LOW
16					MID	HI
17						LOW
18				5yr	LOW	HI
19						LOW
20					MID	HI
21						LOW
22				10yr	LOW	HI
23						LOW
24					MID	HI
25						LOW
26					HI	HI
27			No_Action	5yr	LOW	HI
28						LOW
29					MID	HI
30						LOW
31				10yr	LOW	HI
32						LOW
33					MID	HI
34						LOW
35	Fecal coliform	HI	Existing	1yr	LOW	HI
36						LOW
37					MID	HI
38						LOW
39				5yr	LOW	HI
40						LOW
41					MID	HI
42						LOW
43				10yr	LOW	HI
44						LOW
45					MID	HI
46						LOW

Scenario	*Constituents*	*FMWRD*		*Storm*	*Flow*	*Fox*
		Concentration	*Condition*			*Concentration*
47			Proposed	1yr	LOW	HI
48						LOW
49					MID	HI
50						LOW
51				5yr	LOW	HI
52						LOW
53					MID	HI
54						LOW
55				10yr	LOW	HI
56						LOW
57					MID	HI
58						LOW
61	Ammonia and total phosphorus	MID	Existing	3 month	LOW	HI
62						LOW
63					MID	HI
64						LOW
65			Proposed	3 month	LOW	HI
66						LOW
67					MID	HI
68						LOW

Notes: MID = average value or 50th percentile, HI = high value or 75th percentile, and LOW = low value or 25th percentile

Scenarios 13, 26, and 31-34 were not simulated at this time.

Table 8. Upstream conditions considered for Fox River at Mill Street, Aurora

Constituent	*Unit*	*Low* 25th perc.	*Medium* 50th perc.	*High* 75th perc.
Flow+	cfs	491	865	1,570*
Fecal coliforms	cfu/100 ml	113	236*	488
BOD_5	mg/l	1	3*	4
Total suspended solids	mg/l	24	31*	42
Nitrate nitrogen	mg/l	0.76	1.04*	1.38
Ammonia nitrogen	mg/l	0.02	0.04*	0.10
Organic nitrogen	mg/l	1.32	1.47*	1.75
Total nitrogen**	mg/l	2.10	2.55*	3.23
Total phosphorus	mg/l	0.26	0.30*	0.35

Notes: + Source: ISWS, 2009

* not used in simulations at this time

** calculated as a sum of nitrogen forms

Methods to Evaluate Impact

The impact of proposed expansions at the FMWRD on water quality in the Fox River is evaluated in two different ways. First, a change between existing and proposed conditions is quantified to ensure no degradation will result from the expansion during storm events. The following measures were considered: maximum simulated value and duration of concentrations above those simulated under dry weather conditions (i.e, length of the time period when simulated values were consistently above 110% of maximum concentrations simulated during dry weather conditions 24 hours prior to the storm). A higher threshold (120%) was used for fecal coliform analyses to account for larger natural variations in fecal coliform observations.

Second, compliance with existing water quality standards is evaluated. The Illinois Pollution Control Board publishes water quality standards in Illinois. Two Sections of Title 35 of the Illinois Administrative Code (IAC), Section 302, Water Quality Standards and Section 303, Water Use Designations and Site Specific Water Quality Standards, contain the standards applicable to lakes and streams in Illinois.

The Water Quality Standards define threshold concentrations and methods of determining the threshold concentration or conditions for pH, phosphorus, dissolved oxygen, radioactivity, chemical constituents, including heavy metals and hydrocarbons, fecal coliform, toxic substances, temperature, and ammonia. The study reach falls under general water quality standards and the reach from Indian Creek to Route 34 under enhanced dissolved oxygen standards. Numerical values are discussed for evaluated constituents in their respective sections.

Not all simulated water quality constituents have water quality standards applicable to the study reach. The IEPA published values they use to list the constituent as a cause of impairment (IEPA, 2006 and 2008) for constituents without a specific water quality standard, e.g., total suspended solids and total phosphorus.

Comparisons to water quality standards were carried out as required by Water Quality Standards with mandatory averaging periods where necessary. The listing values for constituents without Illinois water quality standards were used as maximum allowable concentrations. Any simulated value exceeding the listing values would be considered a violation. This is consistent with the IEPA's use of the listing values.

Fecal Coliforms

Fecal Coliform Water Quality Standards

Fecal coliform standards are applicable between May and October. A minimum of five samples collected over 30 days or less should be used to calculate the geometric mean and a concentration exceeded in 10% of the samples (90^{th} percentile). The Water Quality Standards state that *fecal coliform shall not exceed a geometric mean of 200 per 100 ml, nor shall more than 10% of the samples during any 30 day period exceed 400 per 100 ml.*

It is important to note the length of the averaging period and the number of samples needed to interpret compliance with water quality standards. On one hand, regular monthly sampling does not satisfy the data requirements for evaluation while, on the other hand, intensive storm event sampling may produce a sufficient number of samples but biases samples toward the conditions affected by the sampled storm event. The interpretation of the standard as it applies to event or design storm simulations is not clearly specified in the Water Quality Standards.

Impact of Proposed Modifications

Proposed conditions include disinfection for both fully and partially treated water. The FMWRD NPDES permit allows for discharge of concentrations at or below 400 cfu/100 ml. However, the facilities are designed to disinfect to lower levels. Table 9 shows the probability of fecal coliform concentrations at the existing FMWRD outfall falling at or below selected concentrations based on 2007-2009 DMR data (392 data points). More than 55% of the time, the effluent fecal coliform concentration is 1 cfu/100ml. About 95% of values reported for the FMWRD outfall are 50 cfu/100 ml or below. Two concentrations were selected to evaluate the change in fecal coliform concentrations in Fox River with proposed modifications at the FMWRD: the maximum permitted concentration (400 cfu/100 ml) to evaluate the worst possible impact under minimal treatment levels and the median concentration (1 cfu/100 ml) to evaluate the impact under normal treatment levels. Fecal coliform concentrations in CSOs also varied. Data collected by WEDA indicate median concentrations of 900,000 cfu/100 ml (used with normal level treatment scenarios) and high concentrations of 2,840,000 cfu/100 ml (used with minimal level treatment scenarios) for the FMWRD CSO.

Figure 19 shows simulated fecal coliform bacteria at Route 34 under both existing and proposed conditions for three design rains assuming a normal treatment level. Proposed conditions result in no impact for design storms of 5-year or smaller return interval. The impact is also significantly reduced for the 10-year storm. The highest simulated concentrations under existing conditions are 95,300 cfu/100 ml, 131,000 cfu/100 ml, and 152,000 for the 1-year, 5-year, and 10-year design storm, respectively (Table 10). Note that all the expression "simulated concentrations" within this report signify Fox River ambient concentrations simulated at Route 34 as cross-sectional average concentrations. The highest simulated concentrations under proposed conditions are 423 cfu/100 ml, 423 cfu/100 ml, and 7,990 cfu/100 ml for the 1-year, 5-year, and 10-year design storm, respectively (Table 10). The FMWRD effluent treated to normal levels lowers Fox River fecal coliform concentrations by dilution. The CSO during the 10-year storm causes a significant increase in ambient concentrations above normal concentrations. However, the duration of the concentration increase caused by the 10-year storm was reduced from 1.4-1.5 days to 0.2 days, or by 84-88%.

Table 9. Probability of fecal coliform concentrations in the FMWRD treated effluent

Fecal coliform concentration, cfu/100 ml	*Probability the concentration in FMWRD effluent is at or below stated value*
1	55.6%
10	85.5%
50	95.7%
100	97.7%
150	98.2%
200	98.2%
300	99.0%
400	99.2%

Figure 20 shows simulated fecal coliform bacteria at Route 34 under both existing and proposed conditions for three design rains assuming a minimal treatment level. Proposed conditions result in no impact for design storms of the 5-year or smaller return interval. The impact is also significantly reduced for the 10-year storm. The highest simulated concentrations under existing conditions are 300,000 cfu/100 ml, 413,000 cfu/100 ml, and 480,000 for the 1-year, 5-year, and 10-year design storm, respectively (Table 11). The highest simulated concentrations under proposed conditions are 454 cfu/100 ml, 454 cfu/100 ml, and 24,800 cfu/100 ml for the 1-year, 5-year, and 10-year design storm, respectively (Table 11).

Under the minimal treatment level for proposed conditions, ambient concentrations simulated during the storm increase above ambient concentrations simulated during the dry weather discharge even for 1-year and 5-year storms, assuming a low upstream concentration in Fox River. The simulated increases of 31-52 cfu/100 ml result in peak concentrations of 166-191 cfu/100 ml. These highest simulated concentrations are close to the standard numerical value (200 cfu/100 ml), and measured concentrations in actual samples collected during these events may exceed 200 cfu/100 ml due to a large natural variation exhibited by fecal coliform bacteria in streams. Duplicate samples (samples collected at the same location at the same time) often vary by 20-40% in the Fox River (Bartosova et al., 2010; data collected by the Fox River Study Group, Inc.) However, fecal coliform concentration in treated effluent simulated under the minimal treatment level occurs only on less than 1% of days (Table 9).

The CSO discharge during the 10-year storm causes a significant increase in ambient concentrations above normal concentrations. However, the duration of the concentration increase caused by the 10-year storm was reduced from 1.5 days (existing conditions) to 0.2-0.3 days (proposed conditions), or by 83-86%, for scenarios with high upstream boundary concentrations. For scenarios with low upstream boundary concentrations, the duration of the increase was reduced by 12-74%, depending on the Fox River flow. For low upstream concentrations, the FMWRD effluent treated to a minimal level results in an increase above 20% when compared to dry weather discharge, impacting the reported duration. The increase caused by the CSO itself is limited to 0.3-0.4 days only. Proposed conditions result in 94-100% reduction of maximum concentrations for both normal and minimal treatment levels (Table 12 and Table 13).

Effluent fecal coliform concentrations assuming a normal treatment level are significantly lower than numerical values specified for the water quality standard. Under normal treatment levels, the FMWRD discharges from up to the 5-year storm do not cause any exceedance of water quality standards. In fact, the discharge lowers fecal coliform concentrations in the Fox River by dilution. Note that the highest concentrations under proposed conditions for 1-year and 5-year storms levels are affected by concentrations upstream of the FMWRD and are lower than the upstream concentration (488 cfu/100ml, Table 8).

Under the minimal treatment level, the FMWRD effluent is at or above numerical values for both standards. Simulated concentrations would not cause an exceedance for 1-year and 5-year storms when other samples collected during the same 30-day period would be below 160 cfu/100 ml (Table 14). Again, fecal coliform concentration in treated effluent simulated under the minimal treatment level occurs only on less than 1% of days (Table 9).

Storms larger than the 5-year storm result in CSO, which in turn results in high peak concentrations in the Fox River. To achieve compliance with water quality standards, the other four samples collected during the same 30-day period as a sample during maximum concentration after the 10-year storm would need to be below 80 cfu/100 ml for a normal treatment level and below 60 cfu/100 ml for a minimal treatment level (Table 14).

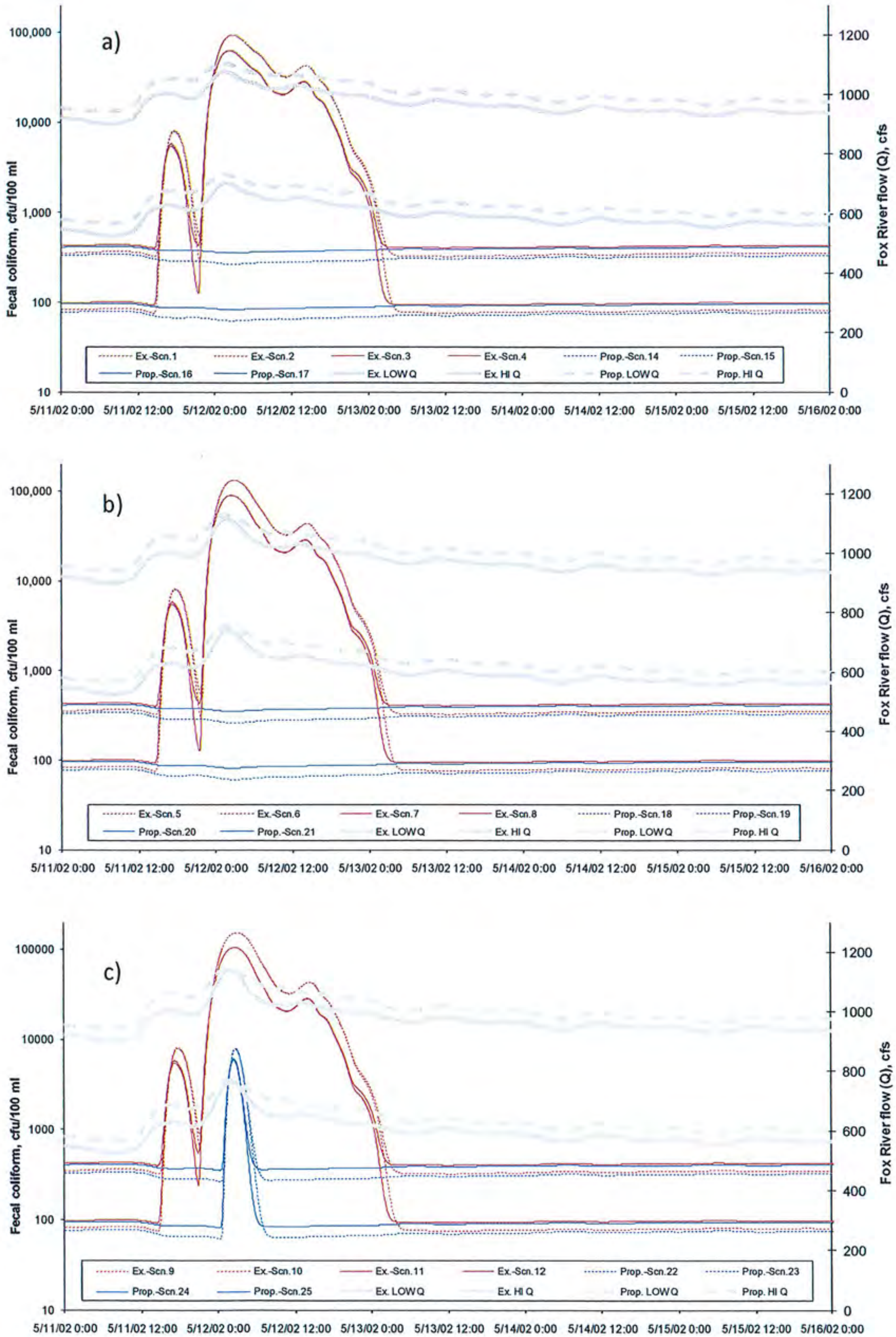


Figure 19. Fecal coliform at Route 34 under existing and proposed conditions (normal treatment level): a) 1-year storm, b) 5-year storm, and c) 10-year storm.

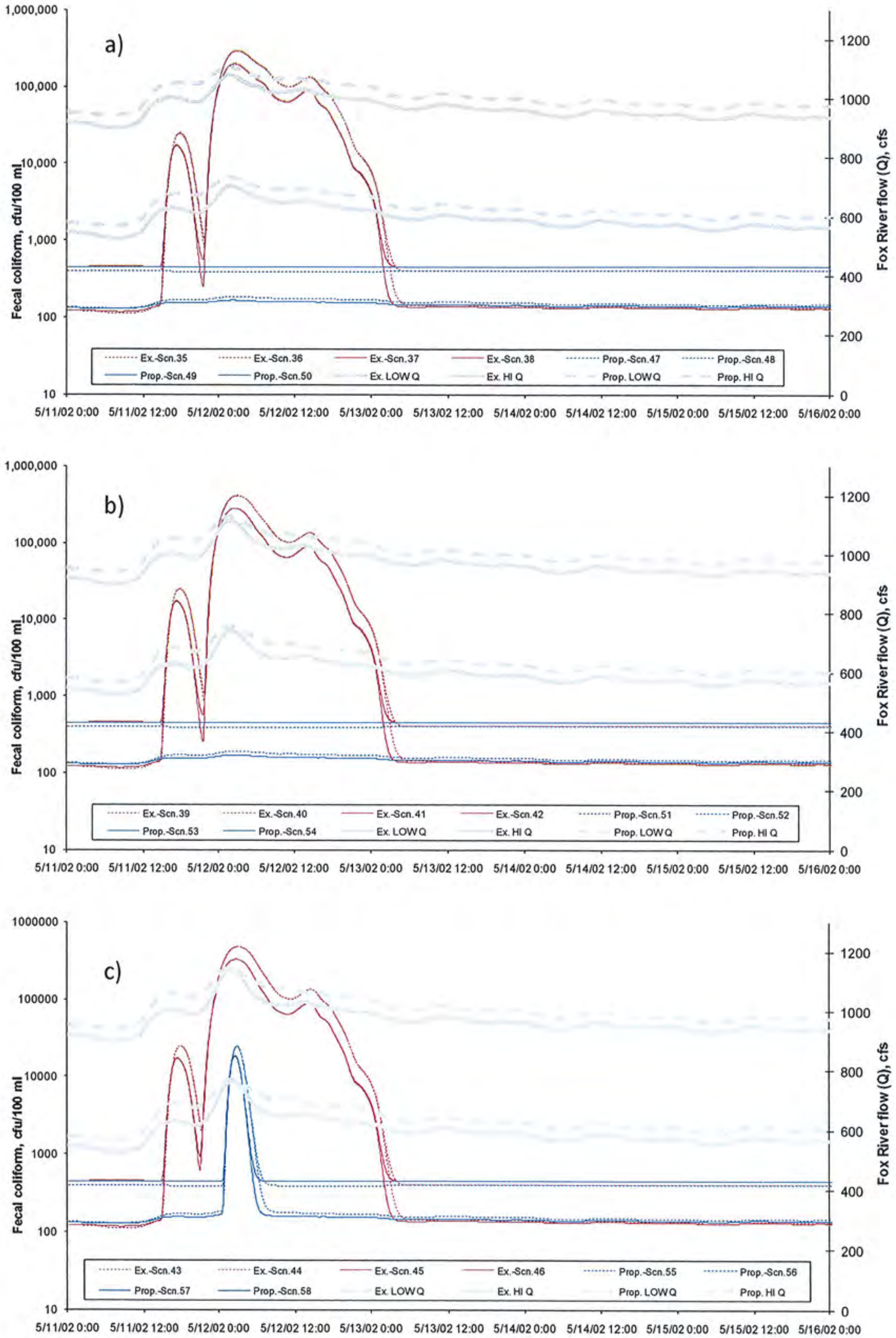


Figure 20. Fecal coliform at Route 34 under existing and proposed conditions (minimal treatment level): a) 1-year storm, b) 5-year storm, and c) 10-year storm.

Table 10. Simulated fecal coliform maximum, maximum increase, and duration of increase above dry weather conditions during design storms (normal treatment level)

Storm	Existing				Proposed			
	Scenario	*Max cfu/100ml*	*Increase cfu/100ml*	*Duration days*	*Scenario*	*Max cfu/100ml*	*Increase cfu/100ml*	*Duration days*
1 year	1	95,300	94,900	1.5	14	346	*	*
	2	95,100	95,000	1.5	15	81	*	*
	3	64,100	63,700	1.4	16	423	*	*
	4	63,800	63,700	1.5	17	98	*	*
5 year	5	131,000	131,000	1.5	18	346	*	*
	6	131,000	131,000	1.5	19	81	*	*
	7	89,100	88,700	1.4	20	423	*	*
	8	88,800	88,700	1.5	21	98	*	*
10 year	9	152,000	152,000	1.5	22	7,990	7,640	0.2
	10	152,000	152,000	1.5	23	7,790	7,710	0.2
	11	105,000	105,000	1.4	24	6,130	5,710	0.2
	12	104,000	105,000	1.5	25	5,870	5,770	0.2

Note: Values rounded to three significant digits
* No increase above 20% of dry weather concentrations during design storm. Corresponding maximum concentration may occur outside the storm impact.

Table 11. Simulated fecal coliform maximum, maximum increase, and duration of increase above dry weather conditions during design storms (minimal treatment level)

Storm	Existing				Proposed			
	Scenario	*Max cfu/100ml*	*Increase cfu/100ml*	*Duration days*	*Scenario*	*Max cfu/100ml*	*Increase cfu/100ml*	*Duration days*
1 year	35	300,000	300,000	1.5	47	396	*	*
	36	300,000	300,000	1.6	48	185	46	1.4
	37	201,000	201,000	1.5	49	454	*	*
	38	201,000	201,000	1.5	50	166	31	0.2
5 year	39	413,000	413,000	1.5	51	396	*	*
	40	413,000	413,000	1.6	52	191	52	1.4
	41	280,000	280,000	1.5	53	454	*	*
	42	280,000	280,000	1.5	54	170	35	0.3
10 year	43	480,000	480,000	1.5	55	24,800	24,400	0.3
	44	480,000	480,000	1.6	56	24,600	24,500	1.4
	45	329,000	329,000	1.5	57	18,700	18,200	0.2
	46	329,000	329,000	1.5	58	18,400	18,300	0.4

Note: Values rounded to three significant digits
* No increase above 20% of dry weather concentrations during design storm. Corresponding maximum concentration may occur outside the storm impact.

Table 12. Percent reduction in simulated fecal coliform maximum, maximum increase, and duration of increase above dry weather conditions during design storms (median treatment level)

Scenarios	*Max*	*Increase*	*Duration*	*Scenarios*	*Max*	*Increase*	*Duration*
	1 year				*10 year*		
1-14	100%	100%	100%	9-22	95%	95%	86%
2-15	100%	100%	100%	10-23	95%	95%	84%
3-16	100%	100%	100%	11-24	94%	95%	88%
4-17	100%	100%	100%	12-25	94%	95%	86%
	5 year						
5-18	100%	100%	100%				
6-19	100%	100%	100%				
7-20	100%	100%	100%				
8-21	100%	100%	100%				

Table 13. Percent reduction in simulated fecal coliform maximum, maximum increase, and duration of increase above dry weather conditions during design storms (minimal treatment level)

Scenarios	*Max*	*Increase*	*Duration*	*Scenarios*	*Max*	*Increase*	*Duration*
	1 year				*10 year*		
35-47	100%	100%	100%	43-55	95%	95%	83%
36-48	100%	100%	14%	44-56	95%	95%	12%
37-49	100%	100%	100%	45-57	94%	94%	86%
38-50	100%	100%	85%	46-58	94%	94%	74%
	5 year						
39-51	100%	100%	100%				
40-52	100%	100%	13%				
41-53	100%	100%	100%				
42-54	100%	100%	79%				

Table 14. Maximum concentrations allowed for four supplemental water quality samples collected during the same 30-day period as maximum simulated concentrations to achieve compliance with water quality standards (geometric mean less than 200 cfu/100 ml)

Storm		*Normal treatment*		*Minimal treatment*	
	Scenario	*Max simulated cfu/100ml*	*Max allowed cfu/100ml*	*Max simulated cfu/100ml*	*Max allowed cfu/100ml*
1 year	47	346	174	396	169
	48	81	251	185	204
	49	423	166	454	163
	50	98	239	166	210
5 year	51	346	174	396	169
	52	81	251	191	202
	53	423	166	454	163
	54	98	239	170	208
10 year	55	7,990	80	24,800	60
	56	7,790	80	24,600	60
	57	6,130	85	18,700	64
	58	5,870	86	18,400	65

Total Suspended Solids

Total Suspended Solids Water Quality Standards

The Illinois Pollution Control Board does not define a standard for total suspended solids. The Illinois Environmental Protection Agency uses a value of 116 mg/l as a threshold to identify total suspended solids as a potential cause for impaired waters (IEPA, 2008). A single exceedance is sufficient to list total suspended solids as a potential cause of impairment.

Impact of Proposed Modifications

Figure 21 shows simulated total suspended solids concentration at Route 34 under both existing and proposed conditions for three design rains. The FMWRD storm discharges cause only a small variation of total suspended solids concentrations (mostly within ±5 mg/l) as simulated during dry weather. Note that for scenarios with high concentration of total suspended solids in the Fox River at Mill Street (75th percentile), the fully treated storm discharges from the FMWRD actually lower the simulated concentrations at first (Figure 21).

The highest simulated concentrations during the storms are 38.9 mg/l and 36.3 mg/l for existing and proposed conditions, both significantly below the listing value of 116 mg/l (Table 15). The FMWRD discharges do not trigger exceedances of the listing value and would not cause the reach to be listed with total suspended solids as a cause of impairment. Proposed conditions result in slightly lower ambient concentrations than existing conditions, less than 10% for any scenario (Table 15).

Table 15. Simulated total suspended solids maximum concentrations (mg/l) and percent reduction.

Storm	*Existing*		*Proposed*		*Reduction*
	Scenario	*Max mg/l*	*Scenario*	*Max mg/l*	*Max %*
1 year	1	38.9	14	36.3	7
	2	24.9	15	22.6	9
	3	40.0	16	38.4	4
	4	24.6	17	23.1	6
5 year	5	38.9	18	36.3	7
	6	25.4	19	23.8	6
	7	40.0	20	38.4	4
	8	25.0	21	23.9	4
10 year	9	38.9	22	36.3	7
	10	25.6	23	24.5	4
	11	40.0	24	38.4	4
	12	25.1	25	24.4	3

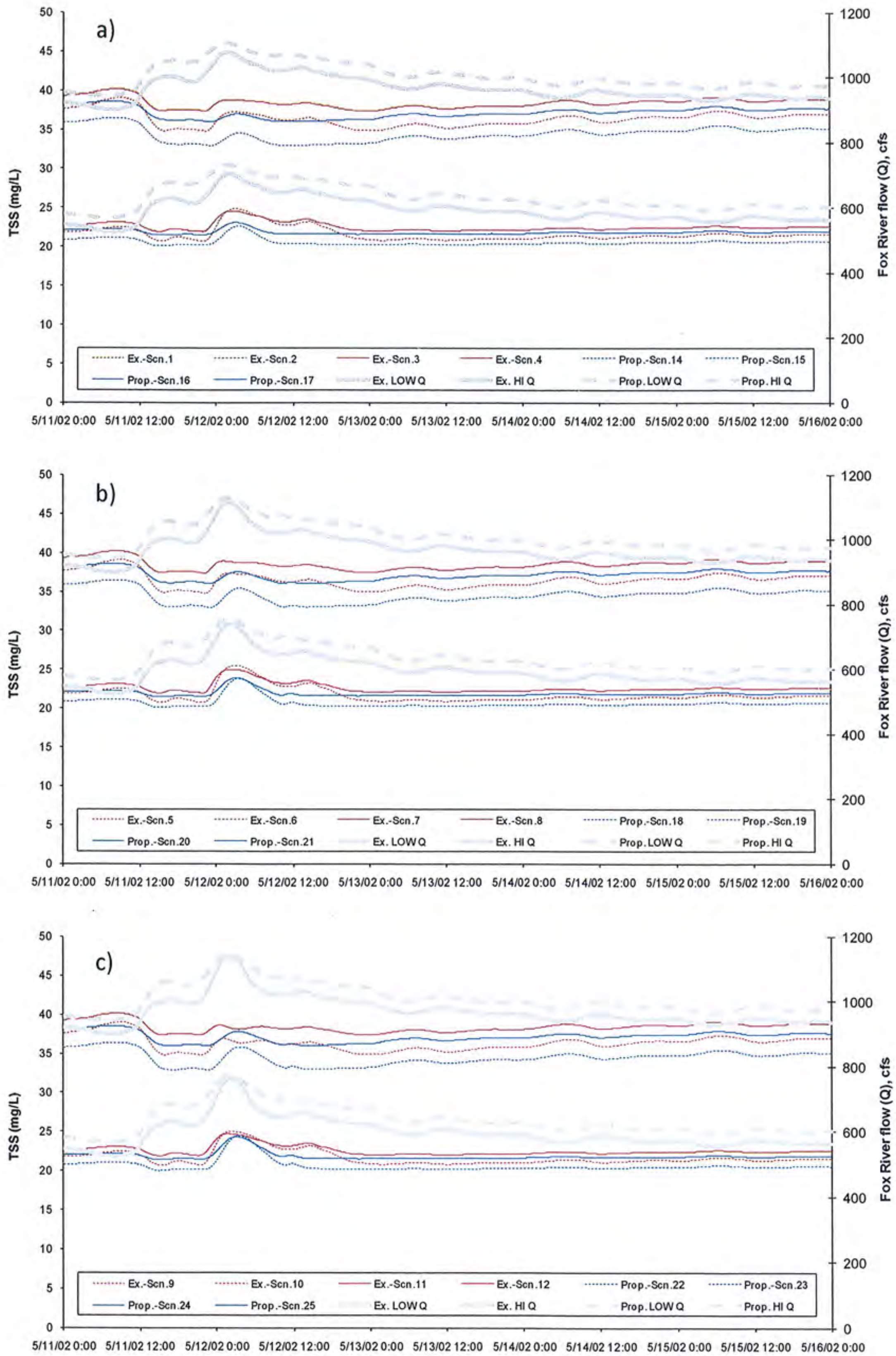


Figure 21. Total suspended solids at Route 34 under existing and proposed conditions: a) 1-year storm, b) 5-year storm, and c) 10-year storm.

Ammonia Nitrogen

Total Ammonia Nitrogen Water Quality Standards

There are four standards for total ammonia nitrogen: the maximum value not to be exceeded at any time (15 mg/l), and the acute, chronic, and sub-chronic standards that vary with pH and/or temperature. Additionally the chronic and sub-chronic standards are defined separately for Early Life Stage Present (March 1st to October 31st) and Early Life Stage Absent (November 1st to February 28th/29th) seasons. The acute standard is considered violated if at any time a sample has a concentration higher than the calculated AS. The acute standard varies with water pH:

$$AS = \frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}}$$

The chronic standard is designed to protect aquatic organisms from long-term effects of increased concentration. As the chronic standard varies with water temperature and pH, these two measurements must be taken at the time of collecting ammonia samples. The ammonia nitrogen concentration is divided by the chronic standard calculated for conditions observed when a sample is collected to determine a quotient. The chronic standard is attained when a 30-day average quotient calculated from at least four samples collected to statistically represent the sampling period is less than or equal to one. During the Early Life Stage Present (ELSP) period the chronic standard is:

When water temperature T (°C) ≤14.51°C: $CS = \left\{\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right\}(2.85)$

T(°C)>14.51°C: $CS = \left\{\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right\}\left(1.45 * 10^{0.028*(25-T)}\right)$

During the Early Life Stage Absent (ELSA) period the chronic standard is:

When water temperature T (°C) ≤ 7°C: $CS = \left\{\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right\}\left(1.45 * 10^{0.504}\right)$

T (°C) > 7°C: $CS = \left\{\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right\}\left(1.45 * 10^{0.028*(25-T)}\right)$

The sub-chronic standard is calculated by multiplying the chronic standard by 2.5. The sub-chronic standard is attained when an average quotient calculated for samples collected on four consecutive days is less than or equal to one.

