# MINUTES

## SEWRPC ADVISORY COMMITTEE ON REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE FOR THE GREATER MILWAUKEE WATERSHEDS

DATE: December 14, 2006

TIME: 1:30 p.m.

PLACE: City of Mequon City Hall
Upper Level Council Chambers
11333 N. Cedarburg Road
Mequon, Wisconsin

Committee Members Present

| | |
|---|---|
| Daniel S. Schmidt, Chairman | SEWRPC Commissioner |
| Michael G. Hahn, Secretary | Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission |
| Martin A. Aquino (for Jeffrey J. Mantes) | Environmental Manager, Environmental Engineering, City of Milwaukee |
| John R. Behrens | Commissioner-Secretary, Silver Lake Protection and Rehabilitation District |
| Marsha B. Burzynski (for James L. McNelly) | Regional Water Resources Planner, Wisconsin Department of Natural Resources |
| Elizabeth Hellman (for Kristine M. Krause) | Environmental Department, We Energies |
| Andrew A. Holschbach | Director, Ozaukee County Planning, Resources, and Land Management Department |
| Judy Jooss (for Diane M. Georgetta) | Town and Country Resource Conservation and Development, Inc. |
| Shirley Krug (for Kevin L. Shafer) | Watershed Planning Manager, Milwaukee Metropolitan Sewerage District |
| James F. Lubner | Sea Grant Advisory Services Specialist, University of Wisconsin Sea Grant Institute |
| Charles S. Melching | Associate Professor, Civil & Environmental Engineering, Marquette University |
| Matthew Moroney | Executive Director, Metropolitan Builders Association of Greater Milwaukee |
| Paul E. Mueller | Administrator, Washington County Planning and Parks Department |
| Cheryl Nenn | Riverkeeper/Project Director, Friends of Milwaukee's Rivers |
| Jeffrey S. Nettesheim | Director of Utilities, Village of Menomonee Falls |
| Stephen Poloncsik (for Peter G. Swenson) | Senior Staff Engineer, U.S. Environmental Protection Agency |
| Chad Sampson (for Julie A. Anderson) | Racine County Division of Planning and Development |
| Thomas A. Wiza | Director of Engineering and Public Works, City of Cedarburg |

Staff Members and Guests

| | |
|---|---|
| Joseph E. Boxhorn | Senior Planner, Southeastern Wisconsin Regional Planning Commission |
| Troy E. Deibert | Water Resources Engineer, HNTB Corporation |
| Ronald J. Printz | Principal Engineer, Southeastern Wisconsin Regional Planning Commission |

## WELCOME AND INTRODUCTIONS

Mr. Schmidt thanked the Advisory Committee members for attending this meeting. He indicated that roll call would be accomplished with a sign-in sheet circulated by SEWRPC staff.

## APPROVAL OF MINUTES OF THE MEETING OF OCTOBER 31, 2006

Mr. Schmidt asked if there were any additions or revisions to be made to the minutes of the October 31, 2006, meeting of the Committee.

Ms. Jooss noted the following typographical errors: the word "sentience" should be changed to "sentence" in the eighth and tenth lines of the first Secretary's Note on page 6.

There being no further additions or revisions, the minutes were approved as revised, on a motion by Mr. Wiza, seconded by Mr. Lubner, and carried unanimously.

## CONSIDERATION OF THE PRELIMINARY DRAFT OF CHAPTER IX, "DEVELOPMENT OF ALTERNATIVE PLANS: DESCRIPTION AND EVALUATION" OF SEWRPC PLANNING REPORT NO. 50 (PR NO. 50), *A REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE FOR THE GREATER MILWAUKEE WATERSHEDS*

Mr. Schmidt asked Mr. Hahn to review the following sections from the preliminary draft of the chapter.

Mr. Hahn began by noting that this meeting represents an important milestone in the planning process. He stated that prior meetings have systematically laid the groundwork leading up to presentation of alternative plans and the recommended plan. He reminded the Committee that an overview of the screening alternatives and alternative water quality plans was presented at the Committee's October 12, 2005, meeting and indicated that those alternatives would be presented in detail at this meeting. Mr. Hahn stated that the SEWRPC staff believes that the screening alternatives and alternative plans adequately cover a broad range of possible conditions. He indicated that Commission staff is open to suggestion and comments, but also noted that the process at this point in time does not allow for the development of other alternative plans. He stated that this meeting was the time for comments, criticisms, and suggestions related to the preliminary recommended plan, which is in the process of being modeled.

Mr. Melching asked whether action by the Committee at this meeting constitutes approval of the preliminary plan and alternatives. He expressed his concern that the Committee has not seen the appendices of the chapter that contain the water quality comparisons. Mr. Hahn replied that the Committee has three options: it can approve the chapter with corrections, it can approve the chapter conditionally until the appendices are reviewed, or it can defer approval until the next meeting. Mr. Hahn noted that the appendices have been posted on the SEWRPC FTP site.

Mr. Hahn recognized Mr. Ronald J. Printz of the SEWRPC staff for his outstanding work as principal author of Chapter IX and said that the chapter would be presented by Mr. Printz.

Mr. Printz began by summarizing the introduction to the chapter. He next summarized the sections describing the relationship of the regional water quality management plan update to the Milwaukee Metropolitan Sewerage District's (MMSD) 2020 facilities planning program and the Wisconsin Department of Natural Resources' (WDNR) Milwaukee River Basin and Root-Pike River Basin planning programs. Mr. Printz explained that the WDNR's State of the Basin Reports for these two basins identified streams that could potentially meet higher water use classifications. He stated that these potential higher classifications are included in Chapter VII of PR No. 50. He noted that the SEWRPC staff would compare these streams to the higher standards. Mr. Hahn commented that this will be done in the context of the recommended plan and noted that, based on preliminary results, it is likely that there will be few changes in water use objectives.

Mr. Printz next summarized the section on the relationship to land use planning.

Mr. Melching commented that discussion of the older and newer estimates for 2020 population and land use projections on page 4 is confusing and asked whether it could be streamlined. Mr. Printz replied that this could be clarified. He noted that the alternatives were evaluated using the older, community-based estimates. He also indicated that when the estimates from the land use plan for 2035 became available, it was found that some of the assumptions in the older estimates were overly optimistic. He stated that the recommended plan would be analyzed against the revised estimates. Mr. Hahn noted that it was anticipated that this would happen because the 2035 land use plan was being developed during the planning period for the regional water quality management plan update. He also said that the original, community-based estimates were used for conveyance components of the MMSD system, while the revised estimates were used for storage and treatment. Mr. Melching stated that an explanation of this would be helpful.

[Secretary's Note: Footnote 5 on page 4 was revised to read as follows. (In this Secretary's Note, and in subsequent Notes, revised and added text is indicated in bold letters for clarification only. The report text will not be bold.)

*"As described in Chapter VIII, 2020 and buildout population and land use estimates by sewershed for 27 of the 28 MMSD member or contract communities were initially developed by the SEWRPC staff based on future land use information provided by those communities. City of Milwaukee staff developed 2020 and buildout population and land use estimates by sewershed for the City, using the same methodology employed by the SEWRPC staff for the other communities served by the MMSD. Planned land use data from the SEWRPC 2020 Regional land use plan was applied for communities in the study area that are not served by MMSD. Those initial year 2020 population and land development assessments were applied for developing and evaluating the screening alternatives and the alternative water quality management plans.* ***That approach provided a consistent basis for comparison of the screening alternatives and the alternative water quality plans.***

*The work plan for the* ***regional*** *water quality management plan update anticipated the SEWRPC 2035* ***regional*** *land use plan would be completed during the course of preparing the* ***regional*** *water quality plan. Thus, when data from the 2035 plan became available, 2020 land use and population estimates for the MMSD communities were revised using those data and the revised data were used to develop the wastewater treatment components called for under the recommended MMSD 2020 Facilities Plan****,*** *which is incorporated in the* ***preliminary and final recommended regional water quality management*** *plans. Similarly****,*** *refined population estimates were used for the 2020 condition evaluation of all of the* ***other*** *public sewage treatment plants in the study area. As described in Chapter VIII of this report, conveyance components of the MMSD system were still sized based on the original year 2020 population and land use estimates.* ***The revised 2020 industrial and commercial land use estimates were also applied for the development of revised nonpoint source pollution loads used in the preliminary recommended water quality management plan described at the end of this chapter.***

***The rationale for using the original year 2020 population and land use estimates provided by the MMSD communities to size and evaluate conveyance components of the MMSD system under the preliminary and final recommended plans and using the revised year 2020 projections based on the 2035 regional land use plan to evaluate and size regional MMSD treatment facilities under those plans was based on the possibility that, while the community-projected growth could occur in any given sewershed or community, it would not be likely to occur throughout the entire MMSD planning area. Thus, applying sewage flow estimates based on the original 2020 population and land***

***use data would provide for adequate conveyance facilities, while applying sewage flow estimates based on the revised 2020 projections (which would more likely represent the overall conditions in the MMSD planning area tributary to the MMSD wastewater treatment plants), would enable facilities associated with those plants to be appropriately sized, rather than oversized.****"*]

Mr. Printz summarized the section on water quality management planning criteria and analytic procedures. He next summarized the section on review and evaluation of potentially applicable water quality management options. He noted that a state-of-the-art report on available water pollution abatement technologies has been developed and that this will be published as a SEWRPC Memorandum report.

Mr. Printz began a summary of the section on the screening alternatives used for developing plan alternatives. Revised copies of Table IX-1 which include cost information for the screening alternatives were distributed to the Committee (see Exhibit A). Mr. Hahn commented that the screening alternatives are not intended as complete plan alternatives. He noted that they are intended to answer a number of "what-if" questions.