Impact of Proposed Modification

Figure 22 shows simulated total ammonia concentrations at Route 34 under both existing and proposed conditions for three design storms. Figure 23 shows simulated total ammonia concentrations at Route 34 under both existing and proposed conditions for the 3-month design storm to illustrate the effect of discharges when CEPT is not utilized. Total ammonia concentrations were also simulated for the 5-year design storm assuming "no action" conditions, i.e., future discharges treated using existing facilities only (Figure 24). Proposed conditions result in lower maximum concentrations than existing conditions. The highest simulated concentrations under existing conditions are 0.62 mg/l, 0.71 mg/l, 0.81 mg/l, and 0.85 mg/l for the 3-month, 1-

year, 5-year, and 10-year design storms, respectively (Table 16). The highest simulated concentrations under proposed conditions are 0.30 mg/l, 0.58 mg/l, 0.70 mg/l, and 0.78 mg/l for 3-month, 1-year, 5-year, and 10-year design storms, respectively (Table 16). Proposed conditions result in 48-58%, 17-20%, 12-14%, and 9-10% reduction of maximum concentration for 3-month, 1-year, 5-year, and 10-year design storms, respectively (Table 17). The highest simulated concentration under "no action" conditions is 1.11 mg/l for the 5-year storm. Proposed conditions also represent 35-39% reduction when compared to "no action" conditions.

Interpretation of the compliance with water quality standards is not trivial for design rain simulations. First, chronic and sub-chronic standards are defined for 30-day and 4-day averages, respectively. At least four samples are required for chronic standard evaluation. One of these samples was assumed to be taken at the peak of the pollutograph, i.e., the value corresponds to the maximum concentration during the storm-discharge affected increase. The remaining three samples were assumed to be equal to 50th and 95th percentiles of existing concentrations observed at Route 34. The 50th percentile (0.028 mg/l during ELSP and 0.057 mg/l during ELSA) is used to evaluate compliance with water quality standards under normal ambient conditions. The 95th percentile (0.143 mg/l during ELSP and 0.556 mg/l during ELSA) is used to evaluate compliance with water quality standards under critical, worst case ambient conditions. For sub-chronic standards, the 4-day average was calculated in two different ways: a) normal ambient conditions are represented by an average of all values simulated during 5/11-14, and b) critical ambient conditions are represented by an average of maximum daily values simulated during 5/11-14. Table 19 shows the calculated averages for each scenario assuming normal ambient conditions.

Second, the numerical values of the chronic, sub-chronic, and acute standards vary with pH and/or temperature. Chronic and sub-chronic standards are also defined differently for ELSP and ELSA periods. Theoretically, pH and temperature can vary significantly for each sample used to evaluate compliance with water quality standards. However, pH and temperatures during design storms cannot be determined without i) specifying their value in upstream boundary and all inputs for duration of the simulation, ii) simulating additional stream processes in detail (e.g., algal activity), and iii) determining exact timing of the storm. The extent of natural variation in pH and temperature that is observed at Route 34 represents a major obstacle to simulating all conditions or selecting representative conditions for water quality standards evaluation.

The following methodology was developed to evaluate compliance with chronic and sub-chronic ammonia water quality standards. All observed temperatures and pH combinations were plotted: temperature on x-axis and pH observed at the same time on y-axis (Figure 25). Each combination can be used to calculate corresponding standard and create isolines by combining points with equal ammonia standard concentrations. To simplify the evaluation, isolines were created for 30-day and 4-day averages calculated for each scenario using the procedure described above (Figure 25). These isolines represent a water quality standard valid for temperature and pH combinations that are situated on the isoline. Thus, any observations situated above the line represent observed conditions that would result in violation if the concentration corresponding to the isoline was observed at the same time as the observation. Since the isolines represent averages over respective periods as required by the water quality standard document, the underlying assumption is that the same pH and temperature was present for all samples used to calculate these averages. This assumption was necessary to simplify the complex requirements of ammonia water quality standards under the varying stream conditions as they apply to design storm simulations and to create a practical assessment tool.

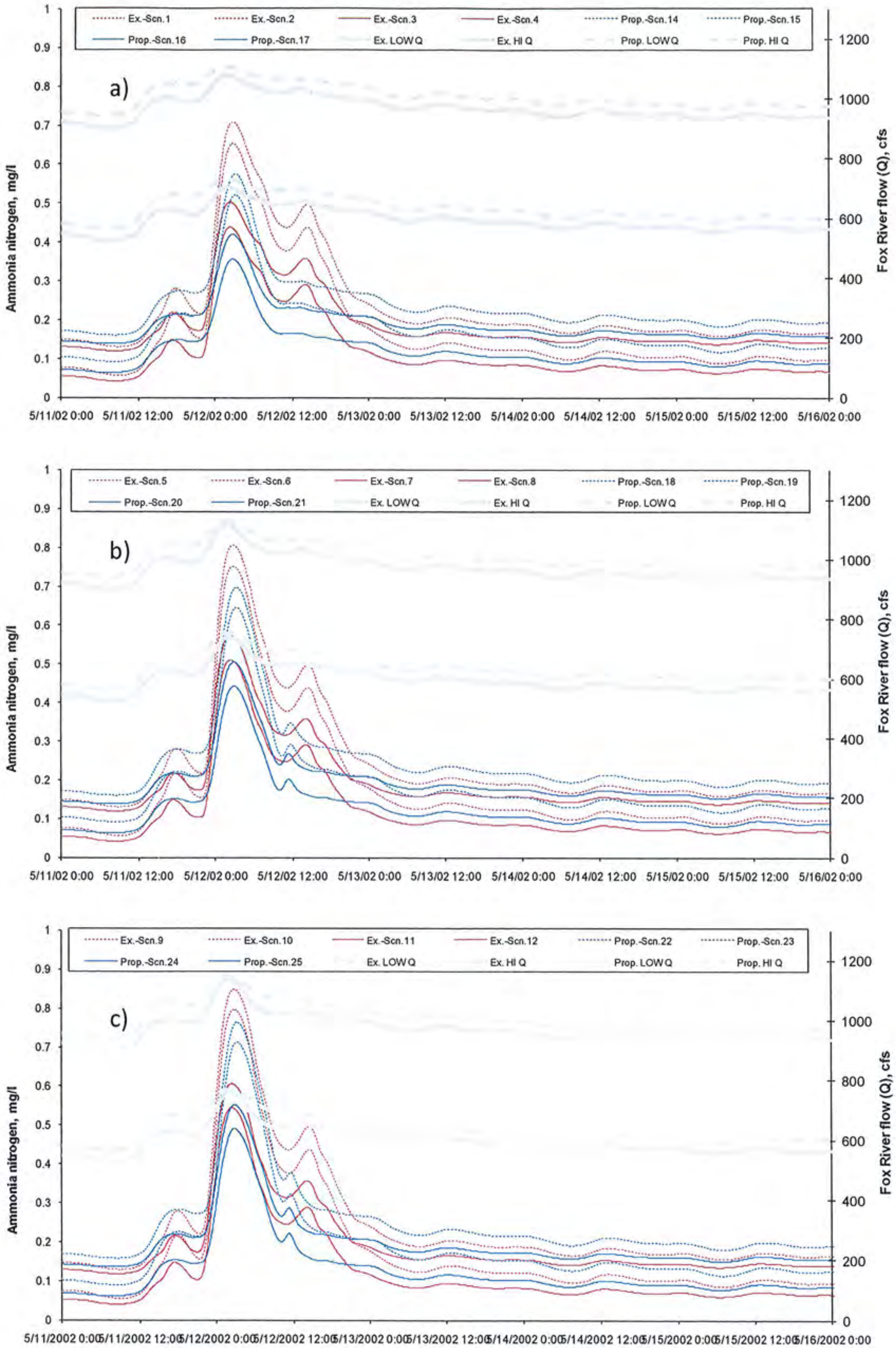


Figure 22. Ammonia nitrogen at Route 34 under existing and proposed conditions:
a) 1-year storm, b) 5-year storm, and c) 10-year storm.

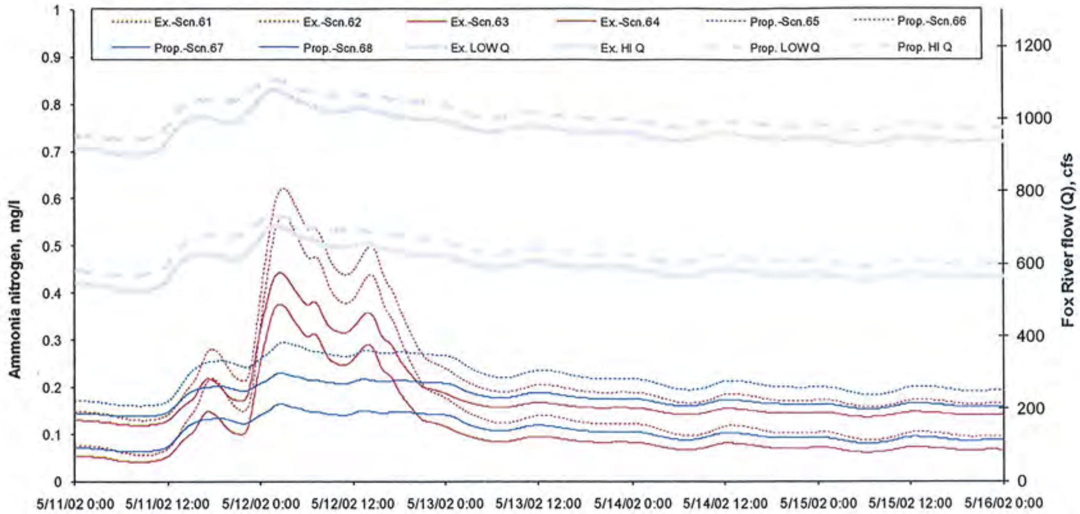


Figure 23. Ammonia nitrogen at Route 34 under existing and proposed conditions: 3-month storm.

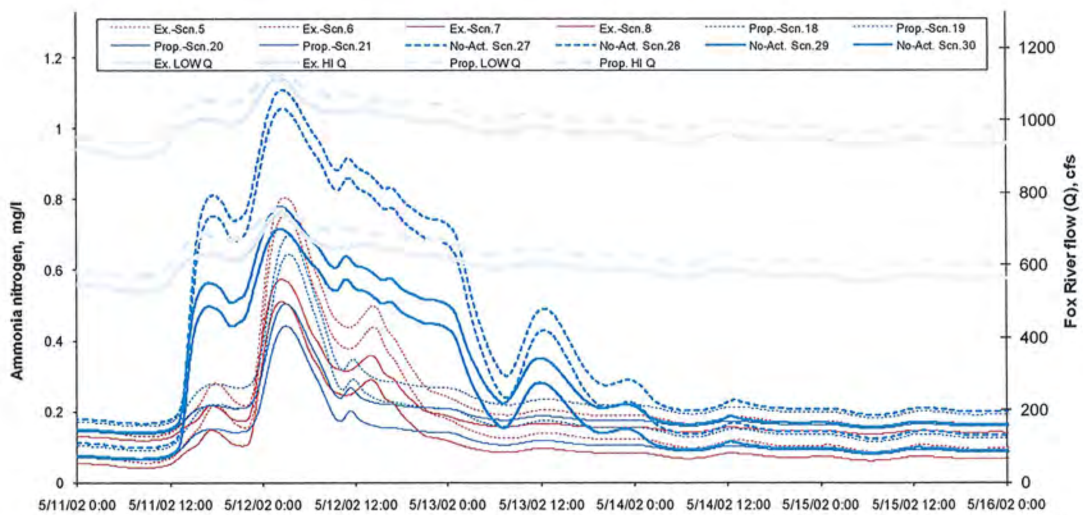


Figure 24. Ammonia nitrogen at Route 34 under existing, proposed, and no-action conditions: 5-year storm

Table 16. Simulated ammonia nitrogen maximum, maximum increase, and duration of increase above dry weather conditions during design storms

Storm	Existing				Proposed			
	Scenario	*Max mg/l*	*Increase mg/l*	*Duration days*	*Scenario*	*Max mg/l*	*Increase mg/l*	*Duration days*
1 year	1	0.71	0.56	3.6	14	0.58	0.40	3.6
	2	0.66	0.57	4.3	15	0.52	0.41	4.3
	3	0.51	0.37	2.9	16	0.42	0.27	2.9
	4	0.44	0.38	4.3	17	0.36	0.28	4.1
5 year	5	0.81	0.65	3.6	18	0.70	0.52	3.6
	6	0.75	0.67	4.3	19	0.65	0.53	4.3
	7	0.57	0.44	2.9	20	0.51	0.35	2.9
	8	0.51	0.45	4.3	21	0.44	0.37	4.1
10 year	9	0.85	0.70	3.6	22	0.77	0.59	3.6
	10	0.80	0.71	4.3	23	0.71	0.60	4.3
	11	0.61	0.47	2.9	24	0.55	0.40	2.9
	12	0.55	0.49	4.3	25	0.49	0.41	4.1
3 month	61	0.62	0.47	3.6	65	0.30	0.12	3.5
	62	0.56	0.48	4.3	66	0.24	0.13	4.3
	63	0.44	0.31	2.9	67	0.23	0.08	2.9
	64	0.38	0.32	4.3	68	0.16	0.09	4.1

Table 17. Percent reduction in simulated ammonia nitrogen maximum, maximum increase, and duration of increase above dry weather conditions during design storms

Scenarios	*Max*	*Increase*	*Duration*	*Scenarios*	*Max*	*Increase*	*Duration*
	1 year				*10 year*		
1-14	19%	29%	2%	9-22	10%	16%	2%
2-15	20%	28%	1%	10-23	10%	16%	1%
3-16	17%	27%	-1%	11-24	9%	15%	-1%
4-17	19%	27%	3%	12-25	10%	15%	4%
	5 year				*3 month*		
5-18	13%	20%	2%	61-65	52%	75%	2%
6-19	14%	20%	1%	62-66	58%	74%	1%
7-20	12%	19%	0%	63-67	48%	74%	0%
8-21	13%	19%	4%	64-68	56%	73%	4%

Table 18. Maximum ammonia nitrogen for "no-action" conditions and percent reduction for proposed conditions when compared to "no-action" conditions (5-year storm only)

Scenario	*Max mg/l*	*Increase mg/l*	*Duration days*	*Scenarios*	*Max %*	*Increase %*	*Duration %*
27	1.11	0.92	3.5	27-18	37%	44%	0%
28	1.06	0.93	4.2	28-19	39%	43%	-2%
29	0.78	0.62	2.9	29-20	35%	43%	0%
30	0.72	0.63	4.1	30-21	38%	42%	-1%

Table 19. Approximated 30-day (chronic standard) and 4-day (subchronic standard) concentrations (50th)

Storm		*Existing*					*Proposed*			
		Chronic		*Subchronic*			*Chronic*		*Subchronic*	
	Scenario	*ELSP mg/l*	*ELSA mg/l*	*ELSP mg/l*	*ELSA mg/l*	*Scenario*	*ELSP mg/l*	*ELSA mg/l*	*ELSP mg/l*	*ELSA mg/l*
1 year	1	0.20	0.22	0.26	0.26	14	0.17	0.19	0.25	0.25
	2	0.18	0.21	0.19	0.19	15	0.15	0.17	0.19	0.19
	3	0.15	0.17	0.20	0.20	16	0.13	0.15	0.20	0.20
	4	0.13	0.15	0.13	0.13	17	0.11	0.13	0.21	0.21
5 year	5	0.22	0.24	0.26	0.26	18	0.20	0.22	0.26	0.26
	6	0.21	0.23	0.20	0.20	19	0.18	0.20	0.20	0.20
	7	0.16	0.19	0.21	0.21	20	0.15	0.17	0.21	0.21
	8	0.15	0.17	0.13	0.13	21	0.13	0.15	0.14	0.14
10 year	9	0.23	0.26	0.27	0.27	22	0.21	0.23	0.27	0.27
	10	0.22	0.24	0.20	0.20	23	0.20	0.22	0.21	0.21
	11	0.17	0.19	0.21	0.21	24	0.16	0.18	0.21	0.21
	12	0.16	0.18	0.14	0.14	25	0.14	0.17	0.14	0.14
							No Action			
5 year						27	0.30	0.32	0.48	0.48
						28	0.29	0.31	0.42	0.42
						29	0.22	0.24	0.35	0.35
						30	0.20	0.22	0.28	0.28

Figure 25 and Figure 26 show isolines created for chronic water quality standards during ELSP for normal (50th percentile) and critical (95th percentile) ambient conditions, respectively. As explained above, each simulated scenario is represented by an isoline. The points at or above the isolines for respective scenarios represent observed pH and temperature values in the Fox River under which water quality standards would not be met under the stated assumptions. For proposed conditions, possible violations assuming normal ambient conditions are mostly limited to observations of very high pH and/or very high temperatures. Violations for critical ambient conditions are more likely than for normal conditions but still mostly limited to observations of high pH and/or high temperatures under proposed conditions.

The horizontal lines at the right side of the charts compare the range of isolines for existing and proposed conditions at a high temperature (29°C for ELSP and 12°C for ELSA), providing a frame of reference between the two charts. The upward shift of the line for proposed conditions versus existing conditions indicates an improvement in Fox River water quality and consequentially, a lower probability of violating ammonia water quality standard. Note that the horizontal lines are plotted at higher temperatures than at which they are determined to allow better visibility of isolines.

Figure 27 and Figure 28 show isolines created for chronic water quality standards during ELSA for normal (50th percentile) and critical (95th percentile) ambient conditions, respectively. All isolines are located well above the pH=9 line. There are less observations recorded during the ELSA period (datasondes are often removed during winter to prevent damage) but all observations fall safely below the isolines for normal ambient conditions and no violation is expected. Under critical ambient conditions, an occasional violation may occur for very high pH or temperature values (above 11°C; note the ELSA period is between November and February).

Figure 29 and Figure 30 show isolines created for sub-chronic water quality standards during ELSP for normal (50th percentile) and critical (95th percentile) ambient conditions, respectively. All isolines are located well above the pH=9 line. All observations fall safely below the isolines for normal ambient conditions and no violation is expected. Under critical ambient conditions, an occasional violation may occur for very high pH values.

Sub-chronic water quality standards during ELSA will not be violated. The highest 4-day average simulated for proposed conditions is 0.28 mg/l. The lowest applicable standard value calculated from pH=14 and temperature 12°C is 0.48 mg/l, almost twice as high. Thus, the isolines could not be created and corresponding figures are not presented.

Figure 31 illustrates a potential impact of future FMWRD discharges on chronic and sub-chronic water quality standards for normal ambient conditions during the more stringent ELSP period if no action was taken to expand its facilities. Possible violations of chronic standard would occur at much lower pH and temperature values when compared to limited possible cases for proposed conditions. Sub-chronic standard isolines for "no action" condition are also much lower on the chart than for proposed conditions, allowing possible standard exceedances at very high pH values. Proposed modifications greatly reduce future risk of non-compliance with ammonia water quality standards.

Acute toxicity standard does not vary with temperature, only with pH. Table 20 shows pH thresholds calculated for maximum simulated concentrations. When observed pH exceeds this threshold, the concentration would be in violation of the acute toxicity standard. All pH thresholds for proposed conditions are above 9.4 and above thresholds for existing conditions. Any possible violation would occur only at very high pH levels in the Fox River.

Table 20. Acute toxicity evaluation: pH thresholds indicating the lowest value leading to non-compliance

	1 year		*5 year*		*10 year*	
Condition	*Scenario*	*pH*	*Scenario*	*pH*	*Scenario*	*pH*
Existing	1	9.49	5	9.36	9	9.34
	2	9.57	6	9.43	10	9.40
	3	9.97	7	9.76	11	9.69
	4	10.5	8	9.97	12	9.86
Proposed	14	9.74	18	9.51	22	9.41
	15	9.93	19	9.59	23	9.49
	16	11.0	20	9.97	24	9.82
	17	14.0	21	10.5	25	10.1
No action			27	9.12		
			28	9.15		
			29	9.40		
			30	9.48		

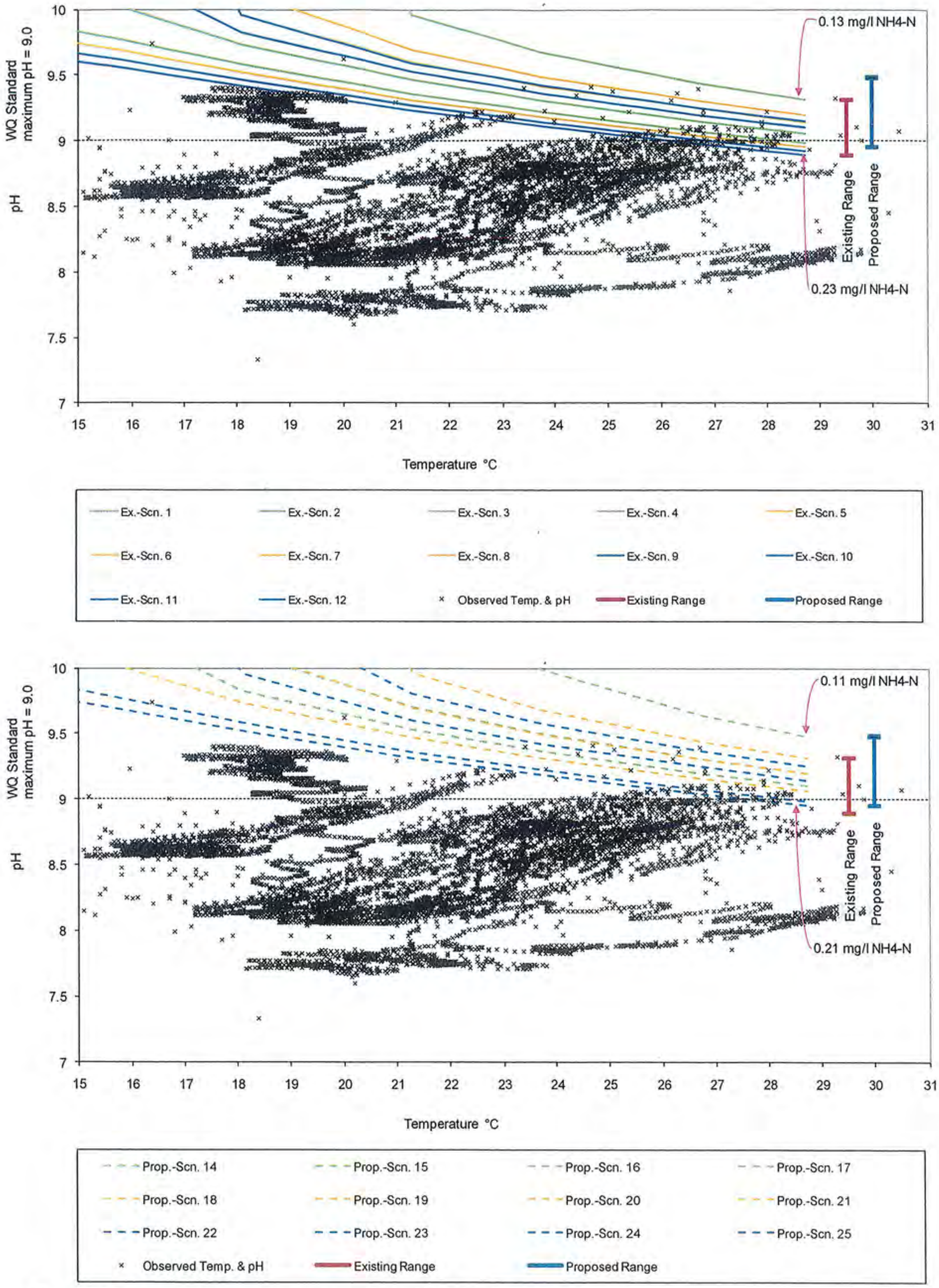


Figure 25. Chronic water quality standards (ELSP) for a) existing and b) proposed conditions (50th).

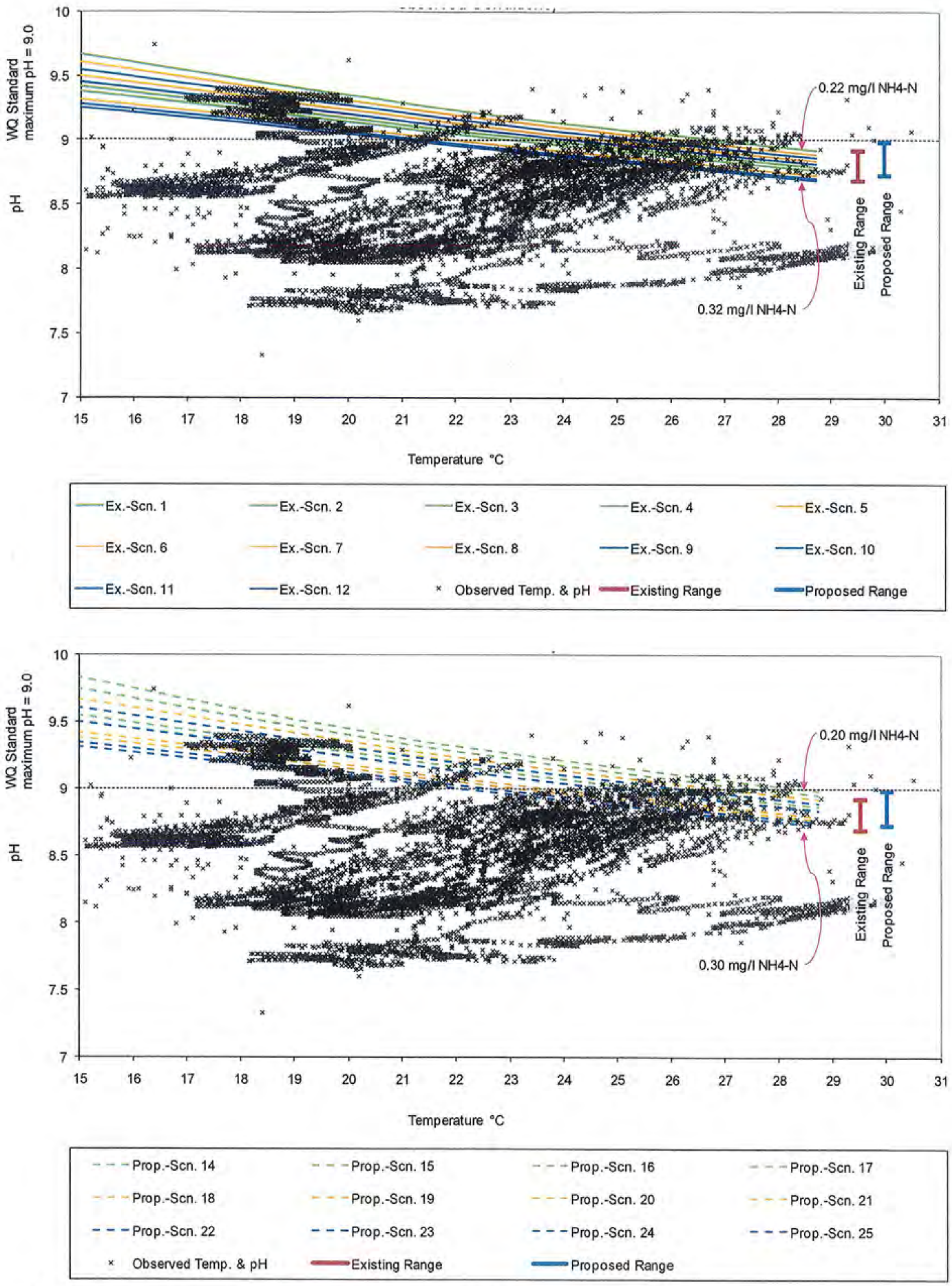
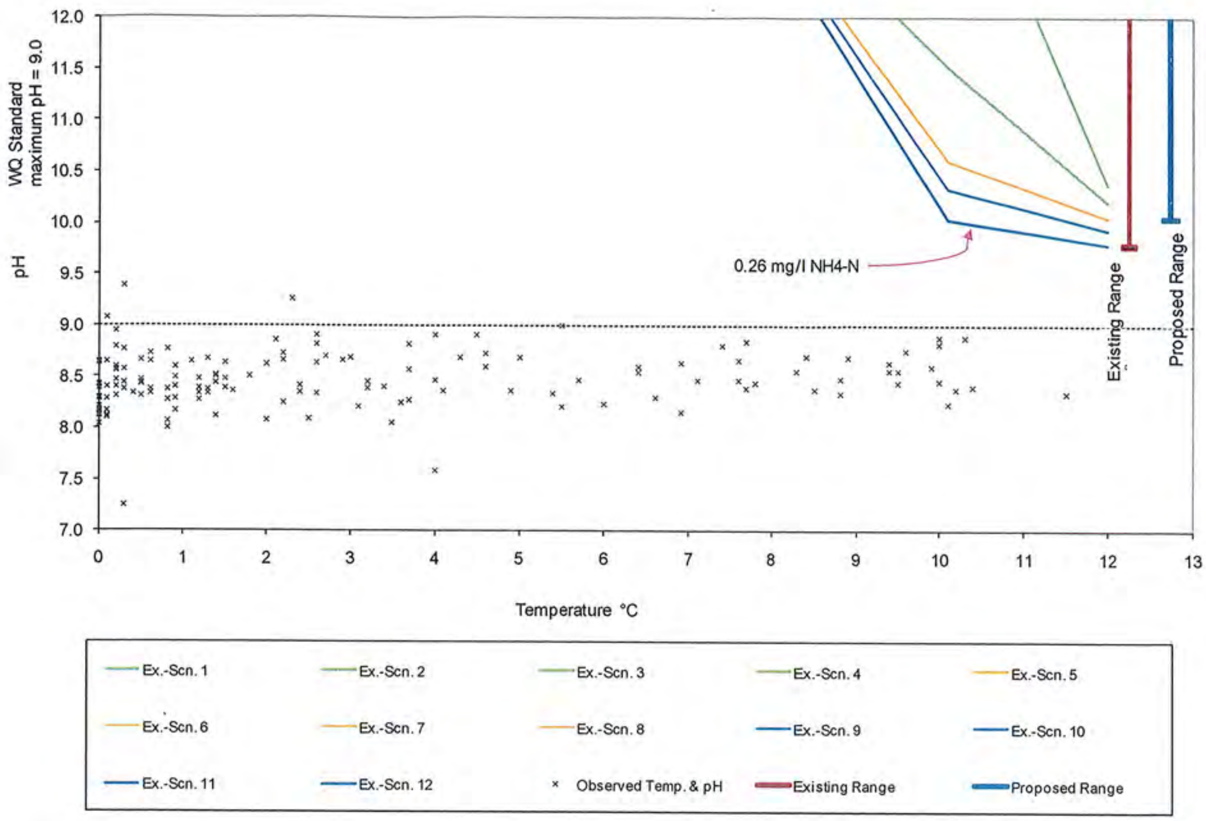


Figure 26. Chronic water quality standards (ELSP) for a) existing and b) proposed conditions (95th).



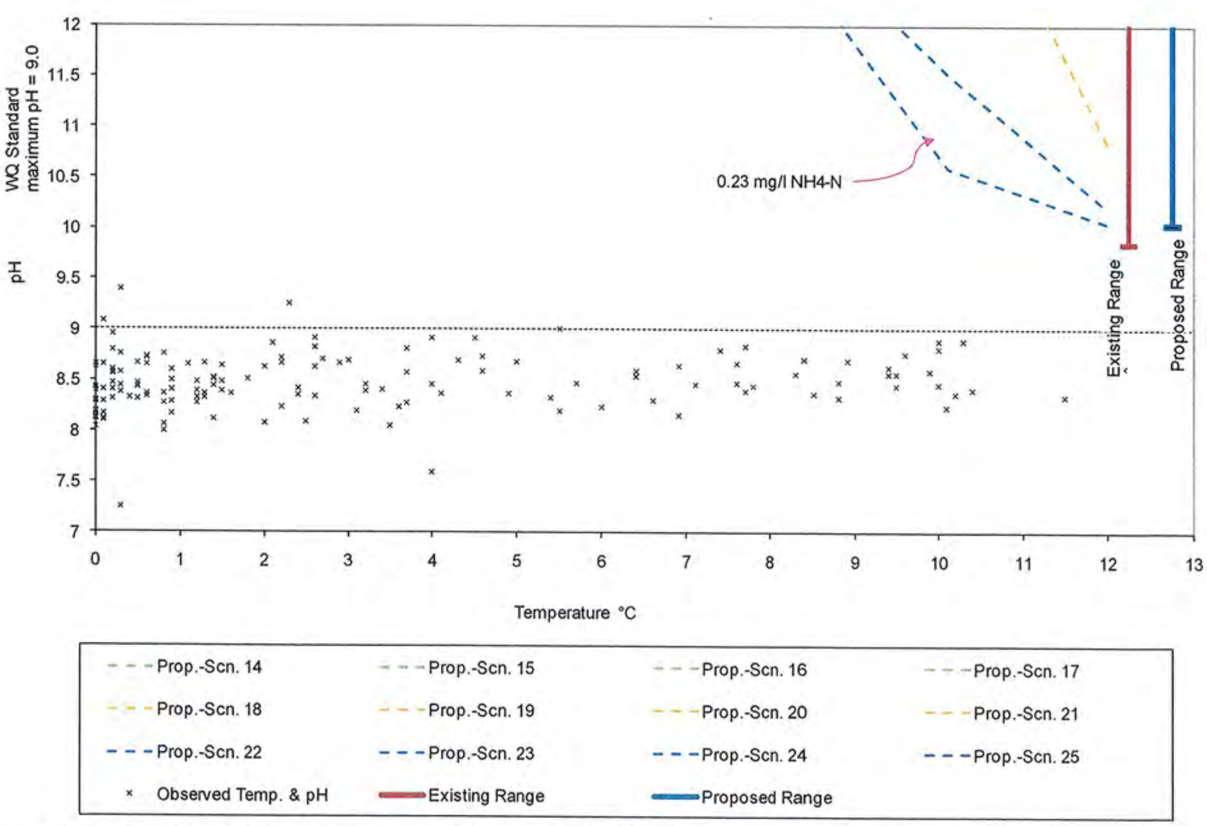


Figure 27. Chronic water quality standards (ELSA) for a) existing and b) proposed conditions (50th).

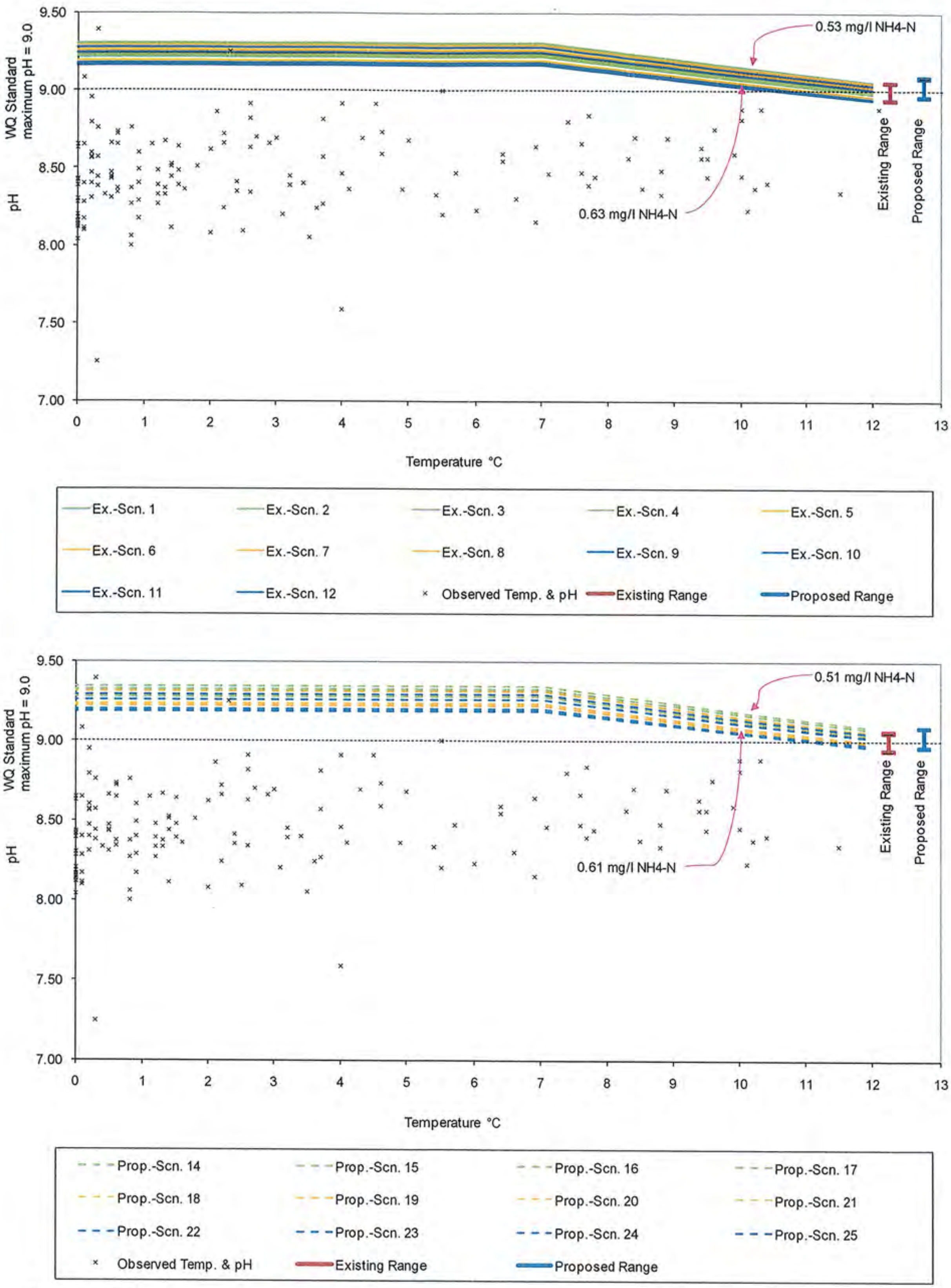
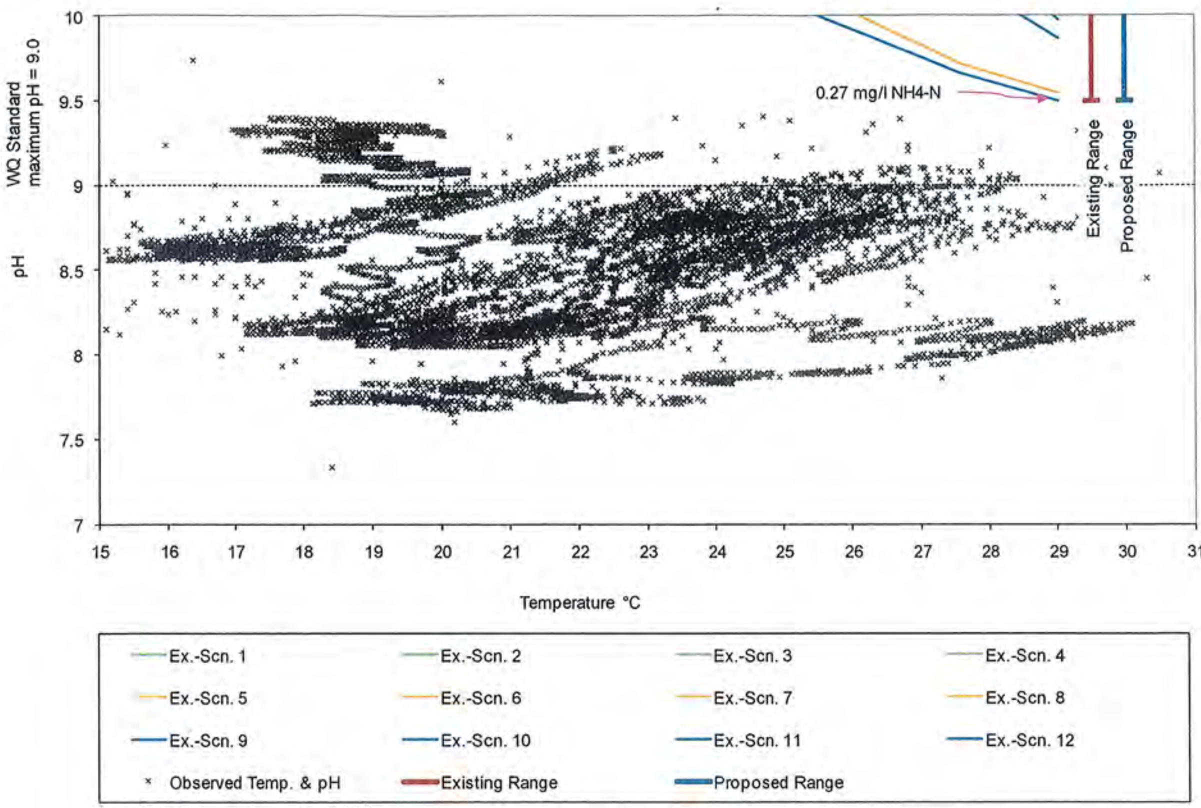


Figure 28. Chronic water quality standards (ELSA) for a) existing and b) proposed conditions (95^{th}).



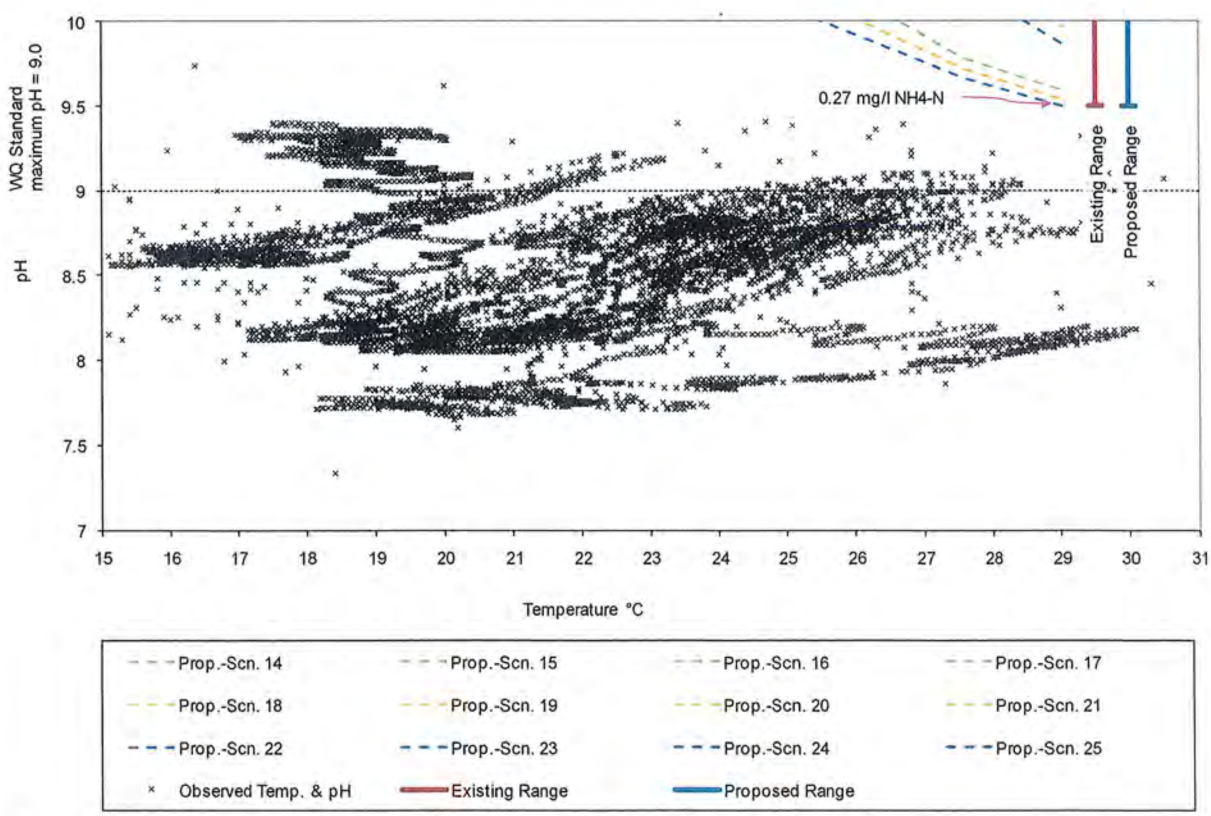


Figure 29. Sub-chronic water quality standards (ELSP) for a) existing and b) proposed conditions (50th).

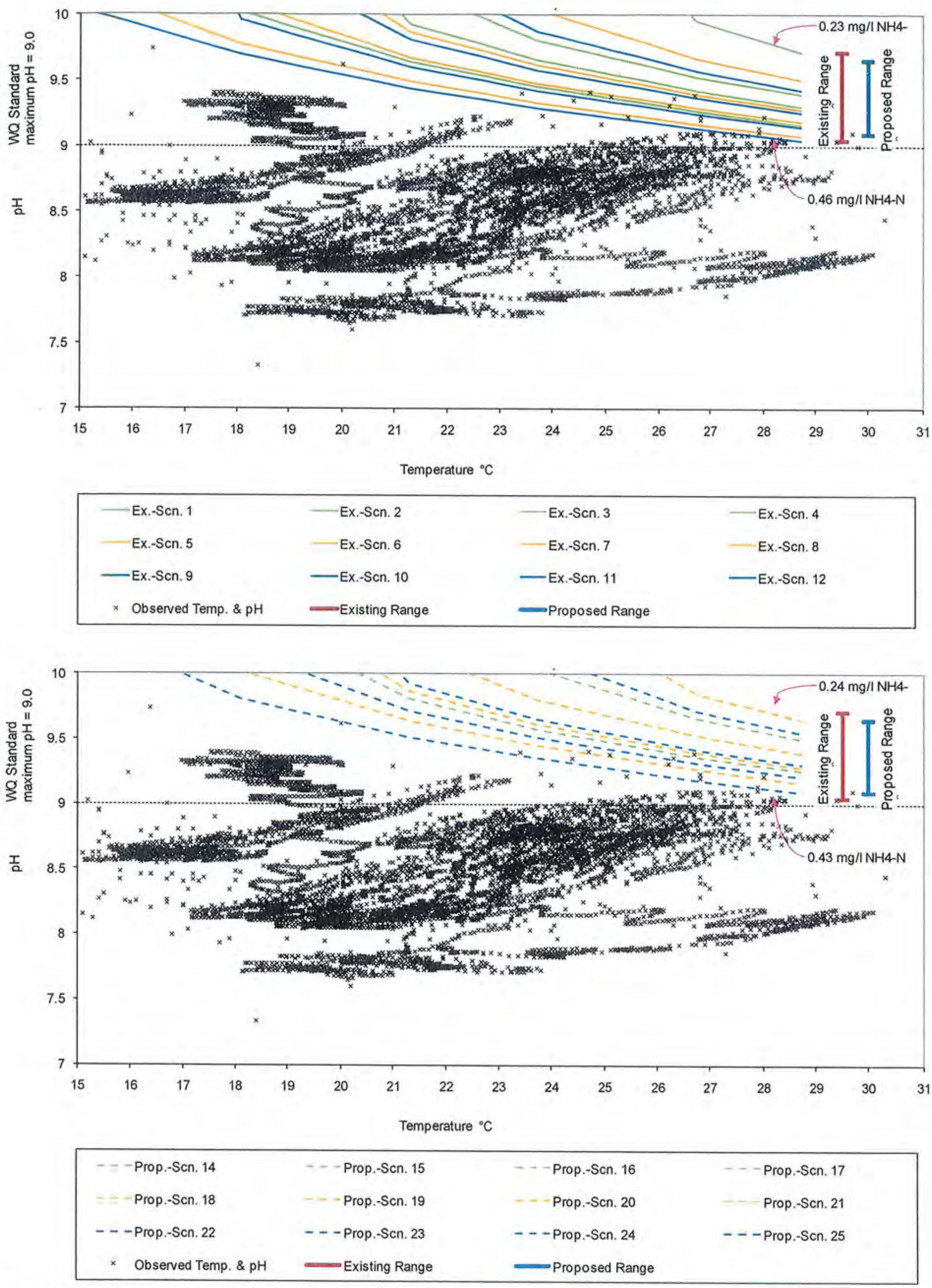


Figure 30. Sub-chronic water quality standards (ELSP) for a) existing and b) proposed conditions (95th).

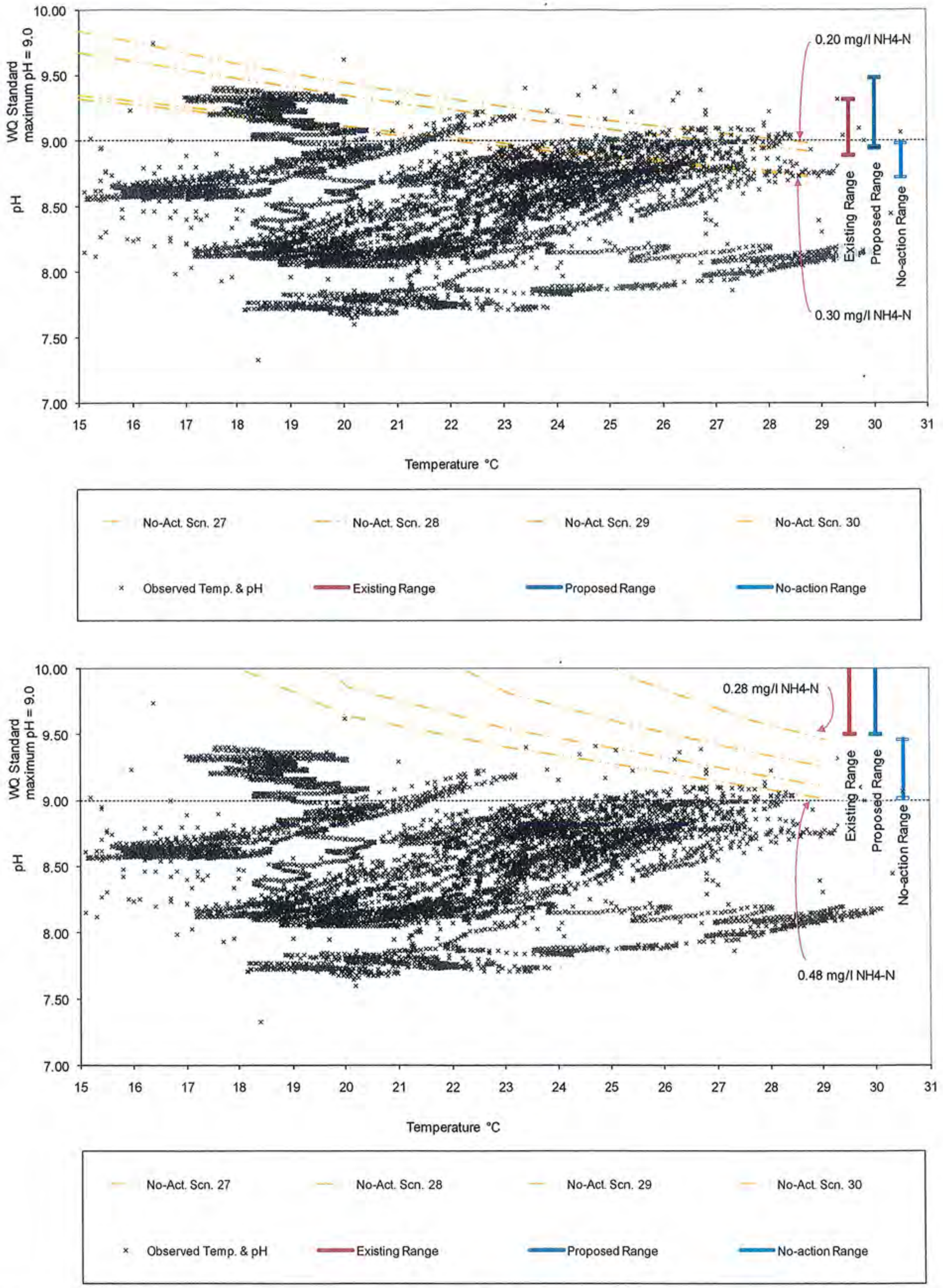


Figure 31. Chronic (a) and sub-chronic (b) water quality standards (ELSP) for "no action" conditions (50^{th}).

Water quality standards also require pH values to be "*within the range of 6.5 to 9.0*". Any violation of ammonia standards discussed above when pH values are above 9.0 would not be a violation if pH values were within the pH standard requirements. Table 21 shows temperatures at which the isolines cross the pH standard line, i.e., a temperature threshold above which the ammonia water quality standards would be violated when pH was 9. It also means that for temperatures below this threshold, violations can occur only when pH standard is violated. For example, chronic ammonia standard during ESLP assuming normal ambient conditions will not be violated for the proposed conditions during the 5-year storm when Fox River temperature is below 29°C and pH is in compliance with water quality standards.

Table 21. Temperatures (°C) at which isolines cross pH=9 for the 5-year storm

FMWRD conditions	*Normal ambient conditions*				*Critical ambient conditions*			
	Chronic		*Subchronic*		*Chronic*		*Subchronic*	
	ELSP	*ELSA*	*ELSP*	*ELSA*	*ELSP*	*ELSA*	*ELSP*	*ELSA*
Existing	27-33	25-31	38-49	38-49	22-26	11-13	30-38	30-38
Proposed	29-35	27-32	38-48	38-48	23-27	11-13	32-40	32-40
No action	22-28	21-27	29-37	29-37	18-23	9-11	21-29	21-29

Nitrate Nitrogen

Nitrate Nitrogen Water Quality Standards

The Illinois Pollution Control Board does not define a standard for nitrate nitrogen in streams except when used for public water supply or food processing. The Illinois Environmental Protection Agency also discontinued using a threshold to identify nitrogen as a potential cause for impaired waters (IEPA, 2008). A value of 7.8 mg/l was used to identify nitrogen impairment when compared to combined nitrate and nitrite nitrogen (IEPA, 2006). A single exceedance is sufficient to list nitrogen as a potential cause of impairment.

Impact of Proposed Modifications

Figure 32 shows simulated nitrate nitrogen concentrations at Route 34 under both existing and proposed conditions for three design rains. The nitrate nitrogen load and concentration discharged by the FMWRD facilities during design storms are lower than the load and concentrations discharged during dry weather flow. The FMWRD full treatment facility is designed to convert ammonia to nitrate (nitrification). The nitrification process becomes less efficient with increasing flow to the treatment plant, converting a smaller portion to nitrate and thus less nitrate discharged during design storms. This leads to a decrease in ambient nitrate nitrogen concentrations during design storms as seen in Figure 32. Minimum and maximum simulated values are listed in Table 22. Note that all maximum concentrations remain the same within each simulated condition, existing (2.49 mg/l) or proposed (2.10 mg/l). This is because maximum concentrations are simulated during the dry weather as described above. All simulated values are well below the IEPA listing value.

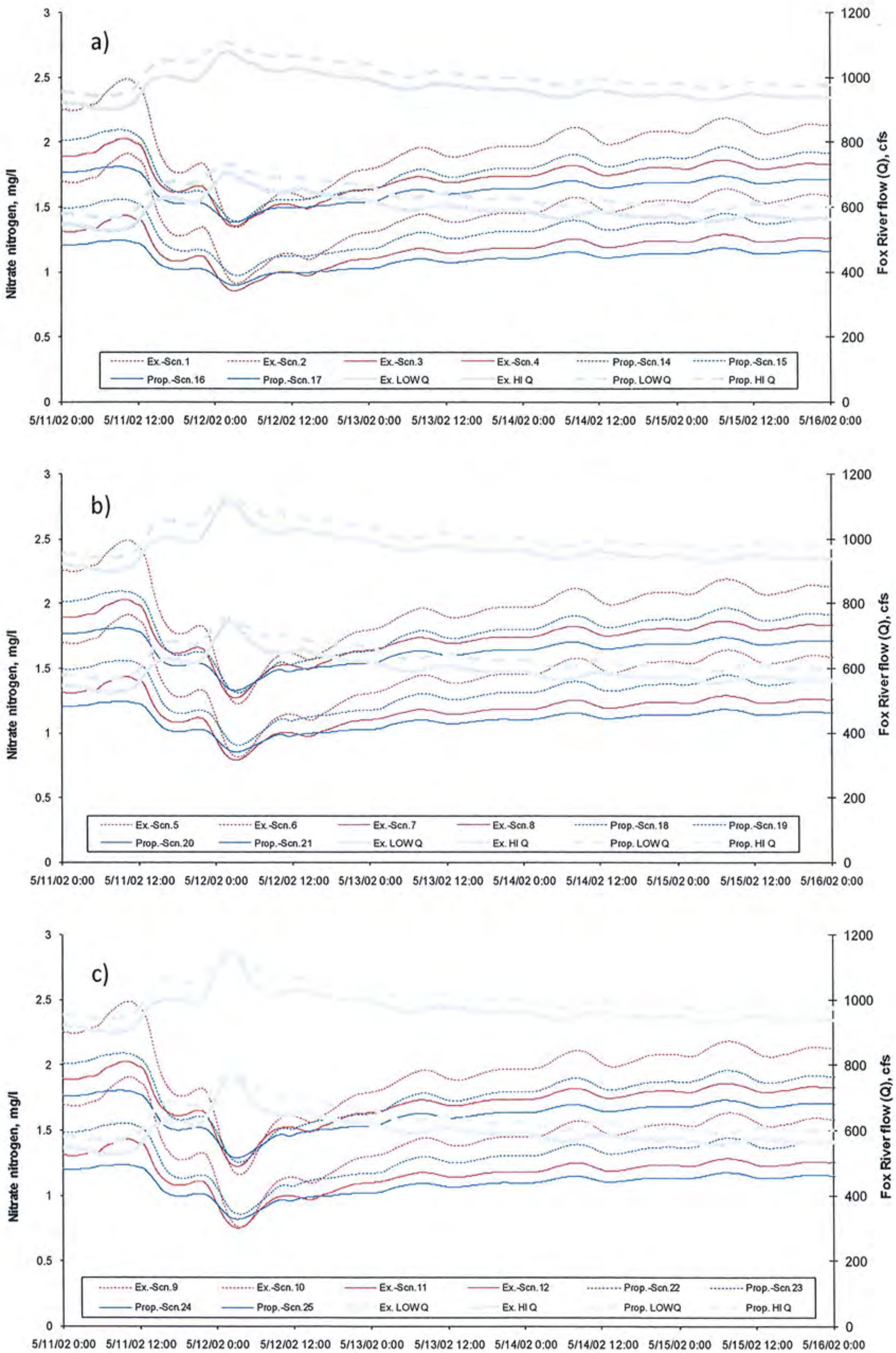


Figure 32. Nitrate nitrogen at Route 34 under existing and proposed conditions: a) 1-year storm, b) 5-year storm, and c) 10-year storm

Table 22. Simulated nitrate nitrogen maximum and minimum concentrations and percent reduction

Storm	*Scenario*	*Existing* *Max* *mg/l*	*Min* *mg/l*	*Scenario*	*Proposed* *Max* *mg/l*	*Min* *mg/l*	*Reduction* *Max* *%*
1 year	1	2.49	1.35	14	2.10	1.39	16%
	2	1.92	0.91	15	1.56	0.97	18%
	3	2.03	1.35	16	1.81	1.38	11%
	4	1.44	0.86	17	1.24	0.90	14%
5 year	5	2.49	1.23	18	2.10	1.31	16%
	6	1.92	0.81	19	1.56	0.91	19%
	7	2.03	1.27	20	1.81	1.33	11%
	8	1.44	0.79	21	1.24	0.85	14%
10 year	9	2.49	1.17	22	2.10	1.26	16%
	10	1.92	0.76	23	1.56	0.86	19%
	11	2.03	1.23	24	1.81	1.30	11%
	12	1.44	0.76	25	1.24	0.83	14%

Total Nitrogen

Total Nitrogen Water Quality Standards

The Illinois Pollution Control Board does not define a standard for total nitrogen. The Illinois Environmental Protection Agency also discontinued using a threshold to identify nitrogen as a potential cause for impaired waters (IEPA, 2008). A value of 7.8 mg/l was used to identify nitrogen impairment when compared to combined nitrate and nitrite nitrogen (IEPA, 2006). A single exceedance is sufficient to list nitrogen as a potential cause of impairment. No listing value is available for total nitrogen. Compliance with nitrate nitrogen standards is evaluated separately.