The subsections summarized by Mr. Printz included:

- Screening Alternative 1A: "Elimination of Separate Sewer Overflows (SSOs) and Combined Sewer Overflows (CSOs) Using Sewer Separation;"
- Screening Alternative 1B: "Elimination of SSOs And CSOs Using Enhanced Treatment and Storage;"
- Screening Alternative 1C: "Elimination of SSOs Using Enhanced Treatment and Storage;" and
- Screening Alternative 1D: "Elimination of SSOs through Infiltration and Inflow Reduction."

Mr. Wiza commented that considerable work has already been done to reduce infiltration and inflow (I/I). He asked what measures were considered for infiltration and inflow reduction. Mr. Printz replied that for the baseline condition it was assumed that infiltration and inflow would remain at current levels and that current efforts to control I/I would continue. He indicated that Screening Alternative 1D examines the question of how much more reduction in infiltration and inflow is needed to eliminate SSOs and what measures are necessary to effect this reduction. In response to a question from Mr. Wiza, he replied that the screening alternative includes replacement of private laterals. Ms. Nenn asked whether the cost of this screening alternative includes the cost of replacing private laterals. Mr. Printz answered that it does.

Mr. Printz then summarized the subsection on Screening Alternative 2: "High Level of Best Management Practices to Control Nonpoint Source Pollution."

Mr. Holschbach asked whether the manure management component of this screening alternative includes barnyards and manure storage facilities. Mr. Printz replied that it does.

Mr. Holschbach also asked what was included in the cost of the septic system management component of Screening Alternative 2 includes. Mr. Printz replied that this cost includes inspections of systems and an assumed level of replacement of systems.

Mr. Wiza asked whether street storage of stormwater would increase inflow and infiltration into sanitary sewers. He noted that the City of Cedarburg has done some repaving to reduce inflow and infiltration from streets. Mr. Printz replied that street storage and rooftop storage of stormwater were confined to the combined sewer area in the MMSD planning area.

Mr. Aquino asked which water quality parameters were considered in evaluating the alternatives. Mr. Printz replied that the evaluation considered fecal coliform bacteria, total nitrogen, total phosphorus, copper, and total suspended solids.

[Secretary's Note: The evaluation also considered dissolved oxygen.]

Mr. Printz then began a summary of the section on the description of alternative water quality management plans.

Mr. Lubner noted typographical errors or minor omissions on pages 12 and 14.

[Secretary's Note: Those errors and omissions were corrected.]

Mr. Printz summarized the subsection entitled "Alternative A: Baseline Alternative." He noted that the components of this alternative are also included in the other alternative water quality plans.

Revised copies of Table IX-3 which include cost information for the alternative water quality plans were distributed to the Committee (see Exhibit B).

Mr. Printz then summarized the subsection entitled "Alternative B1: Regulatory-Based Alternative."

Mr. Melching noted that the pumping rate to the Jones Island wastewater treatment plant (WWTP) and the capacity of the Jones Island WWTP were increased in the screening alternatives, but the capacity of the Jones Island WWTP is not increased in Alternatives B1 and B2. Mr. Printz replied that treatment capacity at the Jones Island WWTP is currently greater than the rate at which sewage can be pumped from the Inline Storage System (ISS). Increasing pumping capacity will allow for the maintenance of a higher rate of treatment for longer periods of time.

Mr. Aquino asked what percent of tunnel capacity would be made available due to the increased pumping. Mr. Printz replied that that percentage would be event-specific. Mr. Mueller asked if the percentage could be provided and Mr. Printz stated that it would be.

[Secretary's Note: The ISS currently has a capacity of 432 million gallons. Under Alternatives B1 and B2, the pumping capacity from the tunnel to Jones Island would be increased from the current 80 MGD to 180 MGD. Assuming the upgraded pumps are operating at full capacity, they would be able to drain about 41 percent of the tunnel volume over a 24-hour period, an increase of about 23 percent over current conditions. As noted at the meeting, the actual rate of pumping will vary over the course of a wet-weather event, depending on circumstances.]

Mr. Printz pointed out that the second full paragraph on page 15 no longer reflects the position of the Wisconsin Department of Natural Resources (WDNR) reflecting SSOs. He continued that the WDNR's position is that SSOs are not allowed. Ms. Krug asked whether a prohibition on SSOs was inconsistent with the Clean Water Act. Ms. Burzynski indicated that the language in MMSD's current operating permit, which does not list exceptions, is correct. She noted that much of the language in the Clean Water Act was about enforcement discretion. Ms. Nenn stated that the Clean Water Act only has exemptions for the protection of life and property and that Wisconsin's SSO rules are being revised. Mr. Hahn stated that SEWRPC staff will work with the WDNR on this issue and that the language will be revised to be consistent with MMSD's operating permit.

Ms. Krug noted that the second to last sentence in the second full paragraph on page 15 referred to "current negotiations" and that she was not aware of any negotiations on the level of protection (LOP) issue. Mr. Hahn responded that there have been meetings with the WDNR to specifically address this issue and that until WDNR review of the SEWRPC regional water quality management plan update and the MMSD 2020 Facilities Plan is final the LOP issue is open to clarification. He indicated that the sentence can be revised.

[Secretary's Note: In response to the preceding comments regarding SSOs, the second full paragraph on page 15 was deleted and replaced with the following:

"**The Wisconsin Pollutant Discharge Elimination System (WPDES) permit for MMSD sewerage system and wastewater treatment facilities specifically states that, "Bypasses and overflows of wastewater from the permittee's sanitary sewerage system are prohibited and are not authorized by this permit, the Department may initiate legal action regarding such occurrences as authorized by § 283.89, Wis. Stats."**

**The WPDES permit for each municipal wastewater treatment facility in the study area, including the MMSD system, has an "Unscheduled Bypassing" subsection that lists the following conditions regarding enforcement actions related to sanitary sewer overflows:**

**"Any unscheduled bypass or overflow of wastewater at the treatment works or from the collection system is prohibited, and the Department may take enforcement action against a permittee for such occurrences under § 283.89, Wis. Stats., unless:**

- **The bypass was unavoidable to prevent loss of life, or severe property damage;**
- **There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and**
- **The permittee notified the Department as required in this Section (of the discharge permit)."**

**Under this alternative plan,** a five-year recurrence interval level of protection (LOP) from SSOs was assumed. This level of occurrence is tied to the frequency of overflow events, and not to rainfall frequency. **Discussions** between the USEPA, WDNR, MMSD and individual communities may ultimately result in a different LOP being required. In order to meet the five-year LOP SSO restriction, this alternative includes the following additional measures:"]

[Secretary's Note: The first three paragraphs in bold text from the preceding Secretary's Note, will also be added to PR No. 50, Chapter VI, "Legal Structures Affecting the Regional Water Quality Management Plan Update," as a new subsection entitled *WPDES Permit Requirements Regarding Sanitary Sewer Overflows*. That subsection will be inserted after the bulleted list on page 50 of Chapter VI.

Ms. Krug noted that the draft MMSD 2020 Facilities Plan calls for an increase of 200 MGD in the treatment capacity at the South Shore WWTP under both Screening Alternatives 1B and 1C and Alternatives B1 and B2, and she asked why this chapter called for an increase of 185 MGD under those screening alternatives and alternative water quality plans. Mr. Printz replied that the capacity increase under the Screening Alternatives should be 200 MGD, and that, based on more detailed modeling, the increase was refined to 185 MGD for Alternatives B1 and B2.

[Secretary's Note: The second sentence of the first paragraph on page 9 was revised to read:

"The most cost effective combination of these measures calls for additional wastewater treatment capacities of **200** million gallons per day (MGD) and 100 MGD for the South Shore and Jones Island treatment plants, respectively."

The third sentence of the fourth paragraph on page 9 was revised to read:

"Under this screening alternative, the most cost effective combination of measures calls for additional wastewater treatment capacities of **200** million gallons per day (MGD) and 100 MGD for the South Shore and Jones Island treatment plants, respectively."]

Mr. Aquino asked whether the alternatives include blending. Mr. Printz answered that the baseline alternative and all other alternative plans include the current rate of blending at the Jones Island WWTP. He added that no additional blending at either the Jones Island WWTP or the South Shore WWTP was assumed. Mr. Aquino asked that a discussion of this be added to the report.

[Secretary's Note: In response to this comment, the following paragraph was added after the third full paragraph on page 13:

"Under certain circumstances, MMSD uses blending to prevent basement backups, raw sewage overflows, and damage to the Jones Island WWTP. When blending becomes necessary, up to 20 percent of the total flow coming out of primary treatment is blended back together with flow that received secondary treatment and the combined flow is then disinfected. Under the baseline condition, it was assumed that the current rate of blending would continue at the Jones Island WWTP. No additional blending was assumed for the Jones Island WWTP and no blending was assumed at the South Shore WWTP."]

Mr. Aquino noted that Alternative B1 assumes a substantial amount of rooftop storage of stormwater. He asked how this would be accomplished. Mr. Printz replied that the amounts were derived from studies by MMSD on potential sites for rooftop storage, mostly in the combined sewer service area. He added that the details would need to be worked out in the plan implementation phase. Mr. Lubner noted that there is a discrepancy between the amount of rooftop storage indicated in the last paragraph on page 15 and the amount listed in Table IX-3. Mr. Printz said that he would check the figure and correct the chapter.

[Secretary's Note: The second sentence of the last paragraph on page 15 and the second sentence of the sixth paragraph on page 16 were revised to read:

"These include downspout disconnection with rain barrel installation at 15 percent of homes in the area, downspout disconnection with rain gardens at a different 15 percent of homes in the area, provision of **14 million** gallons of rooftop storage in the City of Milwaukee central business district, provision of 15 million gallons of street storage through installation of storm sewer inlet restrictors, and provision of stormwater trees."]

Mr. Printz summarized the subsection entitled Alternative B2: "Regulatory-Based Alternative With Revised ISS Operating Procedure."