Impact of Proposed Modifications

Figure 33 shows simulated total nitrogen concentrations at Route 34 under both existing and proposed conditions for three design rains. The highest simulated concentrations under existing conditions occur during dry weather flow and are 4.33 mg/l for all simulated design storms (Table 23). The highest simulated concentrations under proposed conditions are 3.96 mg/l, 3.96 mg/l, and 4.04 mg/l for 1-year, 5-year, and 10-year design storms, respectively (Table 23). This represents a reduction of 4-9%, 3-9%, and 0-7% for 1-year, 5-year, and 10-year design storms, respectively (Table 23). The increase and its duration were not evaluated for total nitrogen as concentrations do not vary more than 10% from simulated dry weather values.

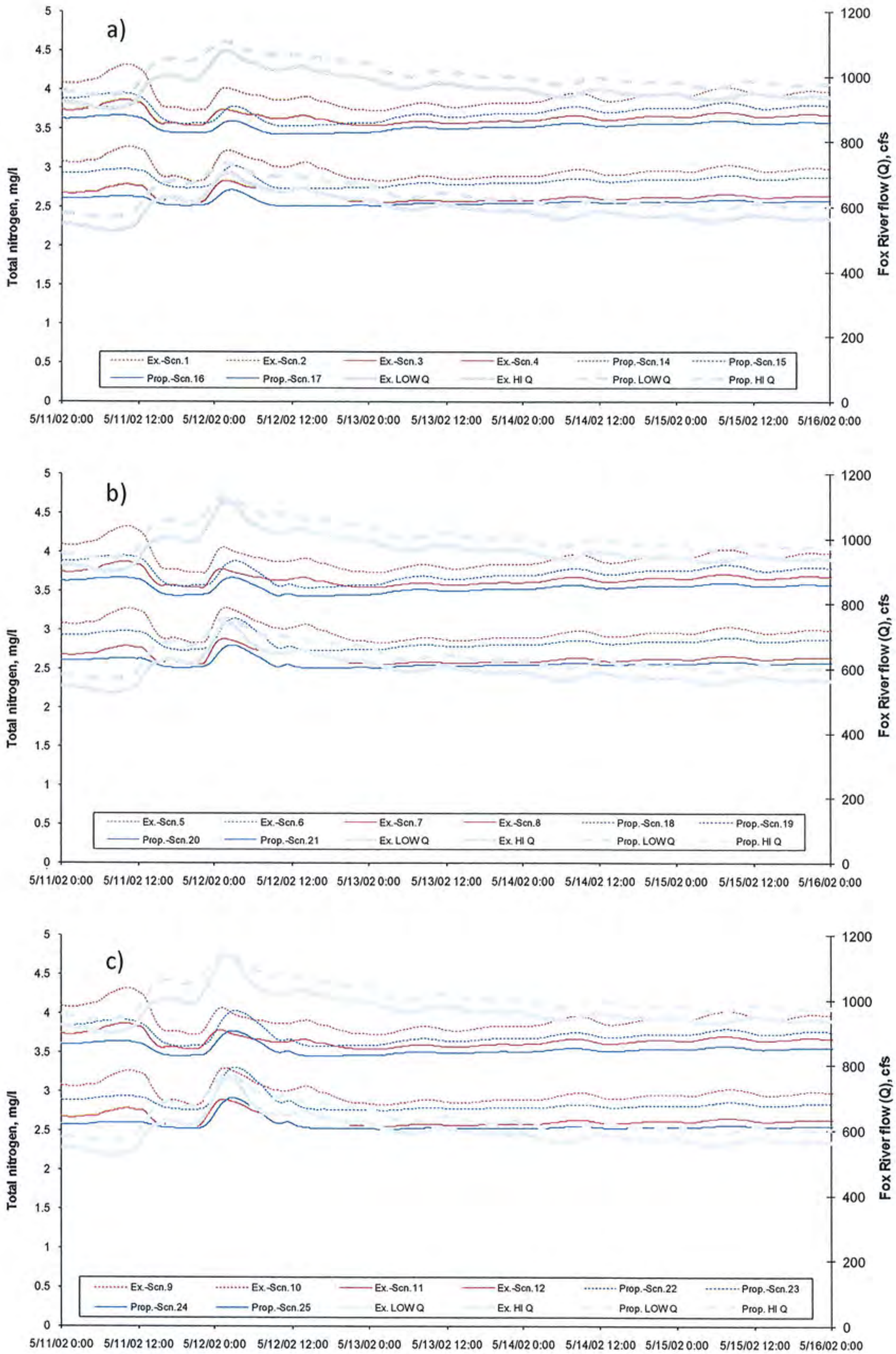


Figure 33. Total nitrogen at Route 34 under existing and proposed conditions:
a) 1-year storm, b) 5-year storm, and c) 10-year storm

Table 23. Maximum total nitrogen simulated during the storm impact (mg/l) and percent reduction.

Storm	*Existing*		*Proposed*		*Reduction*
	Scenario	*Max mg/l*	*Scenario*	*Max mg/l*	*Max %*
1 year	1	4.33	14	3.96	9
	2	3.28	15	3.03	8
	3	3.88	16	3.67	5
	4	2.84	17	2.72	4
5 year	5	4.33	18	3.96	9
	6	3.28	19	3.15	4
	7	3.88	20	3.67	5
	8	2.89	21	2.80	3
10 year	9	4.33	22	4.04	7
	10	3.30	23	3.32	<1
	11	3.88	24	3.78	3
	12	2.90	25	2.92	-1

Total Phosphorus

Phosphorus Water Quality Standards

The Illinois Pollution Control Board only defines phosphorus standards for lakes and reservoirs with a surface area greater than 8.1 hectares (20 acres), where total phosphorus should not exceed 0.05 mg/l. Impoundments behind low head dams constructed on free-flowing streams are not considered lakes or reservoirs regardless of the surface area and thus, this standard does not apply. The Illinois Environmental Protection Agency uses a value of 0.61 mg/l as a threshold to identify phosphorus as a potential cause for impaired waters (IEPA, 2008). A single exceedance is sufficient to list phosphorus as a potential cause of impairment.

Impact of Proposed Modifications

Figure 34 shows simulated total phosphorus concentrations at Route 34 under both existing and proposed conditions for three design rains. Figure 35 shows simulated total phosphorus concentrations at Route 34 under both existing and proposed conditions for the 3-month storm. The highest simulated concentrations under existing conditions are 0.71 mg/l, 0.72 mg/l, 0.73 mg/l, and 0.75 mg/l for 3-month, 1-year, 5-year, and 10-year design storms, respectively (Table 24). The highest simulated concentrations under proposed conditions are 0.62 mg/l, 0.67 mg/l, 0.70 mg/l, and 0.73 mg/l for 3-month, 1-year, 5-year, and 10-year design storms, respectively (Table 24). This represents a reduction of 10-15%, 5-8%, 2-4%, and 1-3% for 3-month, 1-year, 5-year, and 10-year design storms, respectively (Table 25). Note that proposed conditions include higher phosphorus treatment than existing conditions, resulting in lower ambient concentrations overall.

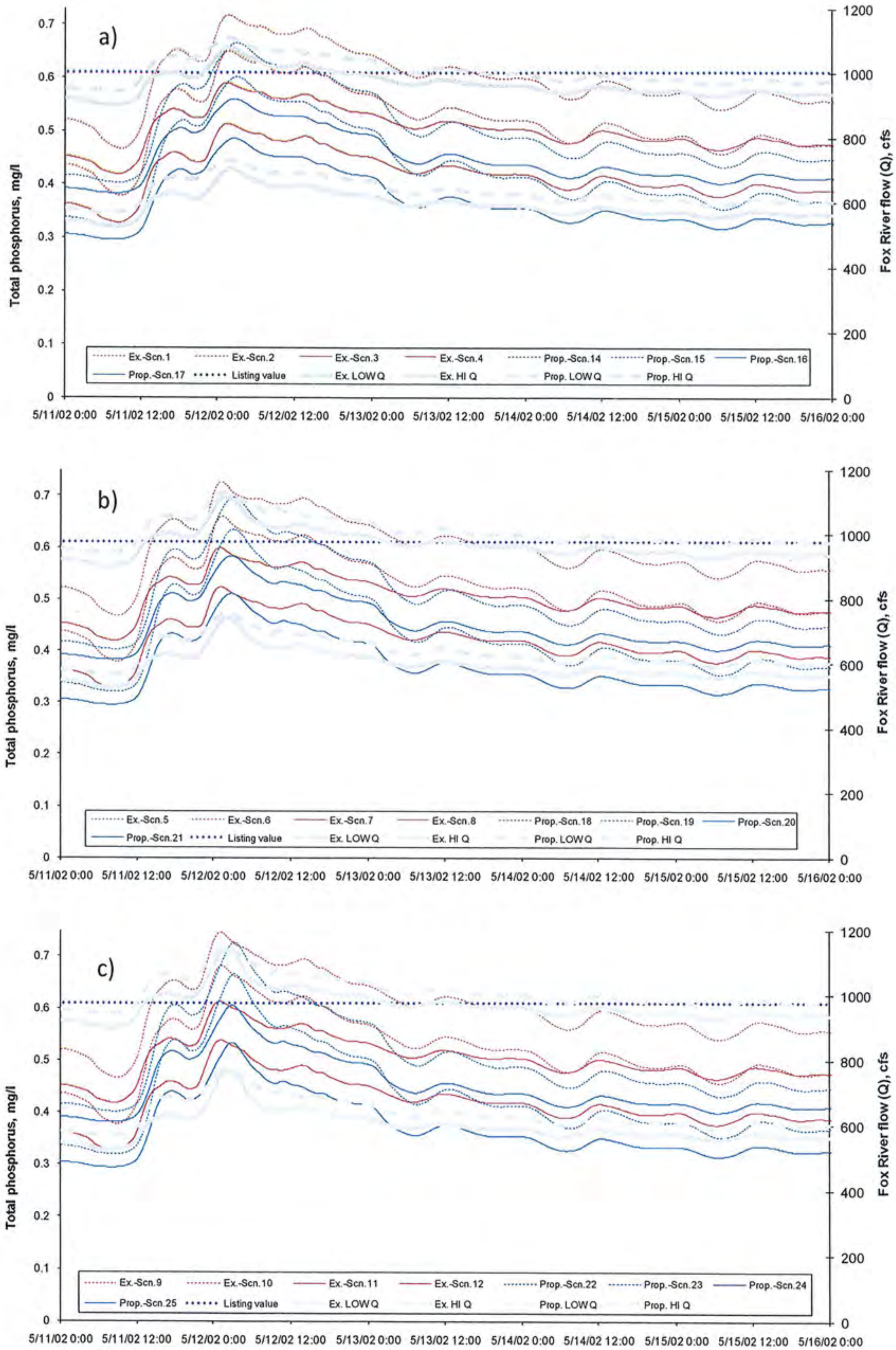


Figure 34. Total phosphorus at Route 34 under existing and proposed conditions:
a) 1-year storm, b) 5-year storm, and c) 10-year storm

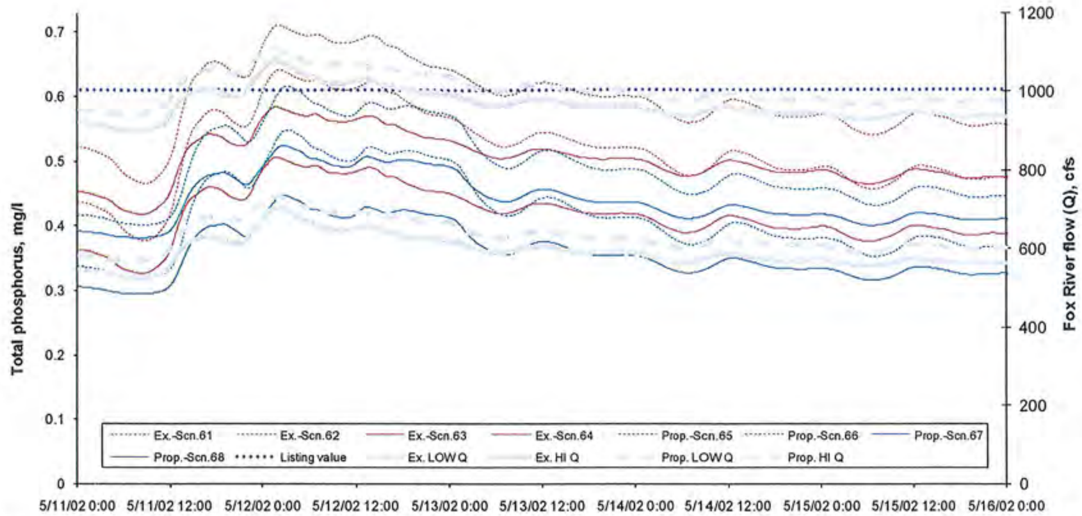


Figure 35. Total phosphorus at Route 34 under existing and proposed conditions for 3-month storm

Table 24. Simulated total phosphorus maximum, maximum increase, and duration of increase above dry weather conditions during design storms

Storm	Existing				Proposed			
	Scenario	*Max mg/l*	*Increase mg/l*	*Duration days*	*Scenario*	*Max mg/l*	*Increase mg/l*	*Duration days*
1 year	1	0.72	0.19	2.7	14	0.67	0.24	2.8
	2	0.65	0.20	2.9	15	0.60	0.25	3.0
	3	0.59	0.13	2.1	16	0.56	0.16	2.1
	4	0.51	0.14	2.7	17	0.49	0.17	2.7
5 year	5	0.73	0.19	2.7	18	0.70	0.27	2.8
	6	0.66	0.21	2.9	19	0.63	0.29	3.0
	7	0.60	0.14	2.1	20	0.58	0.18	2.1
	8	0.52	0.15	2.7	21	0.51	0.20	2.7
10 year	9	0.75	0.21	2.7	22	0.73	0.30	2.8
	10	0.68	0.23	2.9	23	0.67	0.32	3.0
	11	0.61	0.15	2.1	24	0.61	0.21	2.1
	12	0.54	0.17	2.7	25	0.53	0.22	2.7
3 month	61	0.71	0.18	2.7	65	0.62	0.19	2.8
	62	0.64	0.19	2.9	66	0.55	0.20	3.0
	63	0.59	0.12	2.1	67	0.53	0.13	2.1
	64	0.51	0.13	2.7	68	0.45	0.13	2.7

Table 25. Percent reduction in maximum simulated total phosphorus value during design storms

Scenario	*Max*	*Increase*	*Duration*	*Scenario*	*Max*	*Increase*	*Duration*
	1 year				10 year		
1-14	7%	-28%	-1%	9-22	3%	-40%	-1%
2-15	8%	-25%	-3%	10-23	2%	-36%	-3%
3-16	5%	-23%	-4%	11-24	1%	-35%	-4%
4-17	6%	-21%	0%	12-25	1%	-32%	0%
	5 year				3 month		
5-18	4%	-39%	-1%	61-65	13%	-6%	-1%
6-19	4%	-35%	-3%	62-66	15%	-3%	-3%
7-20	3%	-33%	-4%	63-67	10%	-1%	-3%
8-21	2%	-30%	0%	64-68	12%	0%	1%

Note: Negative values mean values increased from existing to proposed conditions due to higher phosphorus removal at the FMWRD facility, resulting in lower dry weather ambient concentrations.

Table 26 shows a maximum increase above the listing value and its duration. Existing conditions cause exceedance of listing values during low flows in the Fox River for all simulated design storms. The duration of this exceedance can range from 0.7 to 1.9 days (16-45 hours), depending on the upstream concentration (longer for higher concentrations). Both magnitude and duration of exceedances are greatly reduced under proposed conditions. The increase above the listing value during the 3-month storm under proposed conditions is negligible (method detection limit is typically 0.01 mg/l). The increase above the listing value during the 1-year storm under proposed conditions is limited to the most critical scenario (low flow and high phosphorus concentrations in the Fox River). The increase above the listing value during 5-year and 10-year storms under proposed conditions occurs for scenarios simulating an impact during low flows in the Fox River. The listing value is exceeded under proposed conditions for 0.2-0.7 days (4-17 hours).

The duration of exceedance above the listing value is a theoretical value calculated under the assumption of constant flow and concentrations in the Fox River at Mill Street in Aurora, i.e., downstream of Aurora's storm sewers and CSOs that might be discharging during or after the design rains, causing flows and concentrations in the Fox River at Mill Street to increase or to vary. The combined effect of all discharges in the study reach would give a more complete picture of concentrations at Route 34 during and after storms. It would also help to evaluate relative contributions of individual sources and possible improvements in concentrations at Mill Street as a result of proposed modifications to City of Aurora's CSOs. Unfortunately, discharge and concentration data on City of Aurora's CSO existing and proposed discharges during design storms were not provided.

Note that no phosphorus removal was assumed for CEPT at this stage of evaluation as removal efficiencies were not provided. Chemical additions planned for CEPT will further reduce phosphorus load and concentrations discharged to the Fox River during design storms. The load and concentrations considered in this study represent the worst possible case when CEPT is not utilized for phosphorus removal.

Table 26. Increase above total phosphorus listing value (0.61 mg/l) and its duration during design storms

Storm	*Scenario*	*Existing* Increase mg/l	*Existing* Duration days	*Scenario*	*Proposed* Increase mg/l	*Proposed* Duration days	*Percent reduction* Increase mg/l	*Percent reduction* Duration days
1 year	1	0.11	1.9	14	0.06	0.7	49%	64%
	2	0.04	0.7	15	*	*	100%	100%
	3	*	*	16	*	*	*	*
	4	*	*	17	*	*	*	*
5 year	5	0.12	1.9	18	0.09	0.7	26%	64%
	6	0.05	0.7	19	0.02	0.2	51%	76%
	7	*	*	20	*	*	*	*
	8	*	*	21	*	*	*	*
10 year	9	0.14	1.9	22	0.12	0.7	14%	63%
	10	0.07	0.7	23	0.06	0.2	21%	67%
	11	<0.01	0.1	24	*	*	100%	100%
	12	*	*	25	*	*	*	*
3 month	61	0.10	1.9	65	<0.01	0.1	93%	95%
	62	0.03	0.7	66	*	*	100%	100%
	63	*	*	67	*	*	*	*
	64	*	*	68	*	*	*	*

Note: * Maximum value is at or below listing value, no exceedance detected.

BOD_5

BOD_5 Water Quality Standards

The Illinois Pollution Control Board does not define a standard for BOD_5 outside standards for dissolved oxygen. The Illinois Environmental Protection also does not define a value for listing BOD_5 as a cause of impairment.

Impact of Proposed Modifications

Figure 36 shows simulated BOD_5 concentrations at Route 34 under both existing and proposed conditions for three design rains. The highest simulated concentrations under existing conditions are 10.4 mg/l, 11.5 mg/l, and 12.0 mg/l for 1-year, 5-year, and 10-year design storms, respectively (Table 27). The highest simulated concentrations under proposed conditions are 6.6 mg/l, 7.9 mg/l, and 8.7 mg/l for 1-year, 5-year, and 10-year design storms, respectively (Table 24). This represents a reduction of 30-43%, 26-37%, and 23-32% for 1-year, 5-year, and 10-year design storms, respectively (Table 28). There is also a significant reduction in both magnitude and duration of an increase above ambient concentrations simulated during the dry weather.

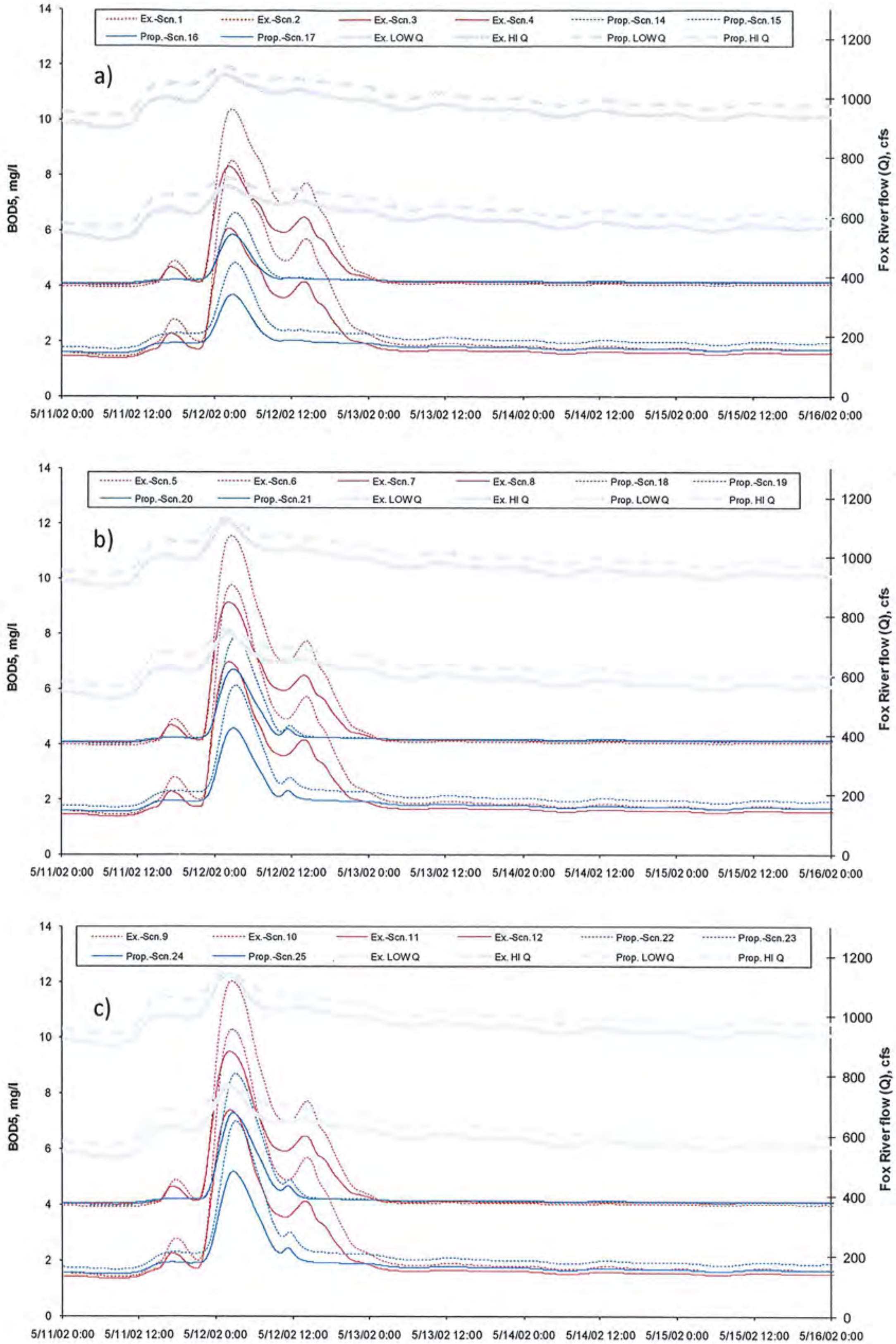


Figure 36. BOD_5 at Route 34 under existing and proposed conditions:
a) 1-year storm, b) 5-year storm, and c) 10-year storm.

Table 27. Simulated BOD_5 maximum, maximum increase, and duration of increase above dry weather conditions during design storms

	Existing				Proposed			
	Scenario	Max mg/l	Increase mg/l	Duration days	Scenario	Max mg/l	Increase mg/l	Duration days
1 year	1	10.4	6.4	1.2	14	6.6	2.6	0.4
	2	8.5	6.9	2.7	15	4.8	3.0	2.5
	3	8.3	4.2	1.0	16	5.8	1.7	0.3
	4	6.1	4.6	2.0	17	3.7	2.0	1.8
5 year	5	11.5	7.5	1.2	18	7.9	3.8	0.5
	6	9.7	8.1	2.7	19	6.1	4.3	2.5
	7	9.1	5.0	1.0	20	6.7	2.6	0.4
	8	7.0	5.5	2.0	21	4.6	2.9	1.8
10 year	9	12.0	8.0	1.2	22	8.7	4.6	0.6
	10	10.3	8.7	2.7	23	7.0	5.2	2.5
	11	9.5	5.4	1.1	24	7.3	3.2	0.5
	12	7.4	5.9	2.0	25	5.2	3.6	1.8

Table 28. Percent reduction in maximum simulated BOD_5 value during design storms

Scenarios	Max	Increase	Duration	Scenarios	Max	Increase	Duration
	1 year				*10 year*		
1-14	36%	60%	67%	9-22	28%	42%	51%
2-15	43%	57%	8%	10-23	32%	41%	8%
3-16	30%	59%	68%	11-24	23%	41%	49%
4-17	39%	55%	7%	12-25	29%	39%	6%
	5 year						
5-18	32%	49%	56%				
6-19	37%	47%	8%				
7-20	26%	49%	60%				
8-21	34%	46%	7%				

Dissolved Oxygen

Dissolved Oxygen Water Quality Standards

Dissolved oxygen standards offer different levels of protection for general use waters and waters with enhanced dissolved oxygen regime. Different seasonal standard values apply to a minimum value at any time, a daily minimum averaged over 7 days, and a daily mean averaged over 30 days (Table 29). Continuous data collected by datasondes are required to calculate averages for evaluating compliance with dissolved oxygen standards.

Table 29. Overview of Dissolved Oxygen Standards (mg/l)

Statistic	*All waters*		*Enhanced dissolved oxygen regime waters*	
	March-July	*August-February*	*March-July*	*August-February*
Any time	5.0	3.5	5.0	4.0
Daily minimum averaged over 7 days	6.0	4.0	6.25	4.5
Daily mean averaged over 30 days	N/A	5.5		6.0

Impact of Proposed Modifications

Simulating the impact of storm discharges on dissolved oxygen is not trivial. Dissolved oxygen exhibits a strong variation with temperature changes during a year as well as during a day. Algal communities and their photosynthetic activities further impact oxygen concentrations and variations during a day. Storms completely change the dynamics of a dissolved oxygen cycle. Storm runoff brings a high volume of water with a relatively constant dissolved oxygen concentration. Even during summer when algal activity is high, the diurnal variation disappears or at least is dampened during a storm. Simulating this dynamic response calls for highly detailed data describing all inputs into the study reach and internal processes within the reach collected during a significant CSO event.

Furthermore, any impact will greatly vary with upstream conditions and timing of the storm. Selecting a constant concentration for upstream conditions would not be appropriate considering the diurnal and seasonal variation. The design storm discharge would have a different impact on dissolved oxygen depending on the time of day when the storm occurred. A discharge during early morning hours when dissolved oxygen is typically very low would have a much higher impact than the same discharge during afternoon hours when algal productivity is high and dissolved oxygen can reach values above saturation.

A simpler approach to evaluate the impact is adopted at this stage until such data become available. BOD_5 and ammonia are the dominant oxygen-demanding substances discharged by the FMWRD. BOD_5 represents an actual oxygen demand by mostly organic material consumed within 5 days. BOD_5 was converted to ultimate BOD (BOD_u) using a multiplier of 1.8. Ammonia needs oxygen during nitrification, a conversion of ammonia to nitrate. Theoretically, 1 mg/l ammonia nitrogen requires 4.57 mg/l oxygen for full conversion. Total oxygen demand is thus approximated as:

$$TOD = 1.8\ BOD_5 + 4.57\ (NH_4\text{-}N)$$

The amount and rate of oxygen-demanding substances discharged during storms to the Fox River are calculated and compared. Figure 37 and Figure 38 show the loading rate and the cumulative load discharged during design storms from the FMRWD (all discharges combined). The storm-influenced discharges begin at 10 a.m. on 5/11/2002 and end at 4 a.m. on 5/16/2002. Total load is also converted to an average loading rate by dividing it by the length of the storm period (four days and 18 hours). The effect of dry weather discharges on dissolved oxygen is not evaluated in this study.

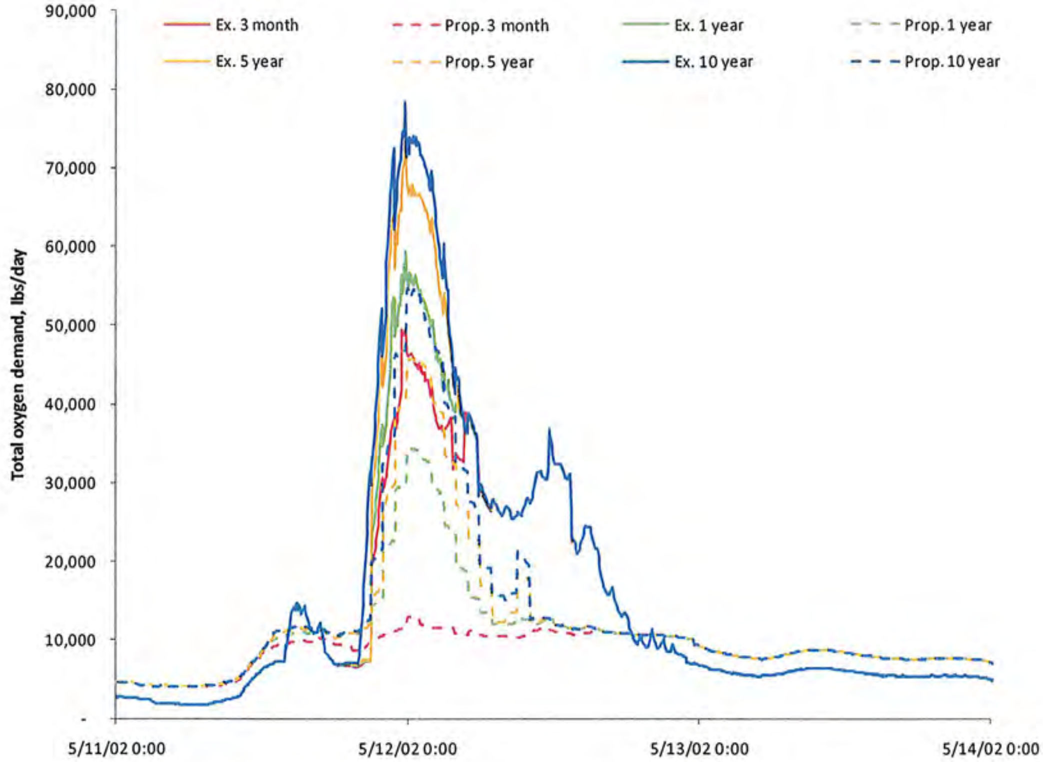


Figure 37. Total oxygen demand discharged by the FMWRD facilities.

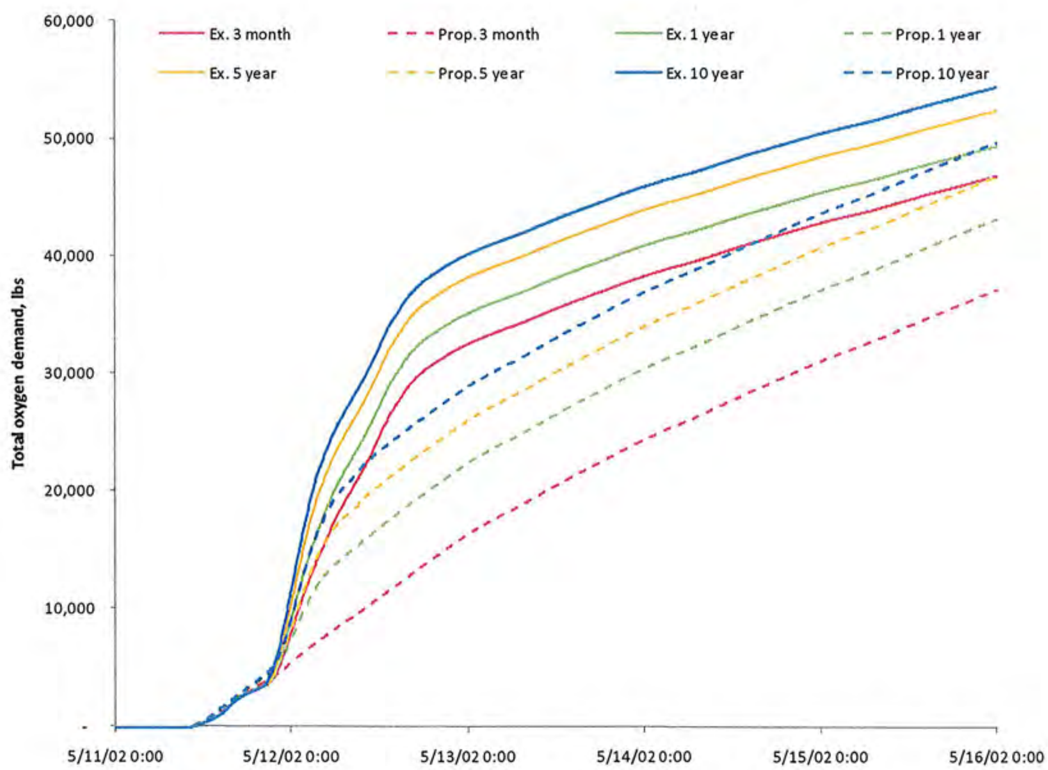


Figure 38. Cumulative total oxygen demand discharged by the FMWRD facilities during design storms.

Error! Not a valid bookmark self-reference. lists total load and maximum rates for discharges of total oxygen demands during the design storms. Total loads and maximum loading rates discharged during design storms are also compared in Figure 39 and Figure 40, respectively. All total oxygen demand loads as well as maximum loading rates discharged under proposed conditions are lower than loads discharged under existing conditions because the design peak hourly flow for proposed conditions is about 1.5 times higher than existing design peak hourly flow. The total load discharged under existing conditions varies from 47,200 to 54,800 lbs (21,300-24,800 kg or 23.6-27.4 tons). The total load discharged under proposed conditions varies from 37,800 to 50,400 lbs (17,200-22,800 kg or 18.9-25.2 tons).

While the loads and loading rates are not directly comparable to the dissolved oxygen standard, the values clearly show the proposed condition will bring a significant reduction of total load and the maximum loading rate compared to the loads discharged under current conditions (Table 31). Total load is reduced by 8-20% and a maximum rate by 30-74% with the percentage of reduction increasing with smaller return periods, i.e., the benefits are larger for the smaller, more common rainfalls. Proposed conditions are expected to improve dissolved oxygen levels during storms when compared to existing conditions by reducing the loads of oxygen-demanding substances discharged to the Fox River. The rate of biochemical processes in receiving waters will determine the spatial extent of this positive impact.

Table 30. Total oxygen demand discharged by the FMWRD facilities

		Total load		*Maximum rate*		*Average rate*	
Storm	*Condition*	*lbs*	*kg*	*lbs/day*	*kg/day*	*lbs/day*	*kg/day*
3 month	Existing	47,200	21,400	49,500	22,500	9,900	4,500
	Proposed	37,800	17,200	12,900	5,900	8,000	3,600
1 year	Existing	49,800	22,600	59,300	26,900	10,500	4,700
	Proposed	43,900	19,900	34,400	15,600	9,200	4,200
5 year	Existing	52,800	23,900	73,400	33,300	11,100	5,000
	Proposed	47,500	21,500	45,800	20,800	10,000	4,500
	No Action	137,400	62,300	105,400	47,800	28,900	13,100
10 year	Existing	54,800	24,800	78,400	35,500	11,500	5,200
	Proposed	50,400	22,800	54,800	24,900	10,600	4,800
	No Action	140,900	63,900	111,600	50,600	29,600	13,400

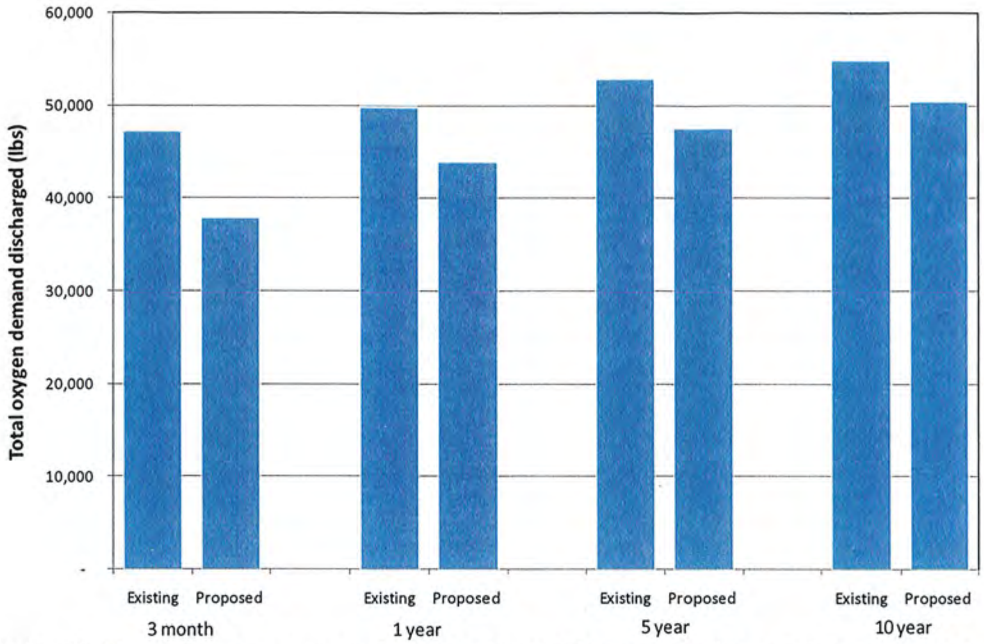


Figure 39. Total oxygen demand discharged from FMWRD facilities during design storms.

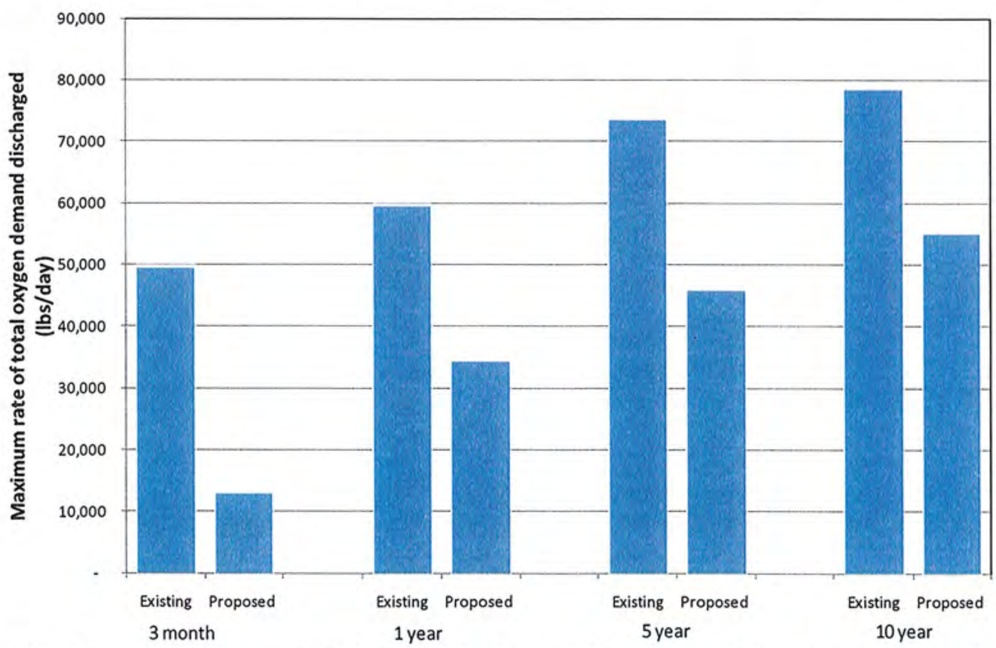


Figure 40. Maximum rate total oxygen demand discharged from FMWRD facilities during design storms.

Table 31. Percent reduction of total oxygen demand discharged by the FMWRD facilities

Storm	*Total load*	*Maximum rate*
3 month	20%	74%
1 year	12%	42%
5 year	10%	38%
10 year	8%	30%

Summary and Conclusion

The goal of this project was to evaluate impacts from the FMWRD CSO discharge on the Fox River water quality using a computer simulation model. Achieving the end result required intensive cooperation with the staff of WEDA and the FMWRD, due to the model's reliance upon monitoring and design data defining discharges to the Fox River reach between Sullivan Road in Aurora and Route 34 in Oswego and water quality in the Fox River. Water quality constituents typically found in CSO discharges and those listed as potential causes of impairment were selected for evaluation: fecal coliforms, total suspended solids, ammonia nitrogen, nitrate nitrogen, total nitrogen, total phosphorus, BOD_5, and dissolved oxygen. Simulating effects of CSO discharges requires a detailed, hydrodynamic model capable of replicating changes in ambient water quality over a short time. Changes in dissolved oxygen during storm discharges were not simulated due to a lack of data to fully describe the complexities of in-stream processes under changing flow conditions. The impact on dissolved oxygen is estimated from discharged loads.

The model developed within WASP software was calibrated using two events (July and August 2008) and validated using two events (September 2008 and August 2009). In addition, a long-term simulation of May-October 2008 was used to validate the overall model performance and identify any model trends that would not be noticeable within a short time period when simulating individual events. It is difficult to collect monitoring data during the exact time period when a discharge from CSOs upstream passes through a monitoring location, especially when time of CSO discharge is not known until after the monitoring is completed. Unfortunately, most monitoring data were collected before or after the peak concentration associated with CSOs discharges passed through monitoring locations, catching the receding part of the pollutograph at best. The peak concentrations simulated by the model are thus unverified by field observations. The intensive sampling effort in August 2009 provided the best data, describing the rising portion of the pollutograph although only for selected constituents. The model matched observed data during the calibration and validation periods adequately, considering the difficulties with data collection and interpretation.

The calibrated and validated model was set to simulate impacts from the FMWRD discharges on the Fox River water quality under existing and proposed conditions at the FMWRD plant. A full treatment expansion is planned to treat additional 46 mgd (design peak hourly flow) and a chemically enhanced primary treatment (CEPT) facility with design peak hourly flow of 44 mgd will disinfect and partially treat all excess flow above the full treatment capacity for storms up to and including the 5-year storm. The FMWRD CSO will be active only during storms larger than the 5-year storm. The untreated volume discharged through the FMWRD CSO during the 10-year storm represents 0.1% of total volume discharged during the storm. The evaluation focused on water quality impacts during storm-affected discharges. The effects of the FMWRD dry weather discharges were not evaluated in this study.

The impact of three design storms (1-year, 5-year, and 10-year) is evaluated for all constituents. Ammonia nitrogen, total phosphorus, and dissolved oxygen are critical constituents for which it was important to evaluate the range of impacts on water quality standards. The impacts on ammonia nitrogen, total phosphorus, and dissolved oxygen were also evaluated for the 3-month storm when all storm volume will be fully treated by the FMWRD facilities under the proposed conditions (i.e., no flow through CEPT or CSO). The impact of "no action" condition on ammonia nitrogen and dissolved oxygen was also evaluated for the 5-year storm.

Four scenarios were simulated for each design storm and for each FMWRD condition, existing or proposed, to evaluate a range of possible impacts as they change with the changing Fox River flow and water quality. Two selected flows represent a low flow (exceeded on 75% of days) and a median flow (exceeded on 50% of days). Two selected concentrations for each simulated constituent represent a low concentration (exceeded in 75% of samples) and a high concentration (exceeded in 25% of samples). High flow in the Fox River was not simulated at this time as the impact of FMWRD discharges on the Fox River water quality is expected to diminish with increased Fox River flow.

The impact was evaluated from two different perspectives. First, a change from existing to proposed conditions was assessed. For all constituents, maximum simulated concentrations under proposed conditions are lower than the maximum simulated concentrations under existing conditions. The actual reduction varies for individual constituents, design storms, and scenarios (Table 32). Also, durations of the increase above dry weather concentrations under proposed conditions are lower than under existing conditions except for total phosphorus, where more stringent treatment for proposed conditions also results in significantly lower concentrations simulated during dry weather. Several constituents do not show a significant increase in simulated concentrations after design storm discharges from the FMWRD facilities: total suspended solids, nitrate nitrogen, and total nitrogen.

Second, a compliance with water quality standards was evaluated for simulated constituents with applicable ambient water quality standards: fecal coliform bacteria and ammonia nitrogen. The IEPA adopted a threshold for some constituents with no water quality standard that is used during the stream impairment evaluation. The IEPA's listing values were used similarly to standards when available (total suspended solids, nitrate nitrogen, and total phosphorus). No standard or listing value is available for total nitrogen and BOD_5. Since dissolved oxygen concentrations in the Fox River were not simulated, the impact was evaluated by comparing total loads and loading rates of oxygen demanding substances discharged under existing and proposed conditions from the FMWRD facilities.

Table 32. Percent reduction of maximum simulated value for evaluated constituents

Constituent	*Design storm*		*Constituent*	*Design storm*	
	1-10 year	*3 month*		*1-10 year*	*3 month*
Fecal coliforms	94-100%	94-100%	Total nitrogen	1-10%	-
Total suspended solids	1-9%	-	Total phosphorus	1-8%	10-15%
Ammonia nitrogen	9-20%	48-58%	BOD_5	23-43%	-
Nitrate nitrogen	11-18%	-	Dissolved oxygen* - total load	8-12%	20%
			- maximum loading rate	30-42%	74%

Note: * Dissolved oxygen was not simulated. Percent reduction was calculated for total load and maximum loading rate discharged by the FMWRD during design storms.
- Not simulated for 3-month design storm.

The interpretation of fecal coliform standards as they apply to a design rain simulation is not specified in the standard documents. Fecal coliform standards are defined for five or more samples collected during a 30-day period: a geometric mean should not exceed 200 cfu/100 ml and only 10% samples can exceed 400 cfu/100 ml. The compliance with these standards will thus largely depend on upstream concentrations and conditions sampled during this 30-day period outside the storm. Observations collected at the Mill Street Bridge in Aurora vary significantly as shown in 25th and 75th percentiles used for the upstream boundary (113 cfu/100 ml and 488 cfu/100 ml, respectively).

All effluent from the FMWRD facilities will be disinfected for 5-year and smaller storms. Under the normal treatment level (1 cfu/100 ml in treated effluent and CEPT), any non-compliance simulated during the 5-year and smaller storms is strictly due to high upstream concentrations. Storms larger than the 5-year storm result in a CSO, which in turn causes high peak concentrations in the Fox River. However, storms of this magnitude have a relatively small probability of occurrence (statistically, once in 5 years). Compliance with water quality standards during the 10-year storm can be achieved if the other four samples collected during the same 30-day period were below 80 cfu/100 ml.

The effect of effluent treated only to the permitted level (400 cfu/100 ml) was also evaluated. This minimal treatment level is at or above numerical values for both standards, resulting in a possible exceedance even for 1-year and 5-year storms if other samples collected during the same 30-day period were above 160 cfu/100 ml. Fortunately, fecal coliform concentrations in the treated effluent exceed the water quality standard values of 200 and 400 only on less than 2% and less than 1% of days, respectively.

Four ammonia standards are applicable to the study reach: absolute maximum, acute toxicity standard determined by pH at a time of observation, and chronic and sub-chronic toxicity standards determined by pH and temperature for ELSP and ELSA periods. Chronic standard applies to 30-day average calculated from at least four samples. Sub-chronic standard applies to 4-day average calculated from at least four samples. A graphical method was developed to evaluate likelihood of ammonia standards being exceeded given the variability in observed pH and temperature values that determine the standard value. Chronic standards during ELSP and ELSA can be possibly exceeded when observed pH and temperature values in the Fox River are very high: pH above 9 and temperatures above 27°C and 29°C for ELSP and ELSA, respectively. Sub-chronic standards during ELSP and ELSA and acute standard will not be exceeded due to proposed FMWRD discharges. Extremely high pH (above 9.4) and temperatures (above 38°C) or high ammonia concentration at upstream boundary may lead to possible exceedances, although observed data do not show such pH and temperature values.

Simulated values for total suspended solids and nitrate nitrogen are all significantly below the listing values of 116 mg/l for total suspended solids and 7.8 mg/l for nitrate nitrogen. The maximum simulated total suspended solids concentrations are 40 mg/l and 38.4 mg/l for existing and proposed conditions, respectively. The maximum simulated nitrate nitrogen concentrations are 2.49 mg/l and 2.10 mg/l for existing and proposed conditions, respectively.

The listing value for phosphorus is 0.61 mg/l. Maximum simulated values exceed the listing value for at least one scenario for each design storm under both existing and proposed conditions. Under proposed conditions, the exceedance is limited to scenarios with low flow and high upstream concentrations for storms smaller than 5-year and scenarios with low flow regardless of the upstream concentrations for 5-year and larger storms. Proposed conditions lead to a significant reduction in both the maximum increase above the listing value (14-100%) and the duration of increase (64-100%) when compared to existing conditions. Model simulations indicate the total phosphorus listing value is likely to be exceeded for 4-17 hours when large storms occur during low flow in the Fox River and the upstream phosphorus concentrations is high.

Simulated ambient concentrations for ammonia nitrogen, nitrate nitrogen, and total phosphorus during the storm-affected discharge are at or above a high range of values observed at Route 34. As FMWRD discharge is not completely mixed at this location, it is difficult to ascertain whether the model overestimates ambient concentrations or whether this difference is caused solely by the incomplete mixing. This is most pronounced for ammonia nitrogen where simulated concentrations during design storms are within 0.2-0.85 mg/l. Although ammonia nitrogen concentrations above 0.2 mg/l are observed rarely (13 out of 252 observations collected between January 2005 and September 2009), the three highest reported concentrations are 1.15 mg/l, 0.99 mg/l, and 0.70 mg/l. The values are in the same range as simulated maximum concentrations for design storms.

Overall, simulations showed that the proposed modification to FMWRD facilities 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 a) do not cause an exceedance of the water quality standard for fecal coliforms during 5-year and smaller storms, b) would likely not cause exceedances of ammonia water quality standards unless pH and temperature reach high values or upstream ammonia concentrations are high, c) would likely cause exceedance of the total phosphorus listing value when no chemical treatment is applied to CEPT and large storms occur during low flows and high phosphorus concentrations in the Fox River upstream of the FMWRD, and d) 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 corresponding return period (3 months) and a partial treatment including full disinfection for all storms with return period 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.

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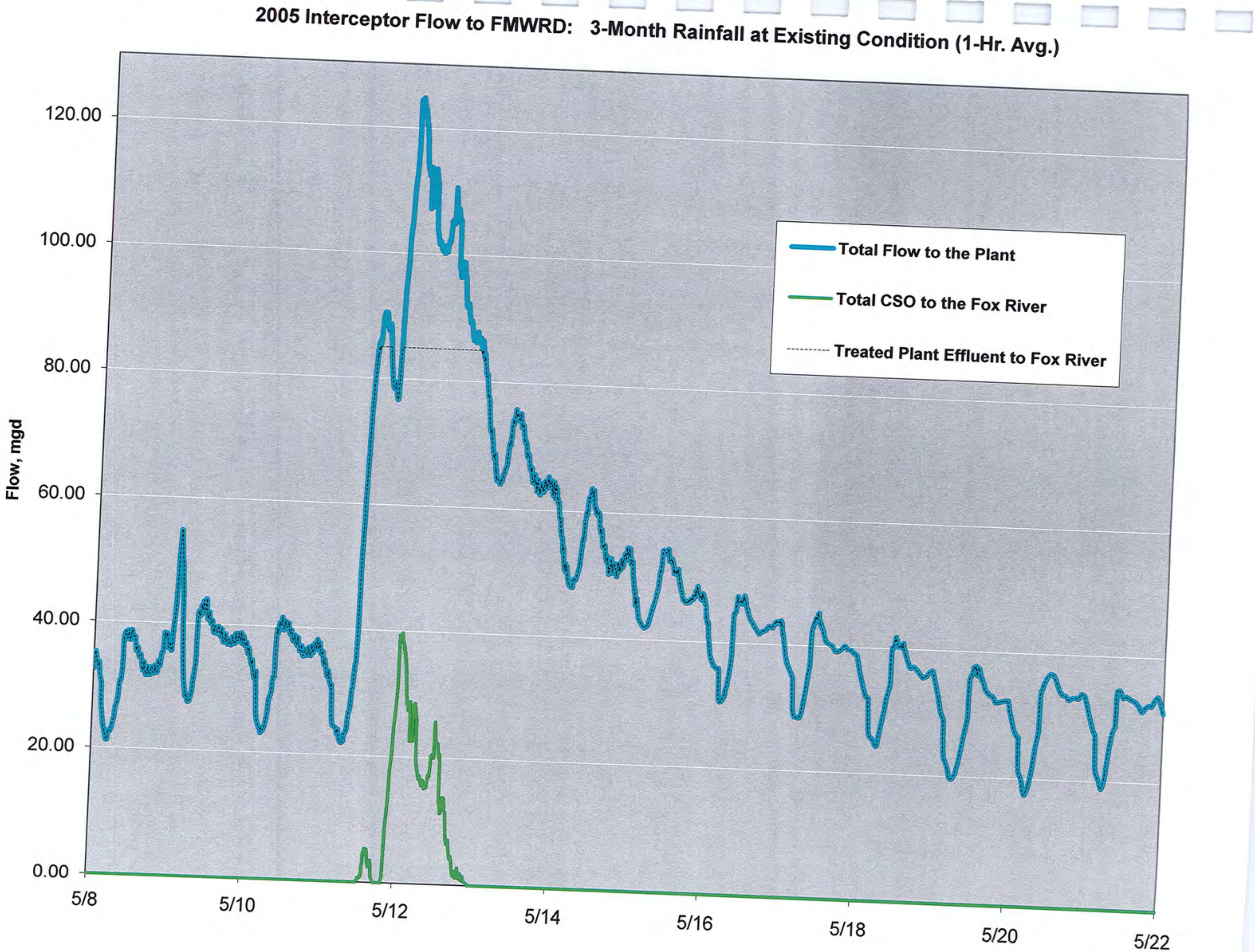
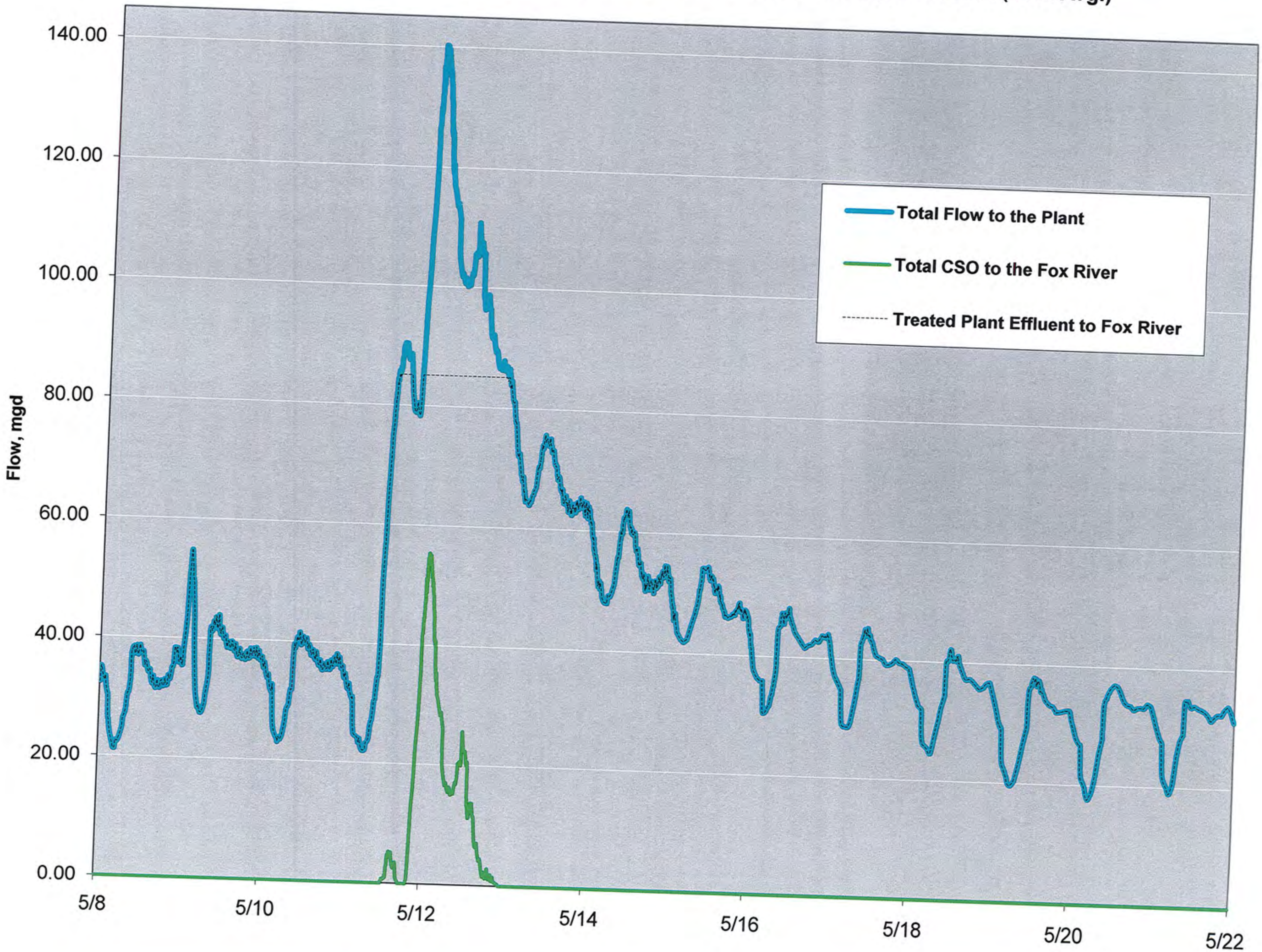
APPENDIX J