Mr. Printz noted that implementation of Alternative B2 would require changes in regulations. Mr. Hahn explained that the recommended plan will fully meet existing laws and regulations to the extent that can be determined. He indicated that an option would be explored outside current regulations that may achieve greater improvements in water quality in a cost-effective manner.

Ms. Burzynski stated that a the change in ISS operation assumed in Alternative B2 would require a change in Federal law and asked that the last sentence in the third paragraph on page 16 be revised to reflect that.

[Secretary's Note: In response to this comment, the last sentence of the third paragraph on page 16 was revised to read as follows:

"Thus, implementation of this alternative would require a change in **Federal law with regard to SSOs**."]

Mr. Printz proceeded to summarize the subsection entitled "Alternative C1: Water Quality-Based Alternative."

Mr. Mueller asked for an explanation of the process followed for choosing the levels of implementation of certain nonpoint source pollution control and infiltration components of plan alternatives, such as disconnection of downspouts and provision of rain barrels at 15 percent of homes, disconnection of downspouts and provision of rain gardens at another 15 percent of homes, and conversion of 10 percent of existing cropland and pasture to wetland or prairie conditions. Mr. Printz replied that the percentages for downspout disconnection were derived from studies conducted by MMSD and that the levels assumed under the alternative water quality plans were considered achievable by the project team. Mr. Hahn added that the levels of some rural nonpoint measures were set based, in part, on discussions with county land conservation staffs as to what might be achievable. Mr. Melching noted that Marquette University participated in a downspout disconnection study conducted by MMSD. He indicated that disconnection was feasible for three buildings on the Marquette campus and that based on this, the 15 percent goal may be reasonable.

Mr. Mueller stated that in order to determine how much "bang for the buck" each screening and alternative plan provides, in addition to the cost information already provided, he would like to see information on the effects on water quality of individual components of the plans. He said that, while he recognizes that it may not be possible to do this conveniently, it would be helpful to local officials to add this information to Tables IX-1 and IX-3. He added that it would also be helpful to indicate in those tables which components require changes in regulations or enforcement. Ms. Krug suggested presenting this information only for the components of the recommended plan. Mr. Mueller indicated that presenting this only for the recommended plan would not help the decision makers see how the decision was made among alternatives. Mr. Hahn said that it would be worthwhile to include such information, and he indicated that much of the information is in the state-of-the-art report. He noted that the amount of work needed to add this information to the tables may be prohibitive. He suggested that the Committee could review the state-of-the-art report at a special meeting.

[Secretary's Note: Based on the state-of-the-art report and the modeling sensitivity analyses, measures have been identified that control water pollution in a cost-effective manner. Because of the complexity of the natural and man-made systems, the impacts of individual measures cannot be isolated and compared in a relative context. SEWRPC staff will consider whether indications of which components require changes in regulations or enforcement can be added to Tables IX-1 and IX-3. In addition, should the Committee expressly indicate its desire to review the state-of-the-art report, SEWRPC staff will review it with them at a future meeting.]

Mr. Aquino asked how practical it would be to implement certain measures included in the alternative plans, since their implementation could require voluntary agreement from homeowners. Mr. Hahn replied that the project team had attempted to strike a balance between doing enough to meet water quality standards and selecting measures that could practically be implemented. He noted that, because of all that has been done to control point sources of pollution, it is now necessary to focus on nonpoint sources. He also noted that a recommended plan will be presented and that an additional modeling analysis will be made to demonstrate what "extreme measures" would be required to try to meet water quality standards throughout the study area.

Ms. Nenn asked if there would be several plans. Mr. Hahn responded that there would be a plan that will be built from the MMSD 2020 facilities plan, is intended to meet current regulatory requirements, and would also include significant controls on nonpoint sources of pollution. He reiterated that the SEWRPC staff, working with the

project consultant team, would consider whether limited funds could better be spent on higher levels of nonpoint source pollution control than on additional SSO controls which would not produce as great an improvement in water quality.

Mr. Melching noted that the literature on both urban and rural best management practices (BMPs) shows large ranges in the effectiveness of BMPs in capturing pollutants and asked whether the assumptions as to effectiveness were realistic. Mr. Printz replied that the state-of-the-art report contains documentation on the effectiveness of these technologies. He agreed that the effectiveness values in the literature show considerable variation. He stated that the modelers generally took a conservative approach and assumed effectiveness in the lower to middle portions of the reported ranges.

Mr. Printz summarized the subsection entitled "Alternative C2: Water Quality-Based Alternative with Green Measures."

Mr. Melching noted that in the original text of the chapter, Alternative C2 was cited as the most expensive, while current figures indicate that Alternative C1 is more expensive than Alternative C2. He asked why this changed. Mr. Printz explained that the difference was due to the applications of different stormwater disinfection technologies in the two alternatives. Initially, he continued, the costs of ultraviolet disinfection were thought to be similar to those for chlorination/dechlorination, but upon further examination it turned out that the costs of the ultraviolet light technology used in Alternative C2 were considerably lower than the costs of the chlorination/ dechlorination technology used in Alternative C1. This lower cost for disinfection offsets the costs of the additional measures called for under Alternative C2.

Mr. Printz summarized the section on the comparative evaluation of water quality management alternative plans.

Mr. Melching stated that it would be useful to add a table listing the water quality indicators used in evaluating plan alternatives. Mr. Hahn said that such a table would be added. He also noted that Appendices G through J, which set forth pollutant load and water quality summary data for the screening alternatives and the alternative water quality plans, are quite voluminous, so the Committee was notified prior to the meeting that they were posted on the SEWRPC ftp site. He offered to provide hard copy of those Appendices to any Committee member who requested them.

[Secretary's Note: In response to this suggestion, Table IX-3A was developed and attached hereto as Exhibit C. The following sentence was added after the fifth sentence of the fifth paragraph on page 18:

"These indicators are listed in Table IX-3A."]

[Secretary's Note: Subsequent to the Committee meeting Ms. Nenn requested, and was provided, hard copies of the Appendices.]

Mr. Melching stated that he would be interested in seeing a table that showed only the percentage compliance with water quality standards and criteria. Mr. Printz replied that there was not much difference between plan alternatives in the percent compliance. Mr. Hahn indicated that looking only at the percentage compliance masked certain improvements in water quality associated with some alternatives. He noted that early in the analysis, this approach was used and showed so few differences among alternatives that it did not give a basis for comparison of alternative plans. He stated that additional summaries of this could be added.

[Secretary's Note: The percent compliance with water quality standards at each assessment point for screening alternatives and for alternative water quality plans are documented in Appendices H and J, respectively, of this report. In response to this comment, Appendix K was developed and attached hereto as Exhibit D. Appendix K shows the format of this data. It is important to note that some of the results are counterintuitive, especially in the Root River watershed.

The modelers are reviewing this and the tables will be revised, if necessary. The following paragraph was added before the first full paragraph on page 20:

"The compliance with applicable regulatory or planning water quality standards and criteria for fecal coliform bacteria, dissolved oxygen, and total phosphorus expected under the four alternative plans are summarized in Appendix K. In general, only small differences in compliance with water quality standards were noted among the alternative plans."]

Ms. Nenn noted that the last sentences of the first full paragraph and third full paragraph on page 20 do not explain what would be complied with.

[Secretary's Note: The last sentence in the first full paragraph on page 20 was revised to read:

"While differences in the expected levels of compliance among alternative plans are small, Alternative C2 provides the highest level of compliance **with water quality standards for fecal coliform bacteria** followed by Alternative C1, Alternative B2, and Alternative B1."

The last sentence in the third full paragraph on page 20 was revised to read:

"While differences in the expected levels of compliance among alternative plans are small, Alternative C1 provides the highest level of compliance **with the recommended planning water quality standard for total phosphorus** followed by Alternative C2, Alternative B2, and Alternative B1."]

Mr. Hahn summarized the section on supplementary analyses of water quality management measures.

Mr. Lubner noted typographical errors or minor omissions on pages 21 and 22.

[Secretary's Note: Those errors or omissions were corrected.]

Ms. Krug requested that the description of MMSD's operating procedures for the ISS in the first paragraph on page 22 be clarified. She noted that MMSD's practice is to vary the volume reserved for inflow from the separate sewer service area as conditions dictate during a storm event. She added that this volume was held constant in the modeling.

[Secretary's Note: In response to this comment, the word "actually" was deleted from the first sentence of footnote 19 on page 22 and the third sentence of the first paragraph on page 22 was revised to read as follows:

"That alternative was designed to be compared with Alternative B1, which represented the MMSD operating practice **of reserving** ISS storage volume for separate sewage inflow, **and also** provided… ."]

Mr. Hahn summarized the subsection on sensitivity analyses of urban and rural best management practices.

With reference to the fourth full paragraph on page 23, Mr. Hahn noted that the estimate for reduction in loads of total suspended solids, total nitrogen, and total phosphorus that could be obtained by expanding current buffer widths would be revised.

[Secretary's Note: The consultant modeling team will provide updated information on the degree of control provided by buffer and the text on page 23 will be revised accordingly.]

[Secretary's Note: The last sentence in the fourth full paragraph on page 23 was revised to read as follows:

"Similarly, **load** reductions **ranging from about 13 to 20 percent** could also be achieved by converting agricultural land to either wetland or prairie vegetation."]

Mr. Hahn summarized the section on the preliminary recommended water quality management plan. Revised copies of Table IX-6 which sets forth information on wastewater treatment plants in the study area were distributed to the Committee (see Exhibit E).

[Secretary's Note: During SEWRPC review of this chapter following the meeting, the following clarification was made to the second sentence in the second paragraph on page 24 was revised to read as follows:

"Largely because of the significant MMSD sewerage system and wastewater treatment system upgrades that have been implemented, such as construction of the ISS, along with system upgrades by other communities in the study area, water quality modeling results indicate that additional measures to **control CSOs or to** meet the regulatory requirements regarding discharges from SSOs would not be expected to achieve a significant improvement in overall water quality."]