DESIGN STORM HYDROGRAPHS

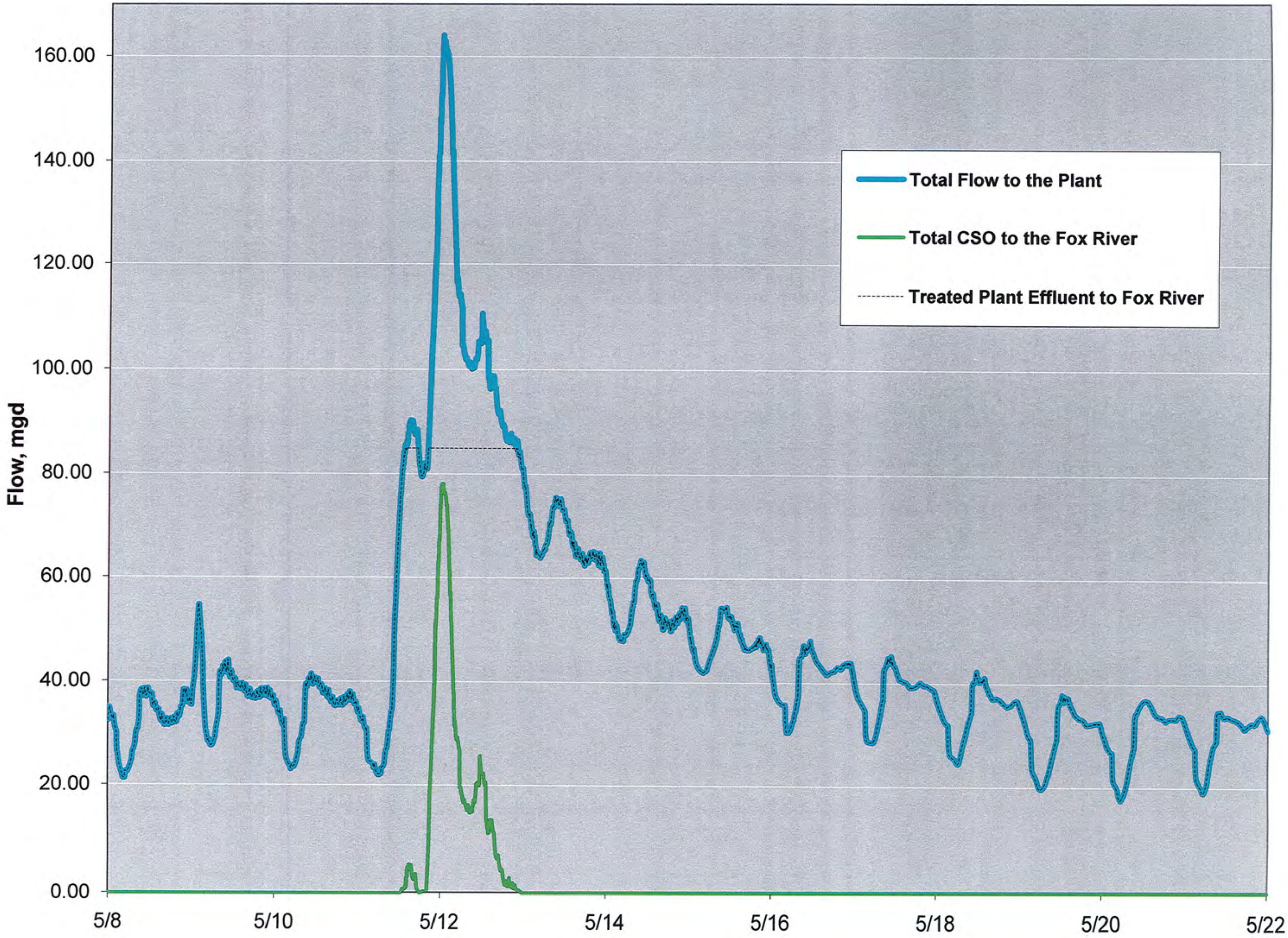


2005 Interceptor Flow to FMWRD: 3-Month Rainfall at Existing Condition (1-Hr. Avg.)
Flow, mgd
120.00
100.00
80.00
60.00
40.00
20.00
0.00
5/8
5/10
5/12
5/14
5/16
5/18
5/20
5/22
Total Flow to the Plant
Total CSO to the Fox River
Treated Plant Effluent to Fox River

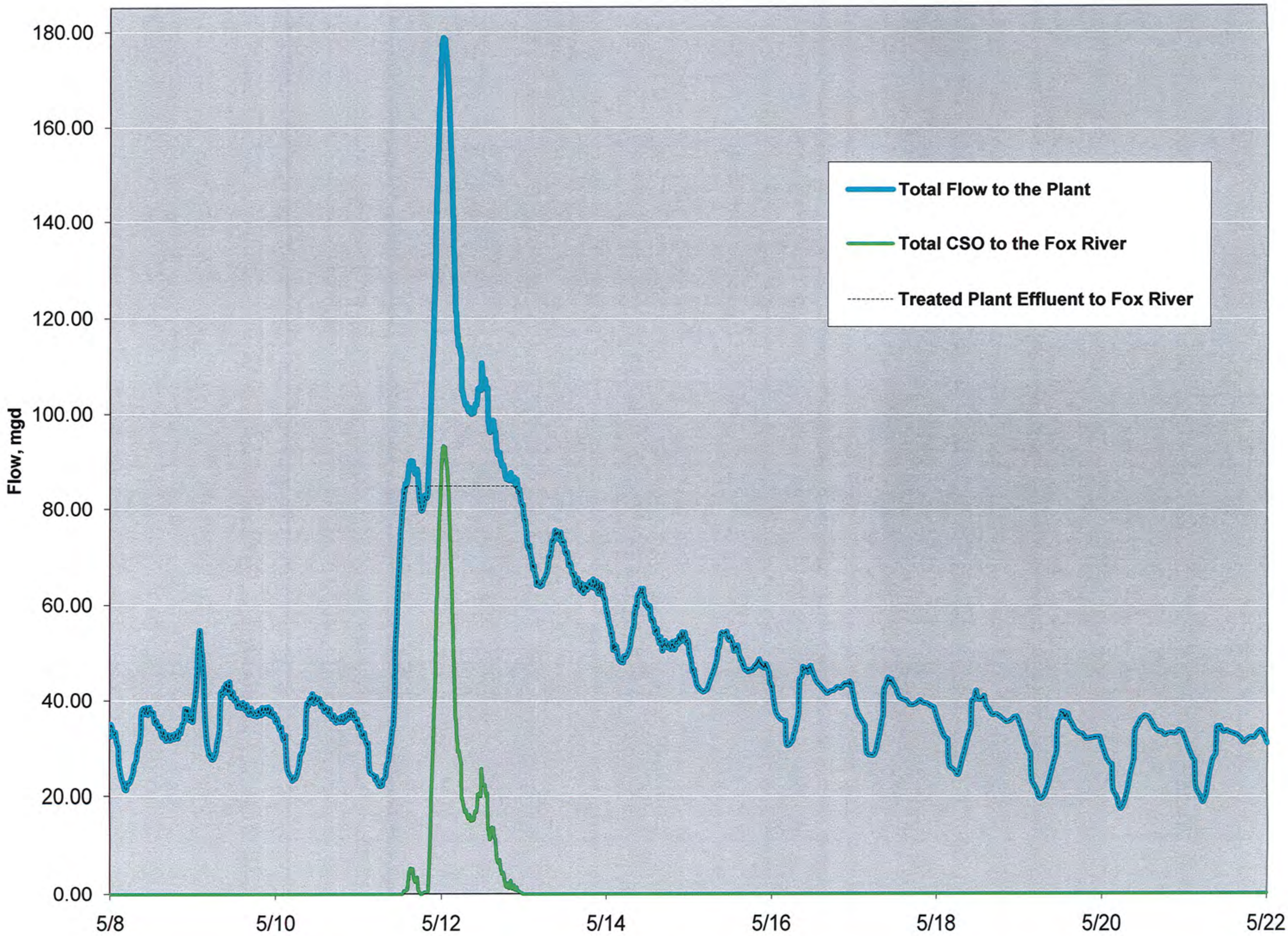
2005 Interceptor Flow to FMWRD: 1-Year Rainfall at Existing Condition (1-Hr. Avg.)

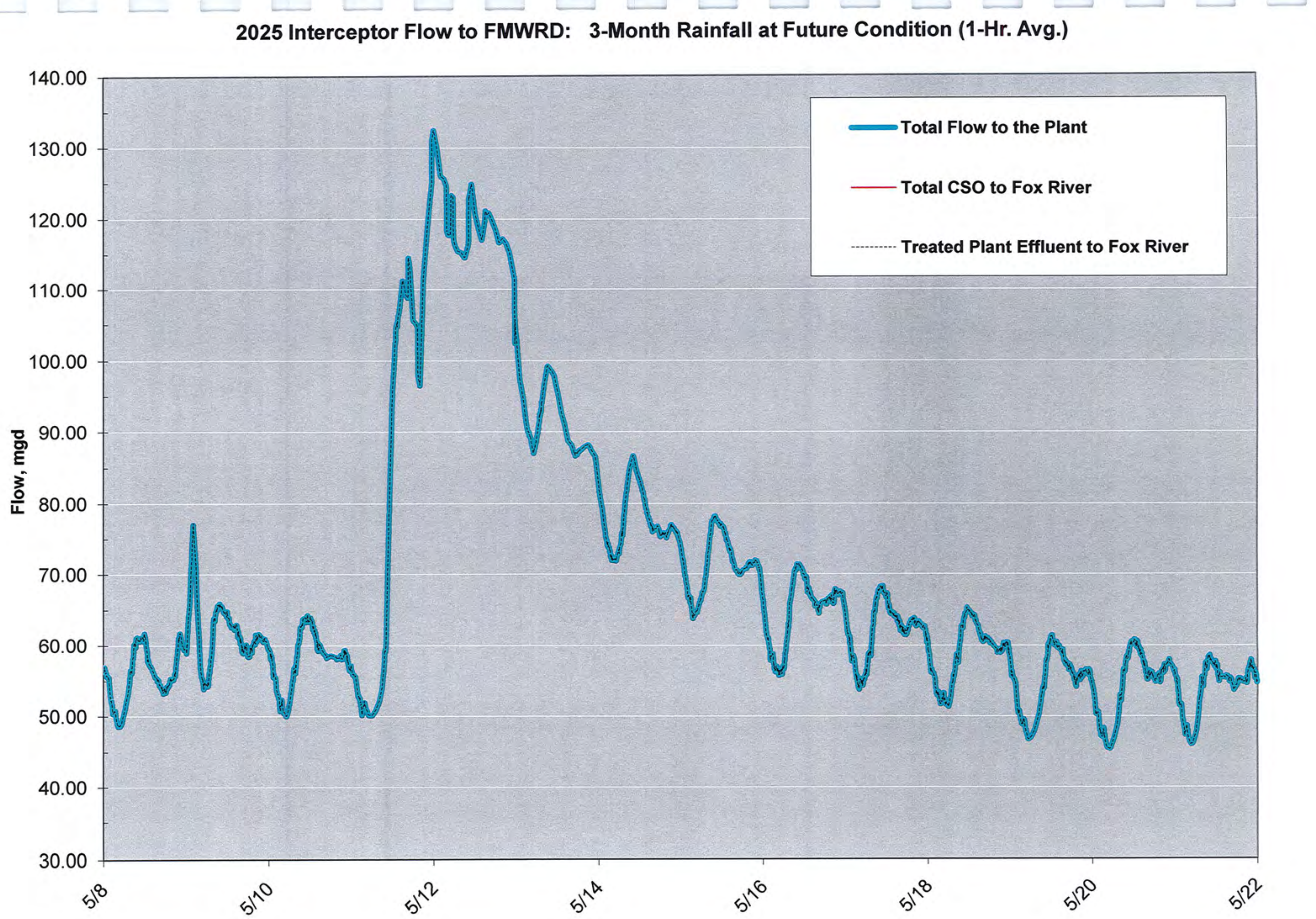


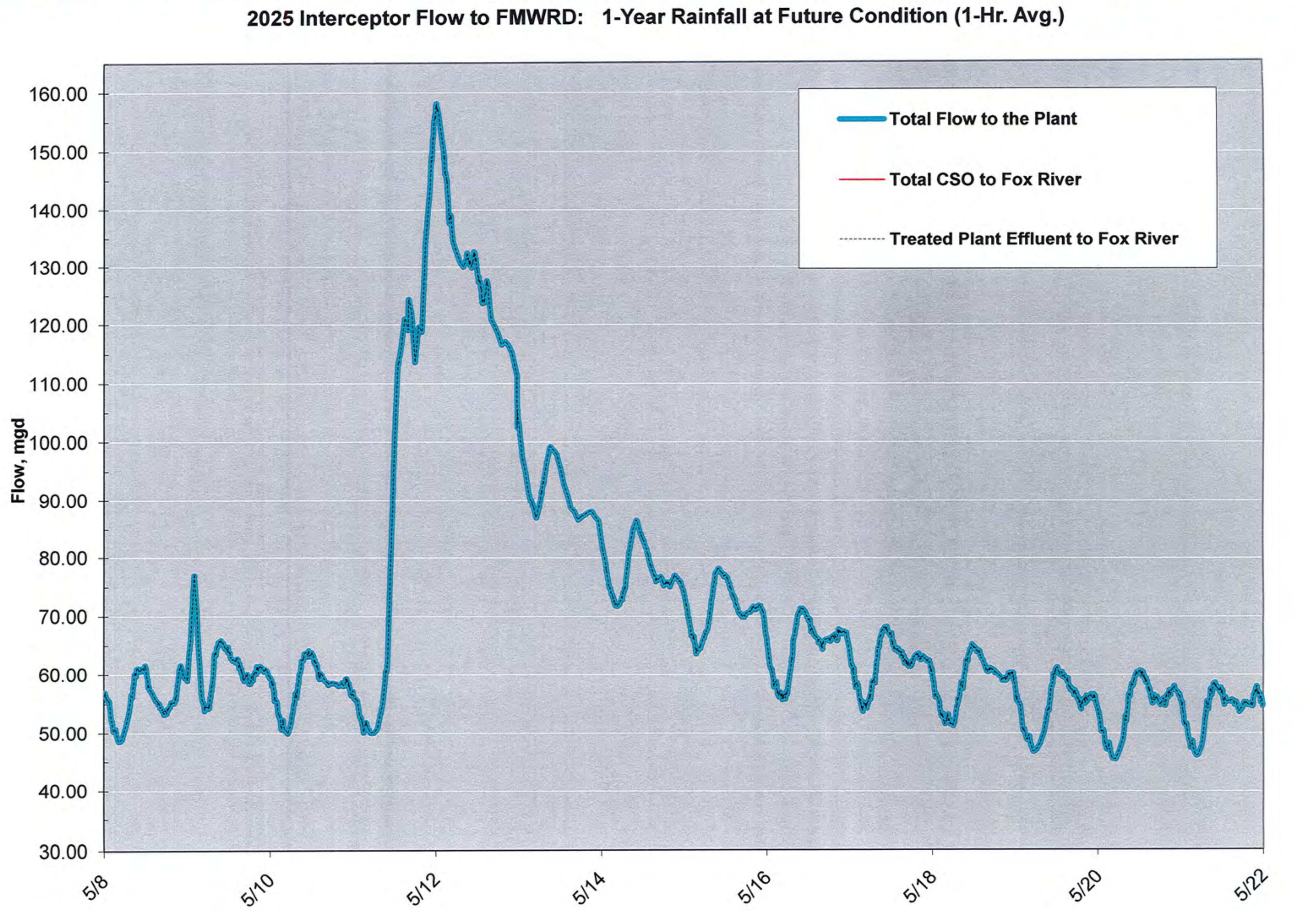
2005 Interceptor Flow to FMWRD: 5-Year Rainfall at Existing Condition (1-Hr. Avg.)



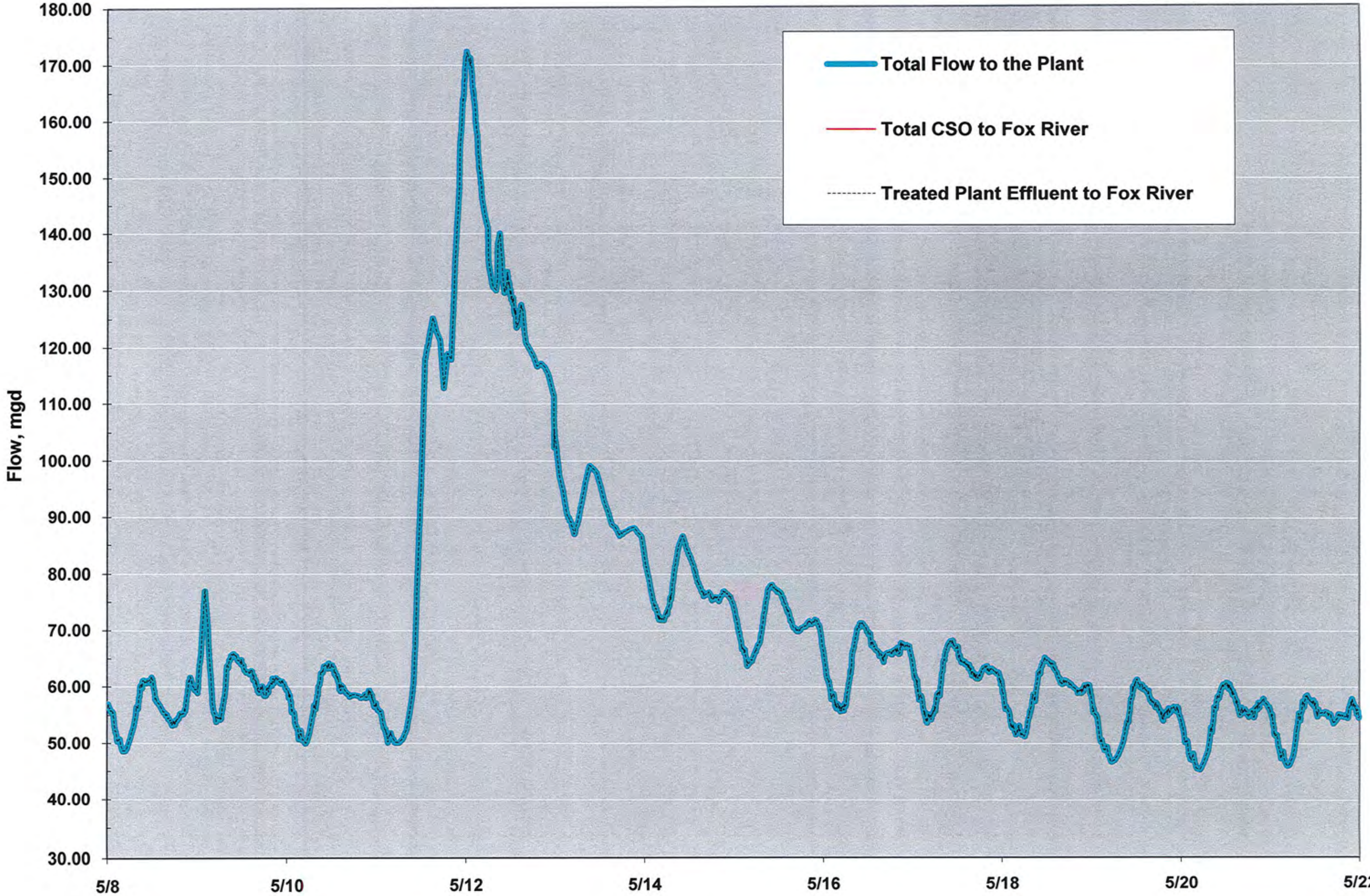
2005 Interceptor Flow to FMWRD: 10-Year Rainfall at Existing Condition (1-Hr. Avg.)



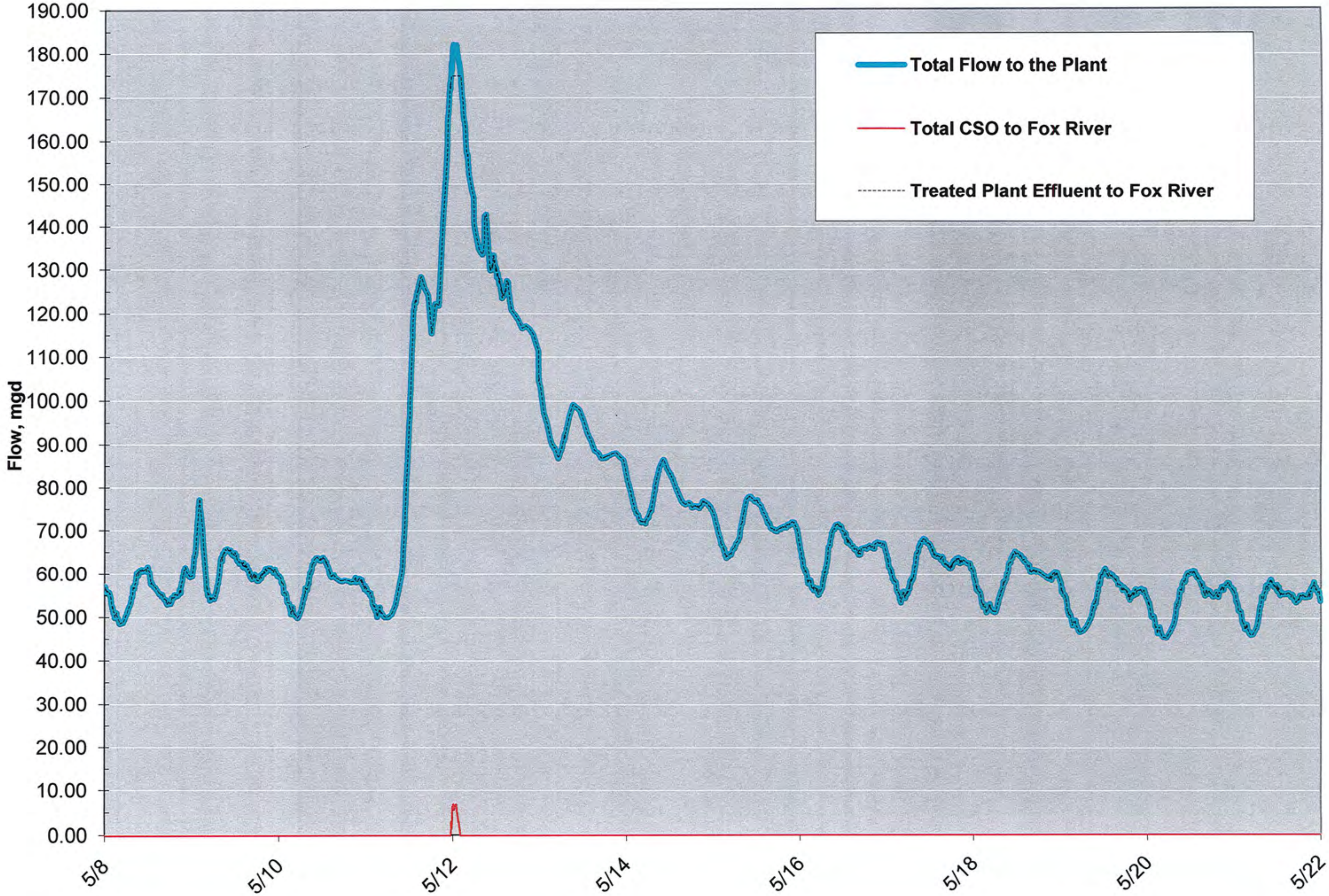

2025 Interceptor Flow to FMWRD: 3-Month Rainfall at Future Condition (1-Hr. Avg.)
Flow, mgd
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
5/8
5/10
5/12
5/14
5/16
5/18
5/20
5/22
Total Flow to the Plant
Total CSO to Fox River
Treated Plant Effluent to Fox River


2025 Interceptor Flow to FMWRD: 1-Year Rainfall at Future Condition (1-Hr. Avg.)
Total Flow to the Plant
Total CSO to Fox River
Treated Plant Effluent to Fox River
Flow, mgd
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
5/8
5/10
5/12
5/14
5/16
5/18
5/20
5/22

2025 Interceptor Flow to FMWRD: 5-Year Rainfall at Future Condition (1-Hr. Avg.)



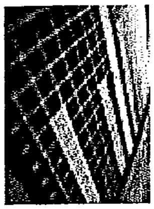
2025 Interceptor Flow to FMWRD: 10-Year Rainfall at Future Condition (1-Hr. Avg.)



APPENDIX K

U.S. CENSUS BUREAU DATA

U.S. Census Bureau
American FactFinder



Aurora city, Illinois

Selected Economic Characteristics: 2006-2008

Data Set: **2006-2008 American Community Survey 3-Year Estimates**

Survey: **American Community Survey**

NOTE. Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

For more information on confidentiality protection, sampling error, nonsampling error, and definitions, see Survey Methodology.

Selected Economic Characteristics	Estimate	Margin of Error	Percent	Margin of Error
EMPLOYMENT STATUS				
Population 16 years and over	**125,756**	**+/-3,085**	**125,756**	(X)
In labor force	95,186	+/-2,597	75.7%	+/-0.9
Civilian labor force	95,125	+/-2,611	75.6%	+/-0.9
Employed	89,366	+/-2,563	71.1%	+/-1.1
Unemployed	5,759	+/-666	4.6%	+/-0.5
Armed Forces	61	+/-73	0.0%	+/-0.1
Not in labor force	30,570	+/-1,418	24.3%	+/-0.9
Civilian labor force	**95,125**	**+/-2,611**	**95,125**	(X)
Percent Unemployed	6.1%	+/-0.7	(X)	(X)
Females 16 years and over	**62,948**	**+/-1,572**	**62,948**	(X)
In labor force	42,304	+/-1,469	67.2%	+/-1.6
Civilian labor force	42,291	+/-1,468	67.2%	+/-1.6
Employed	39,515	+/-1,483	62.8%	+/-1.7
Own children under 6 years	**19,282**	**+/-1,441**	**19,282**	(X)
All parents in family in labor force	11,945	+/-1,190	61.9%	+/-4.3
Own children 6 to 17 years	**32,869**	**+/-1,752**	**32,869**	(X)
All parents in family in labor force	23,323	+/-1,824	71.0%	+/-3.5
COMMUTING TO WORK				
Workers 16 years and over	**86,085**	**+/-2,655**	**86,085**	(X)
Car, truck, or van -- drove alone	65,503	+/-2,324	76.1%	+/-1.9
Car, truck, or van -- carpooled	10,154	+/-1,448	11.8%	+/-1.5
Public transportation (excluding taxicab)	4,772	+/-692	5.5%	+/-0.8
Walked	1,032	+/-406	1.2%	+/-0.5
Other means	1,637	+/-417	1.9%	+/-0.5
Worked at home	2,987	+/-540	3.5%	+/-0.6
Mean travel time to work (minutes)	29.6	+/-0.8	(X)	(X)
OCCUPATION				
Civilian employed population 16 years and over	**89,366**	**+/-2,563**	**89,366**	(X)
Management, professional, and related occupations	30,410	+/-1,422	34.0%	+/-1.7
Service occupations	12,219	+/-1,242	13.7%	+/-1.2
Sales and office occupations	22,988	+/-1,562	25.7%	+/-1.6
Farming, fishing, and forestry occupations	118	+/-106	0.1%	+/-0.1
Construction, extraction, maintenance and repair occupations	6,259	+/-904	7.0%	+/-1.0
Production, transportation, and material moving occupations	17,372	+/-1,561	19.4%	+/-1.6
INDUSTRY				
Civilian employed population 16 years and over	**89,366**	**+/-2,563**	**89,366**	(X)

Selected Economic Characteristics	Estimate	Margin of Error	Percent	Margin of Error
Agriculture, forestry, fishing and hunting, and mining	124	+/-88	0.1%	+/-0.1
Construction	5,348	+/-807	6.0%	+/-0.9
Manufacturing	15,694	+/-1,430	17.6%	+/-1.4
Wholesale trade	4,247	+/-722	4.8%	+/-0.8
Retail trade	10,872	+/-1,208	12.2%	+/-1.3
Transportation and warehousing, and utilities	4,663	+/-654	5.2%	+/-0.7
Information	1,950	+/-393	2.2%	+/-0.4
Finance and insurance, and real estate and rental and leasing	7,651	+/-1,033	8.6%	+/-1.2
Professional, scientific, and management, and administrative and waste management services	12,256	+/-1,328	13.7%	+/-1.4
Educational services, and health care and social assistance	14,817	+/-1,220	16.6%	+/-1.3
Arts, entertainment, and recreation, and accommodation, and food services	6,725	+/-991	7.5%	+/-1.0
Other services, except public administration	3,533	+/-836	4.0%	+/-0.9
Public administration	1,486	+/-398	1.7%	+/-0.4
CLASS OF WORKER				
Civilian employed population 16 years and over	**89,366**	**+/-2,563**	**89,366**	(X)
Private wage and salary workers	78,746	+/-2,458	88.1%	+/-1.0
Government workers	7,126	+/-734	8.0%	+/-0.8
Self-employed workers in own not incorporated business	3,484	+/-622	3.9%	+/-0.7
Unpaid family workers	10	+/-17	0.0%	+/-0.1
INCOME AND BENEFITS (IN 2008 INFLATION-ADJUSTED DOLLARS)				
Total households	**58,187**	**+/-888**	**58,187**	(X)
Less than $10,000	2,737	+/-452	4.7%	+/-0.8
$10,000 to $14,999	1,889	+/-316	3.2%	+/-0.5
$15,000 to $24,999	4,218	+/-680	7.2%	+/-1.1
$25,000 to $34,999	5,371	+/-697	9.2%	+/-1.2
$35,000 to $49,999	8,512	+/-887	14.6%	+/-1.5
$50,000 to $74,999	11,638	+/-881	20.0%	+/-1.5
$75,000 to $99,999	9,170	+/-798	15.8%	+/-1.4
$100,000 to $149,999	8,863	+/-740	15.2%	+/-1.2
$150,000 to $199,999	3,279	+/-500	5.6%	+/-0.9
$200,000 or more	2,510	+/-359	4.3%	+/-0.6
Median household income (dollars)	62,360	+/-1,940	(X)	(X)
Mean household income (dollars)	77,941	+/-2,227	(X)	(X)
With earnings	52,862	+/-952	90.8%	+/-0.8
Mean earnings (dollars)	78,783	+/-2,403	(X)	(X)
With Social Security	8,303	+/-731	14.3%	+/-1.2
Mean Social Security income (dollars)	14,871	+/-957	(X)	(X)
With retirement income	5,384	+/-480	9.3%	+/-0.8
Mean retirement income (dollars)	18,699	+/-2,029	(X)	(X)
With Supplemental Security Income	966	+/-313	1.7%	+/-0.5
Mean Supplemental Security Income (dollars)	7,820	+/-932	(X)	(X)
With cash public assistance income	728	+/-237	1.3%	+/-0.4
Mean cash public assistance income (dollars)	3,541	+/-1,154	(X)	(X)
With Food Stamp benefits in the past 12 months	4,428	+/-611	7.6%	+/-1.0
Families	**42,103**	**+/-1,114**	**42,103**	(X)
Less than $10,000	1,857	+/-368	4.4%	+/-0.9
$10,000 to $14,999	832	+/-314	2.0%	+/-0.7
$15,000 to $24,999	2,664	+/-521	6.3%	+/-1.2
$25,000 to $34,999	3,740	+/-664	8.9%	+/-1.6
$35,000 to $49,999	5,563	+/-766	13.2%	+/-1.8
$50,000 to $74,999	7,769	+/-847	18.5%	+/-1.9
$75,000 to $99,999	6,994	+/-720	16.6%	+/-1.6
$100,000 to $149,999	7,334	+/-574	17.4%	+/-1.4
$150,000 to $199,999	3,068	+/-496	7.3%	+/-1.2
$200,000 or more	2,282	+/-349	5.4%	+/-0.8
Median family income (dollars)	69,504	+/-3,417	(X)	(X)
Mean family income (dollars)	85,587	+/-2,939	(X)	(X)
Per capita income (dollars)	26,674	+/-802	(X)	(X)
Nonfamily households	**16,084**	**+/-963**	**16,084**	(X)
Median nonfamily income (dollars)	45,565	+/-3,960	(X)	(X)
Mean nonfamily income (dollars)	53,589	+/-3,707	(X)	(X)
Median earnings for workers (dollars)	32,024	+/-806	(X)	(X)

Selected Economic Characteristics	Estimate	Margin of Error	Percent	Margin of Error
Median earnings for male full-time, year-round workers (dollars)	47,262	+/-1,935	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	36,658	+/-2,396	(X)	(X)
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	9.1%	+/-1.4	(X)	(X)
With related children under 18 years	13.2%	+/-2.0	(X)	(X)
With related children under 5 years only	10.4%	+/-4.0	(X)	(X)
Married couple families	4.0%	+/-1.0	(X)	(X)
With related children under 18 years	6.0%	+/-1.5	(X)	(X)
With related children under 5 years only	2.9%	+/-2.4	(X)	(X)
Families with female householder, no husband present	30.4%	+/-5.4	(X)	(X)
With related children under 18 years	36.1%	+/-6.3	(X)	(X)
With related children under 5 years only	49.8%	+/-20.9	(X)	(X)
All people	11.3%	+/-1.6	(X)	(X)
Under 18 years	17.8%	+/-2.9	(X)	(X)
Related children under 18 years	17.6%	+/-3.0	(X)	(X)
Related children under 5 years	21.2%	+/-4.3	(X)	(X)
Related children 5 to 17 years	15.9%	+/-3.1	(X)	(X)
18 years and over	8.3%	+/-1.2	(X)	(X)
18 to 64 years	8.1%	+/-1.2	(X)	(X)
65 years and over	10.8%	+/-4.1	(X)	(X)
People in families	10.5%	+/-1.7	(X)	(X)
Unrelated individuals 15 years and over	15.9%	+/-3.1	(X)	(X)

Source: U.S. Census Bureau, 2006-2008 American Community Survey

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

Notes:

·Employment and unemployment estimates may vary from the official labor force data released by the Bureau of Labor Statistics because of differences in survey design and data collection. For guidance on differences in employment and unemployment estimates from different sources go to Labor Force Guidance.

·Workers include members of the Armed Forces and civilians who were at work last week.

·Occupation codes are 4-digit codes and are based on Standard Occupational Classification 2000.

·Industry codes are 4-digit codes and are based on the North American Industry Classification System 2002 and 2007. The 2006 and 2007 ACS data are coded using NAICS 2002 while the 2008 ACS data use NAICS 2007 codes. Categories that differ between 2002 and 2007 NAICS are aggregated so that the 3 years of data are consistent in display and reflect the NAICS 2007 codes. The Industry categories adhere to the guidelines issued in Clarification Memorandum No. 2, "NAICS Alternate Aggregation Structure for Use By U.S. Statistical Agencies," issued by the Office of Management and Budget.

·While the 2008 American Community Survey (ACS) data generally reflect the November 2007 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities. The 2008 Puerto Rico Community Survey (PRCS) data generally reflect the November 2007 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in PRCS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

·Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2000 data. Boundaries for urban areas have not been updated since Census 2000. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Explanation of Symbols:

1. An '**' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
3. An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
4. An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
5. An '***' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '*****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available. Selected earnings and income data are not available for certain geographic areas due to problems with group quarters data collection and imputation. See the ACS User Notes for details.

APPENDIX L

PROJECTED FINANCIAL STATEMENT AND ACCOUNTANTS REPORT

FOX METRO WATER RECLAMATION DISTRICT

PROJECTED FINANCIAL STATEMENTS AND ACCOUNTANT'S REPORT

For the Years Ending
May 31, 2009, 2010, 2011, 2012, and 2013

Sikich LLP
Certified Public Accountants & Advisors

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS
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FOX METRO WATER RECLAMATION DISTRICT
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ACCOUNTANT'S COMPILATION REPORT

To the Board of Directors
Fox Metro Water Reclamation District
Oswego, Illinois

We have compiled the accompanying projected statements of net assets, statements of revenues and expenses, and cash flows of Fox Metro Water Reclamation District as of May 31, 2009, 2010, 2011, 2012, and 2013, and for the years then ending, in accordance with attestation standards established by the American Institute of Certified Public Accountants. The accompanying projection was prepared for the purpose of complying with bond and loan requirements.

A compilation is limited to presenting, in the form of a projection, information that is the representation of management and does not include evaluation of the support for the assumptions underlying the projection. We have not examined the projection and, accordingly, do not express an opinion or any other form of assurance on the accompanying statements or assumptions. Furthermore, even if the rates are increased and loans are obtained for capital projects there will usually be differences between the projected and actual results because events and circumstances frequently do not occur as expected, and those differences may be material. We have no responsibility to update this report for events and circumstances occurring after the date of this report.

Management has elected to omit the summary of significant accounting policies required by the guidelines for presentation of a projection established by the American Institute of Certified Public Accountants. If the omitted disclosures were included in the projection, they might influence the user's conclusions about the District's financial position, changes in financial position, and cash flows for the projection period. Accordingly, this projection is not designed for those who are not informed about such matters.

The accompanying projection and this report are intended solely for the information and use of the Board of Directors, management, and the Illinois Environmental Protection Agency and are not intended to be and should not be used by anyone other than these specified parties.

Sikich LLP

Aurora, Illinois
June 18, 2009

PROJECTED FINANCIAL STATEMENTS

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF NET ASSETS

May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
ASSETS					
CURRENT ASSETS					
Cash and cash equivalents	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
Investments	27,245,544	20,510,502	19,440,049	17,980,420	22,628,678
Accounts receivable (net of allowance for uncollectable accounts)	1,871,085	2,039,381	2,209,356	2,412,958	2,609,601
Accrued user fee revenue	2,514,270	2,740,419	2,968,822	3,242,413	3,506,651
Prepaid expenses	138,266	129,562	137,444	146,539	155,490
Restricted assets					
Investments (under revenue bond ordinance)	10,986,208	11,298,198	11,865,195	14,420,988	15,153,819
Total current assets	43,255,372	37,218,062	37,120,866	38,703,318	44,554,239
CAPITAL ASSETS					
Plant, land, buildings, and improvements	63,971,792	71,953,792	76,113,792	78,728,792	80,528,792
Sanitary sewers and improvements	107,043,240	120,262,240	136,678,240	149,976,240	156,323,240
Plant machinery and equipment	36,637,866	46,099,166	46,149,166	46,174,166	46,224,166
Office furniture and equipment	1,244,760	1,276,760	1,296,760	1,316,760	1,336,760
Capitalized engineering and other costs	3,242,278	7,065,078	11,943,828	16,796,828	20,988,828
Vehicles	1,233,701	1,253,701	1,253,701	1,273,701	1,273,701
Intangible assets	2,663,926	2,663,926	2,663,926	2,663,926	2,663,926
Construction in process	10,054,122	10,054,122	10,054,122	10,054,122	10,054,122
Subtotal	226,091,685	260,628,785	286,153,535	306,984,535	319,393,535
Less accumulated depreciation	(84,749,544)	(90,295,448)	(96,522,978)	(103,234,593)	(110,245,823)
Net capital assets	141,342,141	170,333,337	189,630,558	203,749,943	209,147,713
OTHER ASSETS					
None	-	-	-	-	-
Total other assets	-	-	-	-	-
TOTAL ASSETS	$ 184,597,514	$ 207,551,399	$ 226,751,423	$ 242,453,261	$ 253,701,951

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
LIABILITIES AND NET ASSETS					
CURRENT LIABILITIES					
Accounts payable	$ 4,151,764	$ 5,758,934	$ 4,941,193	$ 5,096,815	$ 5,074,142
Construction retainage payable	1,053,874	1,881,133	1,390,583	1,134,439	674,075
Wages payable and payroll related	1,738,122	1,790,528	1,891,245	1,997,331	2,108,736
Deferred connection fees	261,461	202,225	312,530	386,066	643,443
Claims liability	450,764	631,955	741,411	860,996	990,976
Current portion of long-term debt	1,253,445	1,914,997	2,967,840	2,845,958	3,002,157
Accrued interest payable	218,456	710,962	987,619	839,592	660,376
Total current liabilities	9,127,885	12,890,732	13,232,420	13,161,197	13,153,905
LONG-TERM DEBT					
Due to other governments	4,902,500	4,817,500	4,727,500	4,632,500	4,532,500
Water pollution control revolving fund note payable	21,487,731	40,309,286	53,388,289	60,218,449	59,756,491
Current portion of long-term debt	(1,253,445)	(1,914,997)	(2,967,840)	(2,845,958)	(3,002,157)
Total long-term debt	25,136,786	43,211,789	55,147,949	62,004,991	61,286,834
Total liabilities	34,264,671	56,102,521	68,380,369	75,166,187	74,440,739
NET ASSETS					
Invested in capital assets, net of related debt	119,854,411	130,024,051	136,242,269	143,531,494	149,391,222
Unreserved	19,492,225	10,126,630	10,263,592	9,334,594	14,716,173
Reserved under revenue bond ordinance	10,986,208	11,298,198	11,865,195	14,420,988	15,153,819
Total net assets	150,332,844	151,448,880	158,371,056	167,287,076	179,261,215
TOTAL LIABILITIES AND NET ASSETS	$ 184,597,515	$ 207,551,401	$ 226,751,425	$ 242,453,263	$ 253,701,953

See summary of significant projection assumptions and accountant's compilation report.

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING REVENUES					
Charges for Services					
User fees	$ 21,342,059	$ 23,261,694	$ 25,200,462	$ 27,522,807	$ 29,765,758
User fee refunds	(55,304)	(60,279)	(65,303)	(71,321)	(77,133)
Penalties	477,398	420,000	433,989	452,277	466,524
BOD surcharges	1,600,000	1,300,000	1,300,000	1,300,000	1,300,000
Lien interest income	5,000	5,000	5,417	5,916	6,398
Other legal and collection fees	138,000	140,000	151,668	165,645	179,145
Pretreatment recovery revenues	67,598	65,000	66,300	67,792	69,487
TV sewer inspection	2,500	5,000	5,000	5,000	5,000
Montgomery pump station	6,600	6,600	6,600	6,600	6,600
Total charges for services	23,583,851	25,143,015	27,104,134	29,454,716	31,721,778
Total operating revenues	23,583,851	25,143,015	27,104,134	29,454,716	31,721,778
OPERATING EXPENSES					
Administrative and overhead					
Personnel costs					
Salaries and wages					
Wages	427,166	422,500	439,400	456,976	475,255
Overtime	2,500	2,500	2,600	2,704	2,812
Salaries - board of trustees	60,000	60,000	60,000	60,000	60,000
Total salaries and wages	489,666	485,000	502,000	519,680	538,067
Benefits					
Unemployment compensation	8,161	12,125	12,550	12,992	13,452
FICA	42,845	37,103	38,403	39,756	41,162
IMRF	65,465	64,069	66,314	68,650	71,079
Charges for services - health and welfare	1,760,000	1,854,000	2,071,849	2,304,567	2,551,487
Vision insurance	38,575	37,481	38,963	40,504	42,107
Employee assistance program	3,000	3,028	3,148	3,272	3,402
Total benefits	1,918,046	2,007,805	2,231,227	2,469,740	2,722,687
Training and development					
Tuition and fees	10,393	25,000	25,500	26,074	26,726
Other	2,807	4,550	4,641	4,745	4,864
Total training and development	13,200	29,550	30,141	30,819	31,590
Total personnel costs	2,420,912	2,522,355	2,763,368	3,020,239	3,292,344
Professional Fees					
Attorney fees	29,162	90,000	91,800	93,866	96,212
Accounting and auditing	51,707	70,000	71,400	73,007	74,832
Total professional fees	80,869	160,000	163,200	166,872	171,044
Insurance					
Property package	173,490	191,000	205,898	223,754	240,976
Workers compensation	185,548	147,745	153,587	159,662	165,980
Boiler and machinery insurance	5,040	-	-	-	-
Contractor's floater insurance	840	3,200	3,264	3,337	3,421
Total insurance	364,918	341,945	362,749	386,753	410,377

(These statements are continued on the following pages.)

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Administrative and overhead (Continued)					
Utilities					
Regular telephone	$ 49,618	$ 55,000	$ 56,100	$ 57,362	$ 58,796
Phones and alarms at lift stations	1,787	2,000	2,040	2,086	2,138
Total utilities	51,404	57,000	58,140	59,448	60,934
Publishing and printing					
Legal notices	8,887	8,000	8,160	8,344	8,552
Fliers and public relations	4,087	6,000	6,120	6,258	6,414
Job ads	1,697	3,000	3,060	3,129	3,207
Forms and other printing costs	4,157	7,500	7,650	7,822	8,018
Total publishing and printing	18,828	24,500	24,990	25,552	26,191
Supplies and equipment					
Maintenance agreements - office machines	2,209	4,000	4,080	4,172	4,276
General repair - office machines	-	1,500	1,530	1,564	1,604
Office supplies	9,955	12,000	12,240	12,515	12,828
Total supplies and equipment	12,164	17,500	17,850	18,252	18,708
Other					
District associations	34,516	40,000	40,800	41,718	42,761
Travel	1,216	1,500	1,530	1,564	1,604
Miscellaneous	240,067	1,950,000	300,000	306,750	314,419
Payroll service	13,030	13,000	13,260	13,558	13,897
Books and subscriptions	1,027	2,500	2,550	2,607	2,673
Total other	289,855	2,007,000	358,140	366,198	375,353
Total administrative and overhead	3,238,951	5,130,300	3,748,436	4,043,315	4,354,951
Data processing					
Personnel costs					
Salaries and wages					
Wages	207,550	218,000	226,720	235,789	245,220
Overtime	1,433	2,000	2,080	2,163	2,250
Total salaries and wages	208,983	220,000	228,800	237,952	247,470
Benefits					
FICA	17,146	16,830	17,503	18,203	18,931
IMRF	24,570	29,062	30,224	31,433	32,691
Total benefits	41,716	45,892	47,728	49,637	51,622
Training and development					
Tuition and fees	4,434	6,250	6,375	6,518	6,681
Books, supplies, and professional assoc	347	400	408	417	428
Meals, lodging, and travel	1,703	1,500	1,530	1,564	1,604
Total training and development	6,484	8,150	8,313	8,500	8,713
Total personnel costs	257,182	274,042	284,841	296,089	307,805

(These statements are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Billing (Continued)					
Supplies and equipment					
Postage	$ 173,476	$ 188,000	$ 193,640	$ 199,449	$ 207,926
Envelopes	38,618	48,000	49,440	50,923	53,087
Bills	16,070	17,000	17,510	18,035	18,802
Other forms and printing	3,418	3,000	3,090	3,183	3,318
Other supplies	1,723	1,000	1,030	1,061	1,106
Total supplies and equipment	233,305	257,000	264,710	272,651	284,239
Total billing	717,894	765,287	790,671	816,917	850,946
Plant operations					
Personnel costs					
Salaries and wages					
Wages	388,948	414,000	430,560	447,782	465,694
Overtime	26,887	34,000	35,360	36,774	38,245
Wages - union	1,156,571	1,020,000	1,060,800	1,103,232	1,147,361
Overtime - union	128,100	90,000	93,600	97,344	101,238
Total salaries and wages	1,700,506	1,558,000	1,620,320	1,685,133	1,752,538
Benefits					
FICA - union	58,927	84,915	88,312	91,844	95,518
FICA - non union	37,062	34,272	35,643	37,069	38,551
IMRF - union	108,221	146,631	152,496	158,596	164,940
IMRF - non union	54,482	59,181	61,548	64,010	66,570
Total benefits	258,692	324,999	337,999	351,519	365,579
Training and development					
Tuition and fees	2,400	4,500	4,590	4,693	4,811
Books and supplies	-	250	255	261	267
Professional associations	382	650	663	678	695
Meals, lodging, and travel	4,160	3,300	3,366	3,442	3,528
Total training and development	6,942	8,700	8,874	9,074	9,301
Total personnel costs	1,966,141	1,891,699	1,967,193	2,045,725	2,127,418
Utilities					
Plant electricity	1,666,892	1,850,000	1,905,500	1,962,665	2,046,078
Lift stations electricity	186,728	190,000	195,700	201,571	210,138
Plant natural gas	181,943	200,000	206,000	212,180	221,198
Lift station natural gas	20,473	22,500	23,175	23,870	24,885
Total utilities	2,056,037	2,262,500	2,330,375	2,400,286	2,502,298
Supplies and equipment					
GBT supplies	2,599	3,000	3,090	3,183	3,318
Polymer	298,309	396,000	407,880	420,116	437,971
Chlorine	67,048	121,000	124,630	128,369	133,825
Other chemicals	196,817	223,000	229,690	236,581	246,635
Total supplies and equipment	564,773	743,000	765,290	788,249	821,749

(These statements are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Plant operations (Continued)					
Solids and solids removal					
Sludge removal	$ 299,500	$ 1,204,200	$ 308,485	$ 317,739	$ 331,243
Grit removal	58,403	45,200	46,556	47,953	49,991
Total solids and solids removal	357,902	1,249,400	355,041	365,692	381,234
Total plant operations	4,944,853	6,146,599	5,417,898	5,599,952	5,832,699
Process expenses					
Personnel costs					
Salaries and wages					
Wages	209,576	190,000	197,600	205,504	213,724
Overtime	4,259	5,000	5,200	5,408	5,624
Total salaries and wages	213,835	195,000	202,800	210,912	219,348
Benefits					
FICA	19,138	14,918	15,514	16,135	16,780
IMRF	27,008	25,760	26,790	27,861	28,976
Total benefits	46,146	40,677	42,304	43,996	45,756
Training and development					
Tuition and fees	-	8,000	8,160	8,344	8,552
Books and supplies	-	500	510	521	535
Professional associations	-	500	510	521	535
Meals, lodging, and travel	892	1,000	1,020	1,043	1,069
Total training and development	892	10,000	10,200	10,430	10,690
Total personnel costs	260,872	245,677	255,304	265,338	275,795
Instrumentation and computer					
Preventative maintenance and repair	17,765	45,000	45,900	46,933	48,106
Spare parts and replacement	4,668	5,500	5,610	5,736	5,880
Tools	1,189	2,500	2,550	2,607	2,673
Small equipment	33,785	15,500	15,810	16,166	16,570
General repairs	-	5,000	5,100	5,215	5,345
Software	1,562	3,000	3,060	3,129	3,207
Consulting	500	1,000	1,020	1,043	1,069
Other	415	9,500	9,690	9,908	10,156
Total instrumentation and computer	59,884	87,000	88,740	90,737	93,005
Total process expenses	320,757	332,677	344,044	356,074	368,800
Plant maintenance					
Personnel costs					
Salaries and wages					
Wages - non union	391,343	392,000	407,680	423,987	440,947
Overtime - non union	9,839	12,000	12,480	12,979	13,498
Wages - union	899,679	1,007,750	1,048,060	1,089,982	1,133,582
Overtime - union	21,620	27,750	28,860	30,014	31,215
Total salaries and wages	1,322,481	1,439,500	1,497,080	1,556,963	1,619,242

(These statements are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Plant maintenance (Continued)					
Personnel costs (Continued)					
Benefits					
FICA - union	$ 80,648	$ 79,216	$ 82,384	$ 85,680	$ 89,107
FICA - non union	35,948	30,906	32,142	33,428	34,765
IMRF - union	114,382	136,790	142,261	147,952	153,870
IMRF - non union	50,254	53,368	55,503	57,723	60,032
Total benefits	281,232	300,280	312,291	324,783	337,774
Training and development					
Tuition and fees	1,595	2,200	2,244	2,294	2,352
Books and supplies	1,052	1,500	1,530	1,564	1,604
Professional associations	251	400	408	417	428
Meals, lodging, and travel	1,108	3,200	3,264	3,337	3,421
Total training and development	4,006	7,300	7,446	7,614	7,804
Total personnel costs	1,607,719	1,747,080	1,816,817	1,889,359	1,964,819
Plant supplies					
Janitorial	14,083	15,400	15,913	16,583	17,106
Sand for beds and lagoons	-	5,000	5,167	5,384	5,554
Safety and first aid supplies	21,410	33,100	34,202	35,644	36,767
Employee rain apparel	25,666	26,400	27,279	28,429	29,324
Tools - plant supplies	2,221	12,000	12,400	12,922	13,329
Plumbing supplies	4,040	6,100	6,303	6,569	6,776
Hardware	13,212	17,700	18,290	19,060	19,661
Steel stock	523	2,500	2,583	2,692	2,777
Lighting supplies	7,124	10,900	11,263	11,738	12,107
Total plant supplies	88,280	129,100	133,400	139,021	143,400
Buildings and grounds maintenance and repair					
Clarifies and aeration (F,D,H)	42,329	43,400	44,846	46,735	48,207
Main pump station (K)	71,412	42,500	43,916	45,766	47,208
Sludge dewatering (N)	93,972	88,100	91,034	94,870	97,859
Digestors (M,M1,M2)	55,711	46,900	48,462	50,504	52,095
Blower building (G)	10,040	23,800	24,593	25,629	26,436
Primary pump station (C,C1)	40,417	50,850	52,544	54,758	56,483
Plant pump station/ chlorine building (J,J1,J2)	13,465	21,800	22,526	23,475	24,215
Operations and maintenance (O)	24,454	28,000	28,933	30,152	31,102
New bar screen and grit (B)	63,758	52,000	53,732	55,996	57,760
Dissolved air floatation (L)	5,452	29,100	30,069	31,336	32,323
Tertiary filters (I)	13,829	18,000	18,600	19,383	19,994
Laboratory/administration (P)	39,095	35,000	36,166	37,690	38,877
Garage (Q,Q1)	27,674	27,400	28,313	29,506	30,435
Grounds and landscaping	60,163	40,700	42,056	43,828	45,208
Outside electrical	31,199	51,250	52,957	55,189	56,927
Janitorial service	34,158	37,000	38,232	39,843	41,099
Building E engine generator	59,330	53,000	54,765	57,073	58,871
Odor control	205,601	225,500	233,011	242,830	250,479
Total buildings and grounds maintenance and repair	892,060	914,300	944,753	984,564	1,015,578

(These statements are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Plant maintenance (Continued)					
Vehicle maintenance and repairs					
Gas and oil	$ 70,027	$ 76,326	$ 78,868	$ 82,192	$ 84,781
Vehicle repair, maintenance, and other	47,759	48,500	50,115	52,227	53,872
Total vehicle maintenance and repairs	117,786	124,826	128,984	134,419	138,653
Total plant maintenance	2,705,845	2,915,306	3,023,954	3,147,363	3,262,450
Laboratory					
Personnel costs					
Salaries and wages					
Wages	399,675	435,000	452,400	470,496	489,316
Overtime	21,683	20,000	20,800	21,632	22,497
Total salaries and wages	421,358	455,000	473,200	492,128	511,813
Benefits					
FICA	34,747	34,808	36,200	37,648	39,154
IMRF	49,894	60,106	62,510	65,010	67,611
Total benefits	84,641	94,913	98,710	102,658	106,764
Training and development					
Tuition and fees	9,456	8,000	8,160	8,344	8,552
Books and supplies	2,208	2,950	3,009	3,077	3,154
Professional associations	961	1,250	1,275	1,304	1,336
Meals, lodging, and travel	5,183	3,000	3,060	3,129	3,207
Total training and development	17,808	15,200	15,504	15,853	16,249
Total personnel costs	523,807	565,113	587,414	610,639	634,826
Supplies and equipment					
Glassware	7,094	5,300	5,477	5,707	5,887
Chemicals	32,956	35,250	36,424	37,959	39,155
Equipment rental	7,528	7,500	7,750	8,076	8,331
Consumable items	27,210	26,400	27,279	28,429	29,324
Small equipment and supplies	8,687	6,700	6,923	7,215	7,442
Other lab supplies	4,045	1,800	1,860	1,938	1,999
Total supplies and equipment	87,520	82,950	85,713	89,325	92,138
Lab repairs and maintenance					
Repair and maintenance	33,275	40,550	41,901	43,666	45,042
Total lab repairs and maintenance	33,275	40,550	41,901	43,666	45,042
Total laboratory	644,601	688,613	715,027	743,630	772,007
Industrial waste					
Personnel costs					
Salaries and wages					
Salaries and wages	200,047	230,300	239,512	249,092	259,056
Overtime	-	300	312	324	337
Total salaries and wages	200,047	230,600	239,824	249,417	259,394

(These statements are continued on the following pages.)

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Industrial waste (Continued)					
Personnel costs (Continued)					
Benefits					
FICA	$ 16,474	$ 17,641	$ 18,347	$ 19,080	$ 19,844
IMRF	23,570	30,462	31,681	32,948	34,266
Total benefits	40,044	48,103	50,027	52,028	54,110
Training and development					
Tuition and fees	2,540	5,000	5,100	5,215	5,345
Books and supplies	-	3,500	3,570	3,650	3,742
Professional associations	970	1,000	1,020	1,043	1,069
Meals, lodging, and travel	5,644	4,700	4,794	4,902	5,024
Total training and development	9,154	14,200	14,484	14,810	15,180
Total personnel costs	249,245	292,903	304,335	316,255	328,683
Supplies and equipment					
Consumable items	12,766	8,500	8,670	8,865	9,087
Small equipment and supplies	6,299	3,600	3,672	3,755	3,848
Total supplies and equipment	19,064	12,100	12,342	12,620	12,935
Repairs and maintenance					
Repairs and maintenance	1,480	1,500	1,550	1,615	1,666
Total repairs and maintenance	1,480	1,500	1,550	1,615	1,666
Other					
Other	161	1,300	1,343	1,400	1,444
Outside analysis	1,452	4,500	4,650	4,846	4,998
Total other	1,613	5,800	5,993	6,246	6,442
Total industrial waste	271,401	312,303	324,220	336,736	349,727
Engineering and sewer maintenance					
Personnel costs					
Salaries and wages					
Wages nonunion	481,396	469,500	488,280	507,811	528,124
Overtime nonunion	2,770	2,500	2,600	2,704	2,812
Wages union	83,997	125,000	130,000	135,200	140,608
Overtime union	14,113	10,000	10,400	10,816	11,249
Total salaries and wages	582,276	607,000	631,280	656,531	682,792
Benefits					
FICA union	6,840	10,328	10,741	11,170	11,617
FICA nonunion	45,176	36,108	37,552	39,054	40,617
IMRF union	9,656	17,834	18,547	19,289	20,060
IMRF nonunion	63,757	62,351	64,845	67,439	70,137
Total benefits	125,430	126,620	131,685	136,952	142,431

(These statements are continued on the following pages.)

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
OPERATING EXPENSES (Continued)					
Engineering and sewer maintenance (Continued)					
Personnel costs (Continued)					
Training and development					
Tuition and fees	$ 2,788	$ 6,000	$ 6,120	$ 6,258	$ 6,414
Books and supplies	174	2,100	2,142	2,190	2,245
Professional associations	264	700	714	730	748
Meals, lodging, and travel	658	2,000	2,040	2,086	2,138
Total training and development	3,883	10,800	11,016	11,264	11,545
Total personnel costs	711,589	744,420	773,981	804,747	836,768
Supplies and equipment					
Drawing supplies and blueprint	1,603	2,500	2,550	2,607	2,673
Field supplies	10,165	22,300	22,746	23,258	23,839
Maps	1,218	5,000	5,100	5,215	5,345
Small equipment	-	6,000	6,120	6,258	6,414
Lift stations supplies and maintenance	108,670	63,000	64,260	65,706	67,348
Microfiche	14	5,000	5,100	5,215	5,345
JULIE supplies	1,800	3,000	3,060	3,129	3,207
Total supplies and equipment	123,470	106,800	108,936	111,387	114,172
Sewer repairs and maintenance					
Contract cleaning of sewers	5,821	180,000	30,000	30,900	32,213
General supplies and maintenance of sewers	38,161	85,000	39,306	40,485	42,206
General repair of sewers	101,796	790,000	104,850	107,995	112,585
District contract televising	113,030	300,000	116,421	119,914	125,010
Developer sewers televising	46,631	99,000	48,030	49,471	51,573
Total sewer repairs and maintenance	305,440	1,454,000	338,607	348,765	363,588
Other					
Engineering consultant (nonspecific projects)	1,619,250	952,200	500,000	510,000	520,200
Total other	1,619,250	952,200	500,000	510,000	520,200
Total engineering and sewer maintenance	2,759,749	3,257,420	1,721,524	1,774,900	1,834,728
Total operating expenses	16,088,484	20,043,047	16,595,525	17,344,946	18,169,833
OPERATING INCOME BEFORE DEPRECIATION	7,495,367	5,099,968	10,508,608	12,109,770	13,551,945
Depreciation	4,754,794	5,545,904	6,227,530	6,711,615	7,011,230
OPERATING INCOME (LOSS)	2,740,573	(445,936)	4,281,079	5,398,155	6,540,714
NONOPERATING REVENUES					
Replacement taxes	200,000	208,000	216,320	224,973	233,972
Annexation and similar fees	749,792	650,000	1,250,000	1,950,000	2,500,000
Connection fees	1,422,213	1,100,000	1,700,000	2,100,000	3,500,000
Interest income - non restricted	74,343	206,842	415,210	393,801	364,608
Interest income - restricted	87,051	82,397	225,964	237,304	288,420
Miscellaneous	280,000	285,600	291,312	297,867	305,313
Total nonoperating revenues	2,813,398	2,532,838	4,098,806	5,203,944	7,192,313

(These statements are continued on the following page.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF REVENUES AND EXPENSES (Continued)

For the Years Ending May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
NONOPERATING EXPENSES					
Interest expense - state revolving fund	$ 439,522	$ 751,426	$ 1,241,667	$ 1,475,138	$ 1,551,747
Interest expense - intergovernmental bonds payable	221,241	217,941	214,541	210,941	207,141
Fiscal agent fees	1,500	1,500	1,500	-	-
Total nonoperating expenses	662,263	970,867	1,457,708	1,686,079	1,758,888
NET INCOME	4,891,708	1,116,035	6,922,176	8,916,020	11,974,139
CONTRIBUTIONS	873,060	-	-	-	-
CHANGE IN NET ASSETS	$ 5,764,768	$ 1,116,035	$ 6,922,176	$ 8,916,020	$ 11,974,139

See summary of significant projection assumptions and accountant's compilation report.