Mr. Hahn indicated that the preliminary recommended plan summarized in Table IX-5 will be detailed and costs will be provided in Chapter X of PR No. 50. He noted that several other measures were being considered for inclusion in the plan, including measures related to the Milwaukee Harbor Estuary Area of Concern, ballast water from ships on Lake Michigan, invasive species, water quality monitoring, dams, and pharmaceuticals and personal care products. He stated that SEWRPC staff is open to suggestions from the Committee on these and other measures.

[Secretary's Note: For consistency with the condition represented in the water quality model, the percentage of farmland or pasture that would be converted to prairie or wetland was changed from 5 to 10 percent, and the last sentence in the second full paragraph on page 25 was revised to read as follows. Corresponding revisions were made in Table IX-5.

"Other rural nonpoint source measures include providing a minimum stream buffer of 75 feet along all current crop and pasture land; the conversion **to either wetland or prairie,** of a total of **10** percent of existing **cropland and/or pasture, focusing on marginally productive land;** and an increased level of inspections, **and, if necessary, replacement,** of private wastewater treatment systems."]

Mr. Lubner noted typographical errors or minor omissions on page 26.

[Secretary's Note: Those errors or omissions were corrected.]

In reference to Table IX-5, Ms. Krug commented that MMSD was not committed to upgrading MIS conveyance capacity at identified hydraulic restrictions. Rather, they have established a "watch list" of possible upgrades. They intend to monitor population levels in tributary sewersheds and will upgrade MIS conveyance capacity as warranted.

[Secretary's Note: In response to this comment the fourth component listed in Table IX-5 was revised to read:

"Upgrade MIS conveyance capacity at **potential** hydraulic restrictions **as needed**"

The following footnote was added at the end of the fourth component listed in Table IX-5:

"MMSD is monitoring population levels in sewersheds tributary to potential hydraulic restrictions and will upgrade MIS conveyance capacity as warranted by the monitoring data."]

Ms. Krug commented that Item No. 8 under the "Rural nonpoint source measures" category in Table IX-5 would be more appropriately included as an implementation measure.

[Secretary's Note: In response to this comment, Item No. 8 under the "Rural nonpoint source measures" category in Table IX-5 was removed from the table and the following items were renumbered.]

Mr. Melching noted that because Chapter IX of PR No. 50 is about the planning process and does not present the final recommended plan which will be described in detail in Chapter X, Committee approval of Chapter IX would relate to the planning process, rather than to approval of a specific set of plan recommendations.

A motion to approve preliminary draft Chapter IX, "Development of Alternative Plans: Description and Evaluation," of PR No. 50, as amended, was made by Mr. Melching, seconded by Mr. Moroney and was carried unanimously by the Committee.

## COMMENTS ON CHAPTER IX, OF SEWRPC PLANNING REPORT NO. 50 AS PROVIDED BY MR. CHARLES S. MELCHING, FOLLOWING THE COMMITTEE MEETING

Mr. Melching noted typographical errors or minor omissions on pages 6, 8, 12, 17, 19, 21, 22, 23, 26, and 27. In addition, he noted typographical errors or minor omissions in Tables IX-1, IX-2, and IX-3.

[Secretary's Note: Those errors or omissions were corrected.]

Mr. Melching suggested that a map of the priority watersheds in the study area might be useful.

[Secretary's Note: In response to this suggestion, the following sentence was added after the first sentence of the first paragraph on page 3:

"These priority watersheds included all of the greater Milwaukee watersheds, except for the Oak Creek watershed and the Lake Michigan direct drainage area."]

Mr. Melching commented that the discussion of Alternative A on pages 12 and 13 does not clearly indicate that this alternative assumes only partial implementation of NR 151 agricultural requirements.

[Secretary's Note: In response to this comment, the following sentence was added at the end of the first partial paragraph on page 13:

"This partial level of implementation of the NR 151 agricultural requirements is considered to be consistent with the anticipated level of funding, assuming no change in the structure of the current grant program."]

## ADDITIONAL REVISIONS TO CHAPTER V, "WATER RESOURCES SIMULATION MODELS AND ANALYTIC METHODS," OF SEWRPC PLANNING REPORT NO. 50 BASED ON REVIEW BY THE MODELING SUBCOMMITTEE

Subsequent to review of this chapter by the Technical Advisory Committee at its meeting on August 29, 2006, the Modeling Subcommittee provided additional comments at its meeting on October 11, 2006.

Referring to the list of modeled water quality indicators on page 5, it was asked if the model actually simulated phytoplankton or if chlorophyll *a* was modeled as a surrogate. Mr. Printz replied that phytoplankton was represented in the models as chlorophyll-*a*. Mr. Andrew J. Thuman of HydroQual, Inc. verified that this was done for the estuary/lake model.

[Secretary's Note: The 12th bullet point on page 5 has been changed to read, "Phytoplankton as represented by measured chlorophyll-*a* data."]

Referring to the section describing the MMSD conveyance system models, it was asked if there was documentation regarding how a quality component was assigned to the CSO and SSO volumes. Mr. Printz replied that it was not described in this section of the chapter, but was referred to previously in the discussion of point source inputs for the LSPC model.

[Secretary's Note: The following text was added to the end of the first full paragraph on page 16, "As described previously in the "Point Source Data" subsection of this chapter, pollutant concentrations were assigned based on overflow sampling data collected by the MMSD, along with literature values and correlation estimates based on monitoring data from other areas of the country. The sanitary sewer overflow concentrations also took into account limited sampling data obtained by local municipalities."]

Referring to Figure V-8, it was asked if the sediment flux subroutine of the estuary/lake model had been used. It was also noted that the box referring to the SED module was not highlighted in the figure. Mr. Thuman replied that the sediment flux subroutine is actually included in the water quality (RCA) module, adding that the SED module is for sediment transport and was not used for this study. He said that the figure should be revised to indicate the sediment flux subroutine as part of the RCA module.

[Secretary's Note: Figure V-8 was revised by making the following changes to the identified outputs from the RCA module: 1) deleted Alkalinity/pH and TIC/CaCO3 since those were not modeled under this study, and 2) added SOD-Nutrient Fluxes.]

It was noted that MMSD sampling station RI-14 was shown in the wrong location on Map V-7. This error was corrected.

## DETERMINATION OF NEXT MEETING DATE AND LOCATION

The next meeting of the Advisory Committee was scheduled for Wednesday, January 31, 2007, beginning at 1:30 p.m. at the Mequon City Hall in the upstairs Council Chambers.

## ADJOURNMENT

The December 14, 2006, meeting of the Advisory Committee on the regional water quality management plan update was adjourned at 3:49 p.m. on a motion by Mr. Moroney, seconded by Mr. Holschbach and carried unanimously by the Committee.

* * *

# Exhibit A

## Table IX-1

## PRINCIPAL FEATURES AND COSTS OF THE SCREENING ALTERNATIVES USED TO AID IN THE DEVELOPMENT OF THE WATER QUALITY MANAGEMENT PLAN ALTERNATIVES

| Screening Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| 1A | Elimination of SSOs and CSOs Using Sewer Separation | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components[c] | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes all components of the future baseline condition alternative[c] | Sewer Separation | 2,740,000 | 0 | 2,740,000 | 173,716 |
| | | Separate combined sewers in 89 percent of combined sewer service area | 200 million gallons per day (MGD) additional treatment capacity at South Shore WWTP | 193,000 | 3,700 | 300,090 | 19,026 |
| | | Additional conveyance, storage, and treatment (CST) measures for elimination of SSOs | 100 MGD additional treatment capacity at Jones Island WWTP | 124,000 | 2,300 | 184,849 | 11,719 |
| | | | 100 MGD additional pumping capacity from ISS to Jones Island | 115,000 | 921 | 144,791 | 9,180 |
| | | | 234 million gallons (MG) additional storage in ISS | 580,000 | 0 | 569,502 | 36,106 |
| | | | MIS relief sewers at 42 locations | 350,000 | 0 | 350,000 | 22,190 |
| | | | Total Cost | $5,136,624 | $ 74,966 | $6,407,940 | $406,289 |
| 1B | Eliminate SSOs and CSOs Using Enhanced Treatment and Storage | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components[c] | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes all components of the future baseline condition alternative[c] | 200 MGD additional treatment capacity at South Shore WWTP | 193,000 | 3,700 | 300,090 | 19,026 |
| | | Additional conveyance, storage, and treatment (CST) measures for elimination of SSOs and CSOs | 100 MGD additional treatment capacity at Jones Island WWTP | 124,000 | 2,300 | 184,849 | 11,719 |
| | | | 100 MGD additional pumping capacity from ISS to Jones Island | 115,000 | 921 | 144,791 | 9,180 |
| | | | 1,622 MG additional storage in ISS | 3,990,000 | 0 | 3,917,781 | 248,387 |
| | | | MIS relief sewers at 42 locations | 350,000 | 0 | 350,000 | 22,190 |
| | | | Total Cost | $5,806,624 | $ 74,966 | $7,016,219 | $444,854 |
| 1C | Eliminate SSOs Using Enhanced Treatment and Storage | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components[c] | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes all components of the future baseline condition alternative[c] | 200 MGD additional treatment capacity at South Shore WWTP | 193,000 | 3,700 | 300,090 | 19,026 |
| | | Additional conveyance, storage, and treatment (CST) measures for elimination of SSOs only | 100 MGD additional treatment capacity at Jones Island WWTP | 124,000 | 2,300 | 184,849 | 11,719 |
| | | Provides some incidental CSO volume reduction benefits | 100 MGD additional pumping capacity from ISS to Jones Island | 115,000 | 921 | 144,791 | 9,180 |
| | | | 153 MG additional storage in ISS | 400,000 | 0 | 392,760 | 24,901 |
| | | | MIS relief sewers at 42 locations | 350,000 | 0 | 350,000 | 22,190 |
| | | | Total Cost | $2,216,624 | $ 74,966 | $3,491,198 | $221,368 |

**Table IX-1 (continued)**

| Screening Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| 1D | Eliminate SSOs through Infiltration and Inflow (I/I) Reduction | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components[c] | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes all components of the future baseline condition alternative[c] | I/I reduction in 90 percent of separate sewer system area | 6,670,000 | 0 | 6,670,000 | 422,878 |
| | | Reduce I/I within sanitary sewer system area (MMSD service area) so as to limit the 5-year recurrence interval wastewater inflow rate of 2,000 gallons per acre per day | | | | | |
| | | Provides some incidental CSO volume reduction benefits | | | | | |
| | | | Total Cost | $7,704,624 | $ 68,045 | $8,788,708 | $577,230 |
| 2 | High Level of Implementation of BMPs to Control Nonpoint Source Pollution | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components[c] | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes selected components of the future baseline condition alternative[c] | Rural nonpoint source measures: | | | | |
| | | Assumes full compliance with Chapter NR 151 rules for control of both urban and rural nonpoint source pollution | 1. Manure management for all livestock operations | 245,995 | 16,060 | 499,137 | 31,645 |
| | | Expanded level of nonpoint source pollution control beyond that required for Chapter NR 151, including expanded control of runoff volumes in urban areas | 2. Fencing along 50 percent of pastures adjacent to waterways | 330 | 16 | 590 | 37 |
| | | | 3. Expand buffers to 50 feet for all cropland and pasture adjacent to streams | 1,654 | 368 | 7,425 | 471 |
| | | | 4. Expand level of septic system inspections | 109,800 | 641 | 119,898 | 7,601 |
| | | | 5. Fertilizer management education program | 40 | 8 | 166 | 10 |
| | | | Additional urban nonpoint source measures in separate sewer areas: | | | | |
| | | | 1. Extend infiltration to include all existing institutional and commercial development and redeveloped well-drained institutional and commercial land. Provide enhanced infiltration for all new institutional, commercial, and residential development and for redeveloped, poorly-drained institutional and commercial development | 107,037 | 5,215 | 230,104 | 14,589 |
| | | | 2. Double implementation of end-of-pipe water quality treatment devices over levels assumed for NR 151 implementation | 259,679 | 7,095 | 371,513 | 23,554 |
| | | | 3. Downspout disconnection with rain barrels at 15 percent of homes in study area | 38,207 | 723 | 49,601 | 3,145 |
| | | | 4. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 3) | 97,967 | 3,711 | 156,458 | 9,919 |

## Table IX-1 (continued)

| Screening Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| 2 (continued) | Implement High Level of Stormwater BMPs (continued) | | 5. Stormwater trees | --[d] | --[d] | --[d] | --[d] |
| | | | 6. Chloride reduction program modeled after programs in Cities of Brookfield and Madison (apply to 50 percent of roads, 25 percent of existing water softeners, 100 percent of new water softeners) | $ 394 | $ 1,183 | $ 19,186 | $ 1,216 |
| | | | 7. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |
| | | | 8. Waterfowl control programs for all Lake Michigan beaches | 0 | 125 | 1,966 | 125 |
| | | | 9. Litter control programs | 0 | 6,204 | 97,787 | 6,204 |
| | | | Urban nonpoint source measures in combined sewer service area: | | | | |
| | | | 1. Extend infiltration to all existing and redeveloped institutional and commercial land. Provide enhanced infiltration for all new industrial, commercial, and institutional development. | 4,671 | 255 | 10,475 | 664 |
| | | | 2. Downspout disconnection with rain barrels at 15 percent of homes in study area. | 10,618 | 201 | 13,784 | 874 |
| | | | 3. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 2) | 27,225 | 1,031 | 43,479 | 2,757 |
| | | | 4. Stormwater trees | --[d] | --[d] | --[d] | --[d] |
| | | | 5. Rooftop storage equaling 14 MG to 50 percent of buildings from MMSD downspout disconnection study. | 24,800 | 0 | 34,270 | 2,173 |
| | | | 6. Storm sewer inlet restrictors to provide 15 MG of street storage | 32,500 | 650 | 42,745 | 2,710 |
| | | | 7. Sewer separation for seven parking lots identified in MMSD stormwater disconnection study | 7,330 | 0 | 7,330 | 465 |
| | | | 8. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |
| | | | 9. Waterfowl control programs for all Lake Michigan beaches | --[f] | --[f] | --[f] | --[f] |
| | | | 10. Litter control programs | --[f] | --[f] | --[f] | --[f] |
| | | | 11. Skimmer boat operation within inner and outer harbor | 1,000 | 150 | 3,364 | 213 |
| | | | Total Cost | $2,003,871 | $111,681 | $3,827,986 | $242,724 |

**Table IX-1 (continued)**

[a]*Costs are based on an annual interest rate of 6 percent and a 50-year amortization period.*

[b]*Original 2020 land use and population projections based on information provided by communities served by the MMSD and on the SEWRPC land use plan in areas outside the MMSD planning area. See Chapter VIII of this report for additional information.*

[c]*Components of the future baseline condition alternative are presented under Alternative A in Table IX-3.*

[d]*Included in costs for downspout disconnection.*

[e]*No cost assigned. Assumed to be covered under cost of compliance with Chapter NR 151 rules.*

[f]*Included above in cost for separate sewer area.*

*Source: Milwaukee Metropolitan Sewerage District, HNTB, and SEWRPC.*

# Exhibit B

## Table IX-3

## PRINCIPAL FEATURES AND COSTS OF THE ALTERNATIVE WATER QUALITY MANAGEMENT PLANS

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| A | Future Baseline Condition | Assumes future year 2020 planned land use conditions[b] | MMSD committed facilities[d] | $ 842,000 | $ 0 | $ 842,000 | $ 53,383 |
| | | MMSD committed facilities as reflected in MMSD 2006 Capital Budget | Maintain current levels of I/I for MMSD and community sewer systems | 0 | 36,493 | 575,198 | 36,493 |
| | | Implementation of *Wisconsin Administrative Code* Chapter NR 151 rules governing urban nonpoint source runoff and partial implementation of rules governing rural nonpoint source runoff | Rural nonpoint source measures: | | | | |
| | | | 1. Conservation tillage | 0 | 0 | 0 | 0 |
| | | Implementation of MMSD Chapter 13 rules governing stormwater runoff volume from new development | Urban nonpoint source measures: | | | | |
| | | | 1. Infiltration systems | 8,970 | 439 | 19,318 | 1,225 |
| | | Assumes increase in WWTP discharge based on future development while maintaining current effluent characteristics | 2. Stormwater treatment systems | 86,560 | 26,813 | 509,175 | 32,282 |
| | | | 3. Wet detention basins | 75,767 | 3,788 | 135,479 | 8,589 |
| | | Assumes current level of industrial source discharges[c] | 4. Vacuum sweeping of roadways | 21,327 | 512 | 37,538 | 2,380 |
| | | Assumes current level of pollutant loadings from POTWs | | | | | |
| | | | Total Cost | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| B1 | Regulatory-Based | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes components of the future baseline condition alternative | 185 MGD additional treatment capacity at South Shore WWTP | 182,200 | 3,437 | 282,062 | 17,883 |
| | | Maintain current MMSD operating procedures to limit occurrence of CSOs and SSOs | 100 MGD additional pumping capacity from ISS to Jones Island | 115,000 | 921 | 144,791 | 9,180 |
| | | Additional conveyance, storage, and treatment (CST) measures to provide a five-year level of protection (LOP) for SSOs | 40 MG additional storage in ISS | 100,000 | 0 | 98,190 | 6,225 |
| | | | Upgrade MIS conveyance capacity at identified hydraulic restrictions | 115,000 | 0 | 115,000 | 7,291 |
| | | Additional stormwater volume controls for the combined sewer service area | Rural nonpoint source measures: | | | | |
| | | Full implementation of Chapter NR 151 urban and rural nonpoint source rules | 1. Manure management for all livestock operations | 245,995 | 16,060 | 499,137 | 31,645 |
| | | | 2. Fencing along 50 percent of pastures adjacent to waterways | 330 | 16 | 590 | 37 |
| | | | 3. Expand buffers to 50 feet for all cropland and pasture adjacent to streams | 1,654 | 368 | 7,425 | 471 |
| | | | 4. Expand level of septic system inspections | 109,800 | 641 | 119,898 | 7,601 |
| | | | 5. Fertilizer management education program | 40 | 8 | 166 | 10 |