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

PROJECTED STATEMENTS OF CASH FLOWS

May 31, 2009 through 2013

	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
CASH FLOWS FROM OPERATING ACTIVITIES					
Operating income (loss)	$ 2,740,573	$ (445,936)	$ 4,281,079	$ 5,398,155	$ 6,540,714
Adjustments to reconcile operating income (loss) to net cash from operating activities					
Depreciation	4,754,794	5,545,904	6,227,530	6,711,615	7,011,230
(Increase) decrease in					
Accounts receivable	(194,491)	(168,297)	(169,974)	(203,603)	(196,642)
Other receivables	3,368,779	-	-	-	-
Accrued user fee revenue	(9,156)	(226,149)	(228,403)	(273,591)	(264,238)
Prepaid expenses	(21,190)	8,704	(7,882)	(9,095)	(8,951)
Increase (decrease) in					
Accounts payable	(266,496)	1,607,170	(817,741)	155,622	(22,674)
Wages payable and payroll related	641,635	52,405	100,717	106,086	111,405
Deferred connection fees	(375,191)	(59,236)	110,305	73,536	257,377
Claims liabilities	214,785	181,191	109,456	119,586	129,979
Total adjustments	8,113,469	6,941,693	5,324,007	6,680,156	7,017,487
Net cash from operating activities	10,854,042	6,495,757	9,605,086	12,078,311	13,558,202
CASH FLOWS FROM NONCAPITAL FINANCING ACTIVITIES					
Annexation fees	749,792	650,000	1,250,000	1,950,000	2,500,000
Other revenue	280,000	285,600	291,312	297,867	305,313
Replacement taxes	200,000	208,000	216,320	224,973	233,972
Contributions	873,060	-	-	-	-
Connection fees	1,422,213	1,100,000	1,700,000	2,100,000	3,500,000
Net cash from noncapital financing activities	3,525,064	2,243,600	3,457,632	4,572,839	6,539,285
CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES					
Acquisition and construction of capital assets	(19,359,029)	(34,537,100)	(25,524,750)	(20,831,000)	(12,409,000)
Due to other governments	790,560	(85,000)	(90,000)	(95,000)	(100,000)
Construction retainage payable	178,573	827,259	(490,549)	(256,145)	(460,364)
Principal payments on bonded debt	(830,000)	-	-	-	-
Proceeds from state revolving fund notes payable	11,875,000	20,075,000	14,994,000	9,798,000	2,384,000
Principal payments on state revolving fund notes payable	(1,219,823)	(1,253,445)	(1,914,997)	(2,967,840)	(2,845,958)
Interest paid on intergovernmental bonded debt	(221,241)	(217,941)	(214,541)	(210,941)	(207,141)
Interest and fiscal agent fees paid on bonded debt	(18,100)	(1,500)	(1,500)	-	-
Interest paid on state revolving fund note payable	(292,543)	(258,920)	(965,010)	(1,623,166)	(1,730,963)
Net cash from capital and related financing activities	(9,096,603)	(15,451,647)	(14,207,347)	(16,186,092)	(15,369,426)
CASH FLOWS FROM INVESTING ACTIVITIES					
Proceeds from (purchase of) restricted investments	6,423,992	(311,990)	(566,998)	(2,555,792)	(732,832)
Proceeds from (purchase of) investments	(13,386,087)	6,735,042	1,070,453	1,459,629	(4,648,258)
Interest on investments	161,394	289,238	641,174	631,105	653,028
Net cash from investing activities	(6,800,701)	6,712,290	1,144,629	(465,058)	(4,728,061)
NET DECREASE IN CASH AND CASH EQUIVALENTS	(1,518,198)	-	-	-	-
CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	2,018,198	500,000	500,000	500,000	500,000
CASH AND CASH EQUIVALENTS, END OF YEAR	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000

See summary of significant projection assumptions and accountant's compilation report.

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS

For the Years Ending May 31, 2009 through 2013

General Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
User Fees:					
Rate per thousand gallons (as of beginning of each fiscal year)	$ 3.11	$ 3.27	$ 3.43	$ 3.60	$ 3.78
Rate increase	$ 0.1000	$ 0.1555	$ 0.1634	$ 0.1715	$ 0.1800
Number of months increase is effective	12	8	12	12	12
Monthly average usage (in 1000's of gallons)	7.24	7.56	7.60	7.75	7.75
Average number of annual users	78,998	79,788	80,586	82,198	84,664
Percentage increase in annual users	0.00%	1.00%	1.00%	2.00%	3.00%
User fee levels	$ 21,342,059	$ 23,261,694	$ 25,200,462	$ 27,522,807	$ 29,765,758
Incremental dollar growth from prior year rate	686,240	750,377	1,200,897	1,311,010	1,417,267
Percentage growth in user fees	0.55%	8.99%	8.33%	9.22%	8.15%
Percentage growth in user fee rate	3.32%	5.00%	5.00%	5.00%	5.00%
Days user fees in accounts receivable	32	32	32	32	32
Days user fees in unbilled user fee revenue	43	43	43	43	43
Interest earnings rate, investments	0.50%	0.75%	2.00%	2.00%	2.00%
Interest earnings rate, cash	0.25%	0.50%	1.00%	1.00%	1.00%
Inflation rate	2.00%	2.00%	2.00%	2.25%	2.50%
BOD surcharges	$ 1,600,000	$ 1,300,000	$ 1,300,000	$ 1,300,000	$ 1,300,000
Penalties	477,398	420,000	433,989	452,277	466,524
Pretreatment revenues	67,598	65,000	66,300	67,792	69,487
Salaries and Wages by Department:					
Administration:					
Wages	$ 427,166	$ 422,500	$ 439,400	$ 456,976	$ 475,255
Percent increase		-1.09%	4.00%	4.00%	4.00%
Trustee wages	$ 60,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000
Percent increase		0.00%	0.00%	0.00%	0.00%
Data Processing:					
Wages	$ 207,550	$ 218,000	$ 226,720	$ 235,789	$ 245,220
Percent increase		5.03%	4.00%	4.00%	4.00%
Billing:					
Wages	$ 230,054	$ 200,000	$ 208,000	$ 216,320	$ 224,973
Percent increase		-13.06%	4.00%	4.00%	4.00%
Operations (nonunion):					
Wages	$ 388,948	$ 414,000	$ 430,560	$ 447,782	$ 465,694
Percent increase		6.44%	4.00%	4.00%	4.00%
Operations (union):					
Wages	$ 1,156,571	$ 1,020,000	$ 1,060,800	$ 1,103,232	$ 1,147,361
Percent increase		-11.81%	4.00%	4.00%	4.00%
Process Control					
Wages	$ 209,576	$ 190,000	$ 197,600	$ 205,504	$ 213,724
Percent increase		-9.34%	4.00%	4.00%	4.00%
Maintenance (nonunion):					
Wages	$ 391,343	$ 392,000	$ 407,680	$ 423,987	$ 440,947
Percent increase		0.17%	4.00%	4.00%	4.00%
Maintenance (union):					
Wages	$ 899,679	$ 1,007,750	$ 1,048,060	$ 1,089,982	$ 1,133,582
Percent increase		12.01%	4.00%	4.00%	4.00%
Lab:					
Wages	$ 399,675	$ 435,000	$ 452,400	$ 470,496	$ 489,316
Percent increase		8.84%	4.00%	4.00%	4.00%
Industrial Waste:					
Wages	$ 200,047	$ 230,300	$ 239,512	$ 249,092	$ 259,056
Percent increase		15.12%	4.00%	4.00%	4.00%

(These summaries are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

General Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
Salaries and Wages by Department: (Continued)					
Engineering and Sewer Maintenance (nonunion):					
Wages	$ 481,396	$ 469,500	$ 488,280	$ 507,811	$ 528,124
Percent increase		-2.47%	4.00%	4.00%	4.00%
Engineering and Sewer Maintenance (union):					
Wages	$ 83,997	$ 125,000	$ 130,000	$ 135,200	$ 140,608
Percent increase		48.81%	4.00%	4.00%	4.00%
Benefits (percent of salaries and wages):					
FICA	N/A	7.65%	7.65%	7.65%	7.65%
IMRF	10.08%	13.21%	13.21%	13.21%	13.21%
Trustee fees subject to IMRF	N/A	N/A	N/A	N/A	N/A
Unemployment compensation	N/A	2.50%	2.50%	2.50%	2.50%
Health care charges percentage increase	N/A	12.50%	7.50%	7.00%	6.50%
Health care charges percentage increase - OPEB	10.00%	3.00%	3.00%	3.00%	3.00%
Health care charges	$ 1,600,000	$ 1,800,000	$ 2,011,504	$ 2,237,443	$ 2,477,171
Health care charges - OPEB	160,000	54,000	60,345	67,123	74,315
Total Health Care Charges	$ 1,760,000	$ 1,854,000	$ 2,071,849	$ 2,304,567	$ 2,551,487
Workers compensation percentage to total wages	3.61%	2.85%	2.85%	2.85%	2.85%
Vision insurance percentage to total wages	0.81%	0.72%	0.72%	0.72%	0.72%
EAP percentage to total wages	0.06%	0.06%	0.06%	0.06%	0.06%
Capital Purchases:					
Data Processing:					
Building/system improvements	$ -	$ -	$ -	$ -	$ -
Plant machinery and equipment	-	-	-	-	-
Office machinery and equipment	25,425	32,000	20,000	20,000	20,000
Billing:					
Building improvements	-	-	-	-	-
Plant machinery and equipment	-	-	-	-	-
Office machinery and equipment	-	-	-	-	-
Plant Operations:					
Building improvements	-	-	-	-	-
Plant machinery and equipment	-	-	-	-	-
Office machinery and equipment	-	-	-	-	-
Process Control:					
Building improvements	-	-	-	-	-
Plant machinery and equipment	-	23,800	25,000	-	25,000
Office machinery and equipment	-	-	-	-	-
Vehicles	-	-	-	-	-
Plant Maintenance:					
Building improvements	-	-	-	-	-
Plant machinery and equipment	-	-	-	-	-
Vehicles	-	-	-	-	-
Lab/Industrial Waste:					
Building improvements	-	-	-	-	-
Plant machinery and equipment	42,354	27,000	25,000	25,000	25,000
Vehicles	-	-	-	-	-
Engineering and Sewer Maintenance:					
Building improvements	-	-	-	-	-
Sanitary sewer	-	-	-	-	-
Plant machinery and equipment	-	-	-	-	-
Office machinery and equipment	-	-	-	-	-
Vehicles	-	20,000	-	20,000	-

(These summaries are continued on the following page.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

General Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
Capital Purchases: (Continued)					
Totals:					
Building improvements	$ -	$ -	$ -	$ -	$ -
Sanitary sewer	- -	-	-	-	-
Plant machinery and equipment	42,354	50,800	50,000	25,000	50,000
Office machinery and equipment	25,425	32,000	20,000	20,000	20,000
Vehicles	-	20,000	-	20,000	-
Annexation and infrastructure participation fees	749,792	650,000	1,250,000	1,950,000	2,500,000
Connection fees	1,422,213	1,100,000	1,700,000	2,100,000	3,500,000
Project cash uses	19,291,250	34,434,300	25,454,750	20,766,000	12,339,000
Payments to City of Aurora for Intergovernmental Agreement Bonds:					
Principal	$ 82,500	$ 85,000	$ 90,000	$ 95,000	$ 100,000
Interest	221,241	217,941	214,541	210,941	207,141
Total	$ 303,741	$ 302,941	$ 304,541	$ 305,941	$ 307,141
Intergovernmental contributions	$ 1,746,120	$ -	$ -	$ -	$ -
Non project specific engineering fees:					
General	$ 1,119,250	$ 452,200	$ 500,000	$ 510,000	$ 520,200
Long-term control plan - engineering	500,000	500,000	-	-	-
Total	$ 1,619,250	$ 952,200	$ 500,000	$ 510,000	$ 520,200
Other assumptions:					
Operations and maintainence (estimated at 4 months of operating expenses including depreciation chargeable to operations)	$ 6,947,759	$ 8,529,650	$ 7,607,685	$ 8,018,854	$ 8,393,688
Depreciation reserve under debt ordinance	500,000	500,000	500,000	500,000	500,000
Bond reserves	3,538,449	2,268,548	3,757,511	5,902,134	6,260,132
TOTAL ESTIMATED RESERVES	$ 10,986,208	$ 11,298,198	$ 11,865,195	$ 14,420,988	$ 15,153,819

(See accountant's compilation report.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS

For the Years Ending May 31, 2009 through 2013

Capital Projects Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
INTERCEPTOR PROJECTS - Construction					
54" East Bank Replacement Shodeen - engineering	$ -	$ -	$ 344,000	$ 158,000	$ 195,000
54" East Bank Replacement Shodeen	-	-	-	2,000,000	2,463,000
Gordon Rd. 24" Forcemain to Sugar Grove Int. Phase 3 from Prestbury PS - engineering	-	-	-	-	-
Gordon Rd. 24" Forcemain to Sugar Grove Int. Phase 3 from Prestbury PS	-	-	-	-	-
Morgan Creek (Keck & Hamman) - engineering	-	-	-	-	-
Morgan Creek (Keck & Hamman)	-	-	-	-	-
Morgan Creek (Stewart) - engineering	-	-	-	-	-
Morgan Creek (Stewart)	-	-	-	-	-
Morgan Creek Pump Station (Hunt Development) - engineering	-	-	-	-	-
Morgan Creek Pump Station (Hunt Development)	-	-	-	-	-
Morgan Creek South - engineering	-	-	-	-	-
Morgan Creek South	-	-	-	-	-
Prestbury Interceptor - Phase II (Norris Rd. along Hankes to Old WWTP) - engineering	-	-	-	-	-
Prestbury Interceptor - Phase II (Norris Rd. along Hankes to Old WWTP)	-	-	-	-	-
Sugar Grove Interceptor- Phase II Blackberry Cr. To ComEd - engineering	-	168,000	168,000	-	-
Sugar Grove Interceptor- Phase II Blackberry Cr. To ComEd	-	2,125,000	2,125,000	-	-
Sugar Grove Interceptor- Phase III (ComEd/ Cambridge to Prairie St.) - engineering	-	-	-	-	-
Sugar Grove Interceptor- Phase III (ComEd/ Cambridge to Prairie St.)	-	-	-	-	-
Reclaimed Water Refuse Facilities Phase I - engineering	162,000	162,000	166,000	166,000	-
Reclaimed Water Refuse Facilities Phase I	-	-	2,137,500	2,137,500	-
Reclaimed Water Refuse Facilities Phase II - engineering	-	-	-	-	-
Reclaimed Water Refuse Facilities Phase II	-	-	-	-	-
Woolley Rd. Int./Macom (Macom Dev./Ashcroft to Douglas) - engineering	-	-	-	-	-
Woolley Rd. Int./Macom (Macom Dev./Ashcroft to Douglas)	-	-	-	-	-
Woolley Rd. (Easterly Ext Wooldy Rd. Phase II Interceptor, Section 15) - engineering	-	-	-	-	-
Woolley Rd. (Easterly Ext Wooldy Rd. Phase II Interceptor, Section 15)	-	-	-	-	-
Cedar Glenn Subdivision WW Collection System - engineering	77,000	156,000	79,000	-	-
Cedar Glenn Subdivision WW Collection System	-	1,000,000	1,000,000	-	-
INTERCEPTOR PROJECTS - Rehabilitation					
Original Interceptor Rehabilitation Phase I - engineering	-	-	-	365,000	-
Original Interceptor Rehabilitation Phase I	-	-	-	2,304,000	-
Original Interceptor Rehabilitation Phase II - engineering	-	-	-	-	377,000
Original Interceptor Rehabilitation Phase II	-	-	-	-	2,384,000
Original Interceptor Rehabilitation Phase III - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase III	-	-	-	-	-

(These summaries are continued on the following pages.)

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

Capital Projects Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
INTERCEPTOR PROJECTS - Rehabilitation (Continued)					
Original Interceptor Rehabilitation Phase IV - engineering	$ -	$ -	$ -	$ -	$ -
Original Interceptor Rehabilitation Phase IV	-	-	-	-	-
Original Interceptor Rehabilitation Phase V - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase V	-	-	-	-	-
Original Interceptor Rehabilitation Phase VI - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase VI	-	-	-	-	-
Original Interceptor Rehabilitation Phase VII - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase VII	-	-	-	-	-
Original Interceptor Rehabilitation Phase VIII - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase VIII	-	-	-	-	-
Original Interceptor Rehabilitation Phase IX - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase IX	-	-	-	-	-
Original Interceptor Rehabilitation Phase X - engineering	-	-	-	-	-
Original Interceptor Rehabilitation Phase X	-	-	-	-	-
Illinois Siphon Tube Rehab/Rplacement - engineering	-	-	-	-	-
Illinois Siphon Tube Rehab/Rplacement	-	-	-	-	-
Miscellaneous Rehab - engineering	-	79,000	158,000	237,000	237,000
Miscellaneous Rehab	-	500,000	1,000,000	1,500,000	1,500,000
FLOW EQUALIZATION BASIN PROJECTS					
Land for FEB (Farnsworth and Indian Trail) - engineering	-	25,000	-	-	-
Land for FEB (Farnsworth and Indian Trail)	-	1,500,000	-	-	-
Reckinger Rd. (Phase II of Master Plan) - engineering	-	-	-	585,000	585,000
Reckinger Rd. (Phase II of Master Plan)	-	-	-	-	-
Reckinger Rd. (Phase III of Master Plan) - engineering	-	-	-	-	-
Reckinger Rd. (Phase III of Master Plan)	-	-	-	-	-
Waubonsie Facility (Phase III of Master Plan) - engineering	-	-	-	-	-
Waubonsie Facility (Phase III of Master Plan)	-	-	-	-	-
Reckinger Rd. (Phase IV of Master Plan) - engineering	-	-	-	-	-
Reckinger Rd. (Phase IV of Master Plan)	-	-	-	-	-
Waubonsie Facility (Phase IV of Master Plan) - engineering	-	-	-	-	-
Waubonsie Facility (Phase IV of Master Plan)	-	-	-	-	-
Reckinger Rd. (Phase V of Master Plan) - engineering	-	-	-	-	-
Reckinger Rd. (Phase V of Master Plan)	-	-	-	-	-
Waubonsie Facility (Phase V of Master Plan) - engineering	-	-	-	-	-
Waubonsie Facility (Phase V of Master Plan)	-	-	-	-	-
Waubonsie Facility (Phase VI of Master Plan) - engineering	-	-	-	-	-
Waubonsie Facility (Phase VI of Master Plan)	-	-	-	-	-

(These summaries are continued on the following page.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

Capital Projects Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
PLANT PROJECTS					
Rehab HVAC Building P-1 - engineering	$ -	$ 245,300	$ -	$ -	$ -
Rehab HVAC Building P-1	-	1,553,000	-	-	-
New Lab Building - engineering	240,000	240,000	-	-	-
New Lab Building	-	-	-	-	-
Miscellaneous Rehabilitation - engineering	522,000	779,000	658,000	414,000	285,000
Miscellaneous Rehabilitation	3,303,000	4,929,000	4,160,000	2,615,000	1,800,000
TPAD - engineering	697,000	697,000	-	-	-
TPAD	7,500,000	7,500,000	-	-	-
TPAD	1,210,500	1,210,500	-	-	-
Digester M-3 Cover - engineering	-	111,000	-	-	-
Digester M-3 Cover	-	700,000	-	-	-
Contracts 1 & 2 - engineering	377,750	755,500	377,750	-	-
Contracts 1 & 2	4,375,000	8,750,000	4,375,000	-	-
Contracts 1 & 2	422,000	844,000	422,000	-	-
Contracts 3 - engineering	405,000	405,000	415,000	415,000	-
Contracts 3	-	-	5,356,500	5,356,500	-
South WWTP- Stage 1 (Phase II of Master Plan) - engineering	-	-	2,513,000	2,513,000	2,513,000
South WWTP- Stage 1 (Phase II of Master Plan)	-	-	-	-	-
South WWTP- Stage 2 (Phase IV of Master Plan) - engineering	-	-	-	-	-
South WWTP- Stage 2 (Phase IV of Master Plan)	-	-	-	-	-
South WWTP- Stage 3 (Phase VI of Master Plan) - engineering	-	-	-	-	-
South WWTP- Stage 3 (Phase VI of Master Plan)	-	-	-	-	-
TOTAL	$ 19,291,250	$ 34,434,300	$ 25,454,750	$ 20,766,000	$ 12,339,000

(See accountant's compilation report.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS

For the Years Ending May 31, 2009 through 2013

Funding Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
2002 Refunding Bond Payable					
Beginning balance	$ 830,000	$ -	$ -	$ -	$ -
Ending balance	-	-	-	-	-
Principal payments	830,000	-	-	-	-
Interest payments	16,600	-	-	-	-
Accrued interest	-	-	-	-	-
Interest expense	-	-	-	-	-
State Revolving Loan #L170038					
Beginning balance	3,198,477	2,440,866	1,655,913	842,632	-
Ending balance	2,440,866	1,655,913	842,632	-	-
Principal payments	757,611	784,953	813,281	842,632	-
Interest payments	107,695	80,353	52,024	22,672	-
Accrued interest	21,827	14,808	7,535	-	-
State Revolving Loan #L171529					
Beginning balance	6,765,221	6,339,139	5,902,188	5,454,090	4,994,561
Ending balance	6,339,139	5,902,188	5,454,090	4,994,561	4,523,309
Principal payments	426,082	436,951	448,098	459,529	471,252
Interest payments	168,815	157,945	146,799	135,367	123,644
Accrued interest	40,174	37,405	34,565	31,653	28,666
State Revolving Loan - #L17263800					
Beginning balance	868,856	832,726	801,185	768,851	735,703
Ending balance	832,726	801,185	768,851	735,703	701,722
Principal payments	36,130	31,541	32,334	33,148	33,981
Interest payments	16,033	20,622	19,829	19,015	18,182
Accrued interest	8,017	10,311	9,915	9,508	9,091
State Revolving Loan - new #1					
Proceeds	-	2,125,000	2,125,000	-	-
Beginning balance	-	-	2,125,000	4,250,000	4,037,500
Ending balance	-	2,125,000	4,250,000	4,037,500	3,825,000
Principal payments	-	-	-	212,500	212,500
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #2					
Proceeds	-	-	2,137,500	2,137,500	-
Beginning balance	-	-	-	2,137,500	4,275,000
Ending balance	-	-	2,137,500	4,275,000	4,107,909
Principal payments	-	-	-	-	167,091
Interest payments	-	-	-	-	105,837
Accrued interest	-	-	-	-	52,919
State Revolving Loan - new #3					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-

(These summaries are continued on the following pages.)

Funding Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
State Revolving Loan - new #4					
Proceeds	$ -	$ 1,000,000	$ 1,000,000	$ -	$ -
Beginning balance	-	-	1,000,000	2,000,000	1,900,000
Ending balance	-	1,000,000	2,000,000	1,900,000	1,800,000
Principal payments	-	-	-	100,000	100,000
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #5					
Proceeds	-	-	-	2,304,000	-
Beginning balance	-	-	-	-	2,304,000
Ending balance	-	-	-	2,304,000	2,213,947
Principal payments	-	-	-	-	90,053
Interest payments	-	-	-	-	57,041
Accrued interest	-	-	-	-	28,521
State Revolving Loan - new #6					
Proceeds	-	-	-	-	2,384,000
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	2,384,000
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #7					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #8					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #9					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new 10					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-

(These summaries are continued on the following pages.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

Funding Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
State Revolving Loan - new #11					
Proceeds	$ -	$ -	$ -	$ -	$ -
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #12					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #13					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #14					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #15					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
State Revolving Loan - new #16					
Proceeds	7,500,000	7,500,000	-	-	-
Beginning balance	-	7,500,000	15,000,000	14,413,716	13,812,683
Ending balance	7,500,000	15,000,000	14,413,716	13,812,683	13,196,531
Principal payments	-	-	586,284	601,033	616,152
Interest payments	-	-	371,358	356,610	341,490
Accrued interest	-	-	185,679	178,305	170,745
State Revolving Loan - new #17					
Proceeds	-	700,000	-	-	-
Beginning balance	-	-	700,000	665,000	630,000
Ending balance	-	700,000	665,000	630,000	595,000
Principal payments	-	-	35,000	35,000	35,000
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-

(These summaries are continued on the following page.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS (Continued)

For the Years Ending May 31, 2009 through 2013

Funding Assumptions	Projected 2009	Projected 2010	Projected 2011	Projected 2012	Projected 2013
State Revolving Loan - new #18					
Proceeds	$ 4,375,000	$ 8,750,000	$ 4,375,000	$ -	$ -
Beginning balance	-	4,375,000	13,125,000	17,500,000	16,816,002
Ending balance	4,375,000	13,125,000	17,500,000	16,816,002	16,114,797
Principal payments	-	-	-	683,998	701,205
Interest payments	-	-	-	433,252	416,045
Accrued interest	-	-	-	216,626	208,023
State Revolving Loan - new #19					
Proceeds	-	-	5,356,500	5,356,500	-
Beginning balance	-	-	-	5,356,500	10,713,000
Ending balance	-	-	5,356,500	10,713,000	10,294,276
Principal payments	-	-	-	-	418,724
Interest payments	-	-	-	-	265,224
Accrued interest	-	-	-	-	132,612
State Revolving Loan - new #20					
Proceeds	-	-	-	-	-
Beginning balance	-	-	-	-	-
Ending balance	-	-	-	-	-
Principal payments	-	-	-	-	-
Interest payments	-	-	-	-	-
Accrued interest	-	-	-	-	-
Total State Revolving Loans					
Proceeds	11,875,000	20,075,000	14,994,000	9,798,000	2,384,000
Beginning balance	10,832,554	21,487,731	40,309,286	53,388,289	60,218,449
Ending balance	21,487,731	40,309,286	53,388,289	60,218,449	59,756,491
Principal payments	1,219,823	1,253,445	1,914,997	2,967,840	2,845,958
Interest payments	292,543	258,920	590,010	966,916	1,327,463
Accrued interest	70,018	62,524	237,694	436,092	630,576
Interest expense	291,084	251,426	765,180	1,165,313	1,521,947

(See accountant's compilation report.)

FOX METRO WATER RECLAMATION DISTRICT
OSWEGO, ILLINOIS

SUMMARY OF SIGNIFICANT PROJECTION ASSUMPTIONS

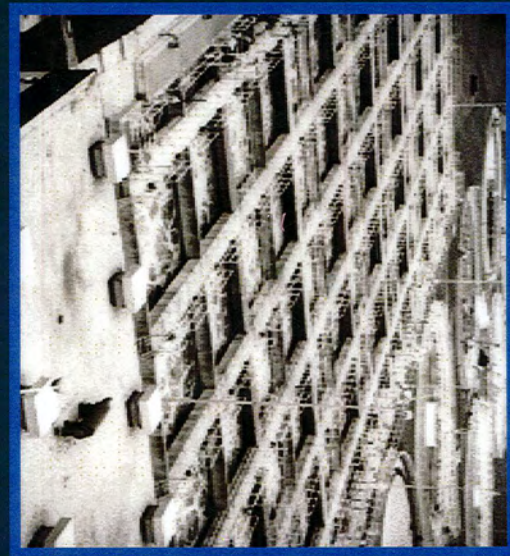
For the Years Ending May 31, 2009 through 2013

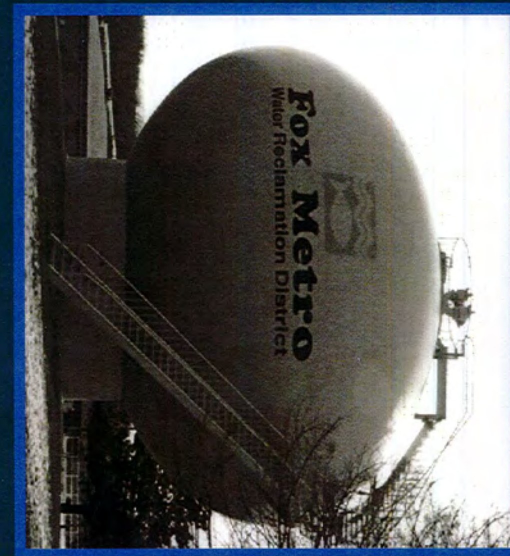
Equity Bond Ordinance:

	Operations and Maintenance 1	Bond and Interest 2	Bond Reserve 3	Depreciation 4	Surplus Revenue 5	Total 6
2009	$ 6,947,759	$ 1,179,483	$ 2,358,966	$ 500,000	$ -	$ 10,986,208
2010	$ 8,529,650	$ 756,183	$ 1,512,365	$ 500,000	$ -	$ 11,298,198
2011	$ 7,607,685	$ 1,252,504	$ 2,505,007	$ 500,000	$ -	$ 11,865,195
2012	$ 8,018,854	$ 1,967,378	$ 3,934,756	$ 500,000	$ -	$ 14,420,988
2013	$ 8,393,688	$ 2,086,711	$ 4,173,421	$ 500,000	$ -	$ 15,153,819

1. Subsequent 1 month of operating expenses per Ordinance. Assumed 4 months for projection.
2. Equal to debt service due in next period
3. $2000 per million per month, limited to total debt service in succeeding year.
4. Minimum of $500,000. Assumed at $500,000 2009 - 2013 for projection.
5. Utilized for operations

(See accountant's compilation report.)





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