**Table IX-3 (continued)**

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| B1 (continued) | Regulatory-Based (continued) | | Urban nonpoint source measures in combined sewer service area: | | | | |
| | | | 1. Downspout disconnection with rain barrels at 15 percent of homes in study area | $ 9,900 | $ 165 | $ 12,501 | $ 793 |
| | | | 2. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 1) | 27,225 | 1,031 | 43,479 | 2,757 |
| | | | 3. Rooftop storage equaling 14 MG to 50 percent of buildings from MMSD downspout disconnection study | 24,800 | 0 | 34,270 | 2,173 |
| | | | 4. Storm sewer inlet restrictors to provide 15 MG of street storage | 32,500 | 650 | 42,745 | 2,710 |
| | | | Total Cost | $1,999,068 | $ 91,342 | $3,518,962 | $223,128 |
| B2 | Regulatory-Based, with Revised ISS Operating Procedure | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes components of the future baseline condition alternative | 185 MGD additional treatment capacity at South Shore WWTP | 182,200 | 3,437 | 282,062 | 17,883 |
| | | Revise MMSD operating procedures to provide zero reserve storage in ISS for SSO control, thereby maximizing use of available storage | 100 MGD additional pumping capacity from ISS to Jones Island | 115,000 | 921 | 144,791 | 9,180 |
| | | Additional conveyance, storage, and treatment (CST) measures to provide a five-year level of protection (LOP) for SSOs | 40 MG additional storage in ISS | 100,000 | 0 | 98,190 | 6,225 |
| | | | Upgrade MIS conveyance capacity at identified hydraulic restrictions | 115,000 | 0 | 115,000 | 7,291 |
| | | Additional stormwater volume controls for the combined sewer service area | Rural nonpoint source measures: | | | | |
| | | Full implementation of Chapter NR 151 urban and rural nonpoint source rules | 1. Manure management for all livestock operations | 245,995 | 16,060 | 499,137 | 31,645 |
| | | | 2. Fencing along 50 percent of pastures adjacent to waterways | 330 | 16 | 590 | 37 |
| | | | 3. Expand buffers to 50 feet for all cropland and pasture adjacent to streams | 1,654 | 368 | 7,425 | 471 |
| | | | 4. Expand level of septic system inspections | 109,800 | 641 | 119,898 | 7,601 |
| | | | 5. Fertilizer management education program | 40 | 8 | 166 | 10 |

## Table IX-3 (continued)

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| B2 (continued) | Regulatory-Based, with Revised ISS Operating Procedure (continued) | | Urban nonpoint source measures in combined sewer service area: | | | | |
| | | | 1. Downspout disconnection with rain barrels at 15 percent of homes in study area | $ 9,900 | $ 165 | $ 12,501 | $ 793 |
| | | | 2. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 1) | 27,225 | 1,031 | 43,479 | 2,757 |
| | | | 3. Rooftop storage equaling 14 MG to 50 percent of buildings from MMSD downspout disconnection study | 24,800 | 0 | 34,270 | 2,173 |
| | | | 4. Storm sewer inlet restrictors to provide 15 MG of street storage | 32,500 | 650 | 42,745 | 2,710 |
| | | | Total Cost | $1,999,068 | $91,342 | $3,518,962 | $223,128 |
| C1 | Water Quality-Based | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components | $1,034,624 | $68,045 | $2,118,708 | $134,352 |
| | | Includes components of the future baseline condition alternative | Rural nonpoint source measures: | | | | |
| | | Maintain current MMSD operating procedures to limit occurrence of CSOs and SSOs | 1. Manure management for all livestock operations | 245,995 | 16,060 | 499,137 | 31,645 |
| | | Expanded level of nonpoint source pollutant control beyond that required for Chapter NR 151, including expanded control of runoff volumes in urban areas | 2. Fencing along 50 percent of pastures adjacent to waterways | 330 | 16 | 590 | 37 |
| | | | 3. Expand buffers to 50 feet for all cropland and pasture adjacent to streams | 1,654 | 368 | 7,425 | 471 |
| | | | 4. Expand level of septic system inspections | 109,800 | 641 | 119,898 | 7,601 |
| | | | 5. Fertilizer management education program | 40 | 8 | 166 | 10 |
| | | | Urban nonpoint source measures in separate sewer areas: | | | | |
| | | | 1. Extend infiltration to include all existing institutional and commercial development. Provide enhanced infiltration for all redeveloped institutional and commercial development and all new residential development | 57,725 | 2,826 | 124,320 | 7,882 |
| | | | 2. Double implementation of end-of-pipe water quality treatment devices over levels assumed for NR 151 implementation (100 percent of parking lots) | 259,679 | 7,095 | 371,513 | 23,554 |
| | | | 3. Targeted stormwater disinfection (high rate chlorination (bleach) and dechlorination units at storm sewer outfalls) | 616,941 | 7,652 | 926,011 | 58,709 |

**Table IX-3 (continued)**

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| C1 (continued) | Water Quality-Based (continued) | | 4. Downspout disconnection with rain barrels at 15 percent of homes in study area | $ 35,625 | $ 594 | $ 44,983 | $ 2,852 |
| | | | 5. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 4) | 97,967 | 3,711 | 156,458 | 9,919 |
| | | | 6. Chloride reduction program modeled after Madison and Brookfield programs. (apply to 25 percent of roads, 25 percent of existing water softeners, 100 percent of new water softeners) | 394 | 1,183 | 19,186 | 1,216 |
| | | | 7. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |
| | | | 8. Waterfowl control programs for all Lake Michigan beaches | 0 | 125 | 1,966 | 125 |
| | | | 9. Litter control programs | 0 | 6,204 | 97,787 | 6,204 |
| | | | Urban nonpoint source measures in combined sewer service area: | | | | |
| | | | 1. Provide enhanced infiltration for new well-drained industrial, commercial, and institutional development | 400 | 20 | 861 | 55 |
| | | | 2. Downspout disconnection with rain barrels at 15 percent of homes in study area | 9,900 | 165 | 12,501 | 793 |
| | | | 3. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 2) | 27,225 | 1,031 | 43,479 | 2,757 |
| | | | 4. Sewer separation for seven parking lots identified in MMSD stormwater disconnection study | 7,330 | 0 | 7,330 | 465 |
| | | | 5. Stormwater trees | --[f] | --[f] | --[f] | --[f] |
| | | | 6. Rooftop storage equaling 14 MG to 50 percent of buildings from MMSD downspout disconnection study | 24,800 | 0 | 34,270 | 2,173 |
| | | | 7. Storm sewer inlet restrictors to provide 15 MG of street storage | 32,500 | 650 | 42,745 | 2,710 |
| | | | 8. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |
| | | | 9. Waterfowl control programs for all Lake Michigan beaches | --[g] | --[g] | --[g] | --[g] |
| | | | 10. Litter control programs | --[g] | --[g] | --[g] | --[g] |
| | | | 11. Skimmer boat operation within inner and outer harbor | 1,000 | 150 | 3,364 | 213 |
| | | | Total Cost | $2,563,929 | $116,544 | $4,632,698 | $293,743 |

## Table IX-3 (continued)

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| C2 | Water Quality-Based, with Green Measures | Assumes future year 2020 planned land use conditions[b] | Future baseline condition components | $1,034,624 | $ 68,045 | $2,118,708 | $134,352 |
| | | Includes components of the future baseline condition alternative | Rural nonpoint source measures: | | | | |
| | | Maintain current MMSD operating procedures to limit occurrence of CSOs and SSOs | 1. Manure management for all livestock operations | 245,995 | 16,060 | 499,137 | 31,645 |
| | | Expanded level of nonpoint source pollutant control beyond that required for Chapter NR 151, including expanded control of runoff volumes in urban areas | 2. Fencing along 50 percent of pastures adjacent to waterways | 330 | 16 | 590 | 37 |
| | | Incorporate "green" best management practices | 3. Expand buffers to 50 feet for all cropland and pasture adjacent to streams | 1,654 | 368 | 7,425 | 471 |
| | | | 4. Expand level of septic system inspections | 109,800 | 641 | 119,898 | 7,601 |
| | | | 5. Fertilizer management education program | 40 | 8 | 166 | 10 |
| | | | 6. Convert 5 percent of existing cropland and pasture to wetland (target less productive lands) | 104,454 | 10,443 | 267,159 | 16,938 |
| | | | 7. Convert 5 percent of existing cropland and pasture to prairie vegetation (target less productive lands) | 23,331 | 6,957 | 132,568 | 8,405 |
| | | | Urban nonpoint source measures in separate sewer areas: | | | | |
| | | | 1. Extend infiltration to include all existing institutional and commercial development. Provide enhanced infiltration for all redeveloped institutional and commercial development and all new residential development | 57,725 | 2,826 | 124,320 | 7,882 |
| | | | 2. Double implementation of end-of-pipe water quality treatment devices over levels assumed for NR 151 implementation (100 percent of parking lots) | 259,679 | 7,095 | 371,513 | 23,554 |
| | | | 3. Targeted stormwater disinfection (ultraviolet light treatment units at storm sewer outfalls) | 152,100 | 6,868 | 306,814 | 19,452 |
| | | | 4. Downspout disconnection with rain barrels at 15 percent of homes in study area | 35,625 | 594 | 44,983 | 2,852 |
| | | | 5. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 4) | 97,967 | 3,711 | 156,458 | 9,919 |
| | | | 6. Chloride reduction program modeled after Madison and Brookfield programs. (apply to 25 percent of roads, 25 percent of existing water softeners, 100 percent of new water softeners) | 394 | 1,183 | 19,186 | 1,216 |
| | | | 7. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |

**Table IX-3 (continued)**

| Alternative | | | | Capital Cost (thousands) | Annual Operation and Maintenance Cost (thousands) | Present Worth Cost[a] (thousands) | Equivalent Annual Cost[a] (thousands) |
|---|---|---|---|---|---|---|---|
| Designation | Name | Description | Component | | | | |
| C2 (continued) | Water Quality-Based, with Green Measures (continued) | | 8. Waterfowl control programs for all Lake Michigan beaches | $ 0 | $ 125 | $ 1,966 | $ 125 |
| | | | 9. Litter control programs | 0 | 6,204 | 97,787 | 6,204 |
| | | | 10. LEED development for 50 percent of new commercial and industrial development in areas with suitable soils | --[h] | --[h] | --[h] | --[h] |
| | | | Urban nonpoint source measures in combined sewer service area: | | | | |
| | | | 1. Provide enhanced infiltration for new well-drained industrial, commercial, and institutional development | 400 | 20 | 861 | 55 |
| | | | 2. Downspout disconnection with rain barrels at 15 percent of homes in study area | 9,900 | 165 | 12,501 | 793 |
| | | | 3. Downspout disconnection with rain gardens at 15 percent of homes in study area. (different homes than Item 2) | 27,225 | 1,031 | 43,479 | 2,757 |
| | | | 4. Sewer separation for seven parking lots identified in MMSD stormwater disconnection study | 7,330 | 0 | 7,330 | 465 |
| | | | 5. Stormwater trees | --[f] | --[f] | --[f] | --[f] |
| | | | 6. Rooftop storage equaling 14 MG to 50 percent of buildings from MMSD downspout disconnection study | 24,800 | 0 | 34,270 | 2,173 |
| | | | 7. Storm sewer inlet restrictors to provide 15 MG of street storage | 32,500 | 650 | 42,745 | 2,710 |
| | | | 8. Pet litter management programs | --[e] | --[e] | --[e] | --[e] |
| | | | 9. Waterfowl control programs for all Lake Michigan beaches | --[g] | --[g] | --[g] | --[g] |
| | | | 10. Litter control programs | --[g] | --[g] | --[g] | --[g] |
| | | | 11. Skimmer boat operation within inner and outer harbor | 1,000 | 150 | 3,364 | 213 |
| | | | Total Cost | $2,226,873 | $133,160 | $4,413,228 | $279,829 |

## Table IX-3 Footnotes

[a]*Costs are based on an annual interest rate of 6 percent and a 50-year amortization period.*

[b]*Original 2020 land use and population projections based on information provided by communities served by the MMSD and on the SEWRPC land use plan in areas outside the MMSD planning area. See Chapter VIII of this report for additional information.*

[c]*Does not include discharge from LaSaffre Yeast plant in City of Milwaukee. That plant closed in 2005.*

[d]*Includes facilities as reported in MMSD 2006 Capital Budget. The facilities and costs are for a six-year period, beginning in 2006, as reflected in the six-year capital improvements program. Capital costs account for inflation over six-year period. No operation and maintenance costs were provided in the budget report.*

[e]*No costs assigned. Assumed to be covered under cost of compliance with Chapter NR 151 rules.*

[f]*Included in costs for downspout disconnection.*

[g]*Included above in cost for separate sewer area.*

[h]*No cost assigned. Assumed higher initial capital costs compensated for in long-term energy savings.*

*Source: Milwaukee Metropolitan Sewerage District, HNTB, and SEWRPC.*

# Exhibit C

**Table IX-3A**

**WATER QUALITY INDICATORS USED TO COMPARE ALTERNATIVE PLANS**

| Parameter | Indicator |
|---|---|
| Fecal Coliform Bacteria Over Entire Year | Arithmetic mean concentration of fecal coliform bacteria |
| | Proportion of time fecal coliform bacteria concentration is equal to or below single sample standard |
| | Geometric mean concentration of fecal coliform bacteria |
| | Days per year geometric mean of fecal coliform bacteria is equal to or below geometric mean standard |
| Fecal Coliform Bacteria from May to September | Arithmetic mean concentration of fecal coliform bacteria |
| | Proportion of time fecal coliform bacteria concentration is equal to or below single sample standard |
| | Geometric mean concentration of fecal coliform bacteria |
| | Days per year geometric mean of fecal coliform bacteria is equal to or below geometric mean standard |
| Dissolved Oxygen | Mean concentration of dissolved oxygen |
| | Median concentration of dissolved oxygen |
| | Proportion of time dissolved oxygen concentration is equal to or above applicable standard |
| Total Phosphorus | Mean concentration of total phosphorus |
| | Median concentration of total phosphorus |
| | Proportion of time total phosphorus concentration is equal to or below the recommended planning standard |
| Total Nitrogen | Mean concentration of total nitrogen |
| | Median concentration of total nitrogen |
| Total Suspended Solids | Mean concentration of total suspended solids |
| | Median concentration of total suspended solids |
| Copper | Mean concentration of copper |
| | Median concentration of copper |

*Source: SEWRPC.*

#124020 V1 - PR-50 TABLE IX-3A
01/09/07

**Exhibit D**

**Table K-1**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: KINNICKINNIC RIVER WATERSHED**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 68 | 68 | 68 | 70 | 70 |
| | | Median | 75 | 75 | 75 | 76 | 76 |
| | | Minimum | 52 | 52 | 52 | 56 | 56 |
| | | Maximum | 80 | 80 | 80 | 80 | 80 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 191 | 192 | 191 | 206 | 206 |
| | | Median | 250 | 256 | 254 | 262 | 262 |
| | | Minimum | 49 | 49 | 49 | 69 | 69 |
| | | Maximum | 317 | 317 | 317 | 322 | 322 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 80 | 80 | 80 | 84 | 84 |
| | | Median | 86 | 86 | 86 | 88 | 88 |
| | | Minimum | 68 | 68 | 68 | 76 | 76 |
| | | Maximum | 89 | 89 | 89 | 90 | 90 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 104 | 105 | 105 | 113 | 113 |
| | | Median | 140 | 145 | 144 | 146 | 146 |
| | | Minimum | 34 | 34 | 34 | 48 | 48 |
| | | Maximum | 153 | 153 | 153 | 153 | 153 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 100 | 100 | 100 | 100 | 100 |
| | | Median | 100 | 100 | 100 | 100 | 100 |
| | | Minimum | 100 | 100 | 100 | 100 | 100 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 60 | 60 | 60 | 60 | 60 |
| | | Median | 77 | 79 | 79 | 79 | 79 |
| | | Minimum | 24 | 24 | 24 | 25 | 25 |
| | | Maximum | 86 | 86 | 86 | 87 | 87 |

[a]*Based on estimates of compliance at five individual assessment points as presented in Appendix J.*

*Source: Tetra Tech, Inc., and SEWRPC.*

#124029 v1 - PR-50 TABLE K-1
01/09/07

**Table K-2**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: MENOMONEE RIVER WATERSHED**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 65 | 66 | 66 | 66 | 66 |
| | | Median | 68 | 69 | 69 | 69 | 69 |
| | | Minimum | 49 | 49 | 49 | 50 | 50 |
| | | Maximum | 78 | 78 | 78 | 79 | 79 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 188 | 191 | 191 | 197 | 199 |
| | | Median | 212 | 220 | 220 | 218 | 226 |
| | | Minimum | 38 | 39 | 39 | 49 | 48 |
| | | Maximum | 305 | 305 | 305 | 308 | 308 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 80 | 80 | 81 | 81 | 81 |
| | | Median | 81 | 81 | 81 | 81 | 82 |
| | | Minimum | 68 | 68 | 68 | 69 | 69 |
| | | Maximum | 91 | 91 | 91 | 91 | 91 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 102 | 108 | 108 | 112 | 114 |
| | | Median | 85 | 129 | 129 | 130 | 136 |
| | | Minimum | 60 | 27 | 27 | 35 | 34 |
| | | Maximum | 153 | 153 | 153 | 153 | 153 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 99 | 99 | 99 | 99 | 99 |
| | | Median | 99 | 99 | 99 | 99 | 99 |
| | | Minimum | 98 | 98 | 98 | 96 | 96 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 70 | 70 | 70 | 76 | 74 |
| | | Median | 68 | 68 | 68 | 72 | 72 |
| | | Minimum | 50 | 51 | 51 | 52 | 52 |
| | | Maximum | 90 | 90 | 90 | 95 | 91 |

[a]*Based upon estimates of compliance at nine individual assessment points as presented in Appendix J.*

*Source: Tetra Tech, Inc., and SEWRPC.*

#124033 v1 - PR-50 TABLE K-2
01/09/07

**Table K-3**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: MILWAUKEE RIVER WATERSHED**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 39 | 39 | 39 | 40 | 42 |
| | | Median | 46 | 46 | 46 | 47 | 48 |
| | | Minimum | 1 | 1 | 1 | 1 | 2 |
| | | Maximum | 79 | 79 | 79 | 82 | 82 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 99 | 99 | 99 | 101 | 105 |
| | | Median | 95 | 95 | 95 | 99 | 108 |
| | | Minimum | 0 | 0 | 0 | 0 | 0 |
| | | Maximum | 255 | 256 | 256 | 266 | 269 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 62 | 62 | 62 | 63 | 65 |
| | | Median | 76 | 76 | 76 | 77 | 78 |
| | | Minimum | 3 | 3 | 3 | 3 | 4 |
| | | Maximum | 93 | 93 | 93 | 94 | 94 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 70 | 73 | 73 | 74 | 75 |
| | | Median | 84 | 84 | 84 | 87 | 78 |
| | | Minimum | 0 | 0 | 0 | 0 | 0 |
| | | Maximum | 149 | 149 | 149 | 150 | 151 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 99 | 99 | 99 | 99 | 99 |
| | | Median | 100 | 100 | 100 | 100 | 100 |
| | | Minimum | 95 | 96 | 96 | 96 | 94 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 49 | 51 | 51 | 50 | 49 |
| | | Median | 39 | 40 | 40 | 39 | 37 |
| | | Minimum | 22 | 24 | 24 | 24 | 21 |
| | | Maximum | 84 | 88 | 88 | 86 | 86 |

[a]*Based on estimates of compliance at 11 individual assessment points as presented in Appendix J.*

*Source: Tetra Tech, Inc., and SEWRPC.*

#124034 v1 - PR-50 TABLE K-3
01/09/07

**Table K-4**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: OAK CREEK WATERSHED**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 51 | 51 | 51 | 53 | 52 |
| | | Median | 54 | 54 | 54 | 55 | 54 |
| | | Minimum | 23 | 24 | 24 | 28 | 28 |
| | | Maximum | 64 | 64 | 64 | 65 | 65 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 37 | 37 | 37 | 46 | 46 |
| | | Median | 22 | 22 | 22 | 46 | 46 |
| | | Minimum | 2 | 2 | 2 | 3 | 3 |
| | | Maximum | 86 | 87 | 87 | 97 | 97 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 70 | 70 | 70 | 71 | 71 |
| | | Median | 72 | 72 | 72 | 73 | 73 |
| | | Minimum | 41 | 41 | 41 | 47 | 46 |
| | | Maximum | 82 | 82 | 82 | 83 | 82 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 28 | 28 | 28 | 32 | 32 |
| | | Median | 18 | 18 | 18 | 22 | 22 |
| | | Minimum | 0 | 0 | 0 | 0 | 0 |
| | | Maximum | 70 | 70 | 70 | 79 | 79 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 84 | 84 | 84 | 85 | 85 |
| | | Median | 80 | 80 | 80 | 80 | 80 |
| | | Minimum | 72 | 72 | 72 | 72 | 72 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 79 | 79 | 79 | 81 | 81 |
| | | Median | 79 | 79 | 79 | 80 | 80 |
| | | Minimum | 73 | 73 | 73 | 75 | 75 |
| | | Maximum | 88 | 88 | 88 | 88 | 88 |

[a]*Based on estimates of compliance at nine individual assessment points as presented in Appendix J.*

*Source: Tetra Tech, Inc. and SEWRPC.*

#124035 v1 - PR-50 TABLE K-4
01/09/07

**Table K-5**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: ROOT RIVER WATERSHED**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 58 | 59 | 59 | 60 | 60 |
| | | Median | 61 | 61 | 61 | 62 | 62 |
| | | Minimum | 45 | 46 | 46 | 47 | 47 |
| | | Maximum | 71 | 71 | 71 | 72 | 72 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 53 | 52 | 52 | 69 | 68 |
| | | Median | 36 | 37 | 37 | 46 | 46 |
| | | Minimum | 9 | 9 | 9 | 10 | 10 |
| | | Maximum | 149 | 151 | 151 | 194 | 191 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 70 | 70 | 70 | 71 | 71 |
| | | Median | 71 | 71 | 71 | 72 | 72 |
| | | Minimum | 57 | 57 | 57 | 60 | 60 |
| | | Maximum | 81 | 81 | 81 | 82 | 82 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 28 | 28 | 28 | 39 | 38 |
| | | Median | 18 | 18 | 18 | 25 | 25 |
| | | Minimum | 4 | 5 | 5 | 6 | 6 |
| | | Maximum | 83 | 84 | 84 | 109 | 107 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 97 | 97 | 97 | 97 | 97 |
| | | Median | 99 | 99 | 99 | 99 | 99 |
| | | Minimum | 88 | 88 | 88 | 88 | 88 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 82 | 82 | 82 | 83 | 83 |
| | | Median | 83 | 83 | 83 | 84 | 84 |
| | | Minimum | 68 | 67 | 67 | 71 | 70 |
| | | Maximum | 90 | 91 | 91 | 92 | 92 |

[a]*Based on estimates of compliance at 12 different assessment points as presented in Appendix J.*

*Source: Tetra Tech, Inc. and SEWRPC.*

#124036 v1 - PR-50 TABLE K-5
01/09/07

**Table K-6**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: NEARSHORE LAKE MICHIGAN AREA**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 96 | 96 | 96 | 97 | 97 |
| | | Median | 98 | 99 | 99 | 99 | 99 |
| | | Minimum | 65 | 67 | 67 | 70 | 70 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 349 | 352 | 351 | 352 | 352 |
| | | Median | 364 | 365 | 365 | 364 | 364 |
| | | Minimum | 233 | 239 | 239 | 242 | 242 |
| | | Maximum | 365 | 365 | 365 | 365 | 365 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 98 | 99 | 98 | 99 | 99 |
| | | Median | 99 | 99 | 99 | 99 | 99 |
| | | Minimum | 88 | 89 | 89 | 92 | 92 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 152 | 153 | 152 | 153 | 153 |
| | | Median | 153 | 153 | 153 | 153 | 153 |
| | | Minimum | 148 | 150 | 150 | 151 | 151 |
| | | Maximum | 153 | 153 | 153 | 153 | 153 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 100 | 100 | 100 | 100 | 100 |
| | | Median | 100 | 100 | 100 | 100 | 100 |
| | | Minimum | 99 | 99 | 99 | 99 | 99 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 97 | 97 | 97 | 97 | 97 |
| | | Median | 100 | 100 | 100 | 100 | 100 |
| | | Minimum | 79 | 79 | 79 | 79 | 81 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |

[a]*Based on estimates of compliance at 18 individual assessment points as presented in Appendix J.*

*Source: Brown and Caldwell, Inc.; HydroQual, Inc.; and SEWRPC.*

#124037 v1 - PR-50 TABLE K-6
01/09/07

**Table K-7**

**WATER QUALITY STANDARD COMPLIANCE SUMMARY STATISTICS FOR ALTERNATIVE WATER QUALITY MANAGEMENT PLANS: OVERALL**

| Water Quality Parameter | Water Quality Indicator | Statistic[a] | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | A | B1 | B2 | C1 | C2 |
| Fecal Coliform Bacteria (annual) | Percent compliance with applicable single sample standard | Mean | 66 | 67 | 67 | 67 | 68 |
| | | Median | 65 | 65 | 65 | 66 | 66 |
| | | Minimum | 1 | 1 | 1 | 1 | 2 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| | Days of compliance with applicable geometric mean standard (365 maximum) | Mean | 173 | 174 | 174 | 181 | 182 |
| | | Median | 145 | 145 | 145 | 154 | 157 |
| | | Minimum | 0 | 0 | 0 | 0 | 0 |
| | | Maximum | 365 | 365 | 365 | 365 | 365 |
| Fecal Coliform Bacteria (May-September) | Percent compliance with applicable single sample standard | Mean | 79 | 79 | 79 | 80 | 80 |
| | | Median | 79 | 79 | 79 | 81 | 81 |
| | | Minimum | 3 | 3 | 3 | 3 | 4 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| | Days of compliance with applicable geometric mean standard (153 maximum) | Mean | 87 | 89 | 89 | 93 | 93 |
| | | Median | 83 | 84 | 84 | 81 | 81 |
| | | Minimum | 0 | 0 | 0 | 0 | 0 |
| | | Maximum | 153 | 153 | 153 | 153 | 153 |
| Dissolved Oxygen | Percent compliance with applicable dissolved oxygen standard | Mean | 97 | 97 | 97 | 97 | 97 |
| | | Median | 100 | 100 | 100 | 100 | 100 |
| | | Minimum | 72 | 72 | 72 | 72 | 72 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |
| Total Phosphorus | Percent compliance with recommended phosphorus standard | Mean | 77 | 77 | 77 | 78 | 78 |
| | | Median | 82 | 82 | 82 | 84 | 83 |
| | | Minimum | 22 | 24 | 24 | 24 | 21 |
| | | Maximum | 100 | 100 | 100 | 100 | 100 |

[a]*Based upon estimates of compliance at 64 individual assessment points as presented in Appendix J.*

*Source: Brown and Caldwell; HydroQual, Inc.; Tetra Tech, Inc.; and SEWRPC.*

#124038 v1 - PR-50 TABLE K-7
01/09/07

# Exhibit E

**Table IX-6**

**SELECTED CHARACTERISTICS OF PUBLIC WASTEWATER TREATMENT PLANTS IN THE REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE STUDY AREA OUTSIDE THE MMSD PLANNING AREA[a]**

| Facility | 2000 Estimated Area Served (square miles) | 2000 Estimated Population Served | Date of Latest Major Modification | Receiving Water | 2003 Design Average Hydraulic Loading (mgd) | 2003 Hydraulic Loading (mgd) | | Planned 2020 | | Ratio of Estimated 2020 Average Annual Hydraulic Load to 2003 Design |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Average Annual | Maximum Monthly | Estimated Population Served[b] | Estimated Average Annual Hydraulic Loading (mgd) | |
| City of Cedarburg | 3.3 | 11,400 | 1988 | Cedar Creek | 2.75 | 1.65 | 1.97 | 14,700 | 2.13 | 0.77 |
| City of West Bend | 8.5 | 30,400 | 1980 | Milwaukee River | 9.00 | 3.42 | 3.66 | 39,100 | 4.51 | 0.50 |
| Village of Campbellsport | 1.1 | 1,900 | 1989 | Milwaukee River | 0.47 | 0.22 | 0.29 | 2,100[c] | 0.25 | 0.52 |
| Village of Cascade | 0.8 | 700 | 1976 | North Branch Milwaukee River | 0.17 | 0.06 | 0.07 | 700[c] | 0.06 | 0.38 |
| Village of Fredonia | 0.6 | 2,000 | 1983 | Milwaukee River | 0.60 | 0.19 | 0.27 | 2,500 | 0.25 | 0.42 |
| Village of Grafton | 2.6 | 11,000 | 1983 | Milwaukee River | 2.15 | 1.27 | 1.35 | 14,400 | 1.69 | 0.79 |
| Village of Jackson | 1.6 | 5,000 | 1997 | Cedar Creek | 1.25 | 0.81 | 1.27 | 8,000 | 1.29 | 1.04 |
| Village of Kewaskum | 1.0 | 3,300 | 1972 | Milwaukee River | 0.75 | 0.51 | 0.79 | 4,600 | 0.71 | 0.95 |
| Village of Newburg | 0.4 | 1,200 | 1997 | Milwaukee River | 0.18 | 0.11 | 0.12 | 1,700 | 0.18 | 1.00 |
| Village of Random Lake | 1.7 | 1,600 | 1979 | Silver Creek | 0.45 | 0.21 | 0.24 | 1,800[c] | 0.24 | 0.52 |
| Village of Saukville | 1.4 | 4,100 | 2002 | Milwaukee River | 1.60 | 0.82 | 1.02 | 5,200 | 1.04 | 0.65 |
| Village of Union Grove | 0.8 | 5,300 | 2003 | West Branch Root River Canal | 2.00 | 0.72 | 1.07 | 5,900 | 0.83 | 0.41 |
| Town of Scott | 0.4 | 200 | 1985 | Groundwater | 0.03 | 0.02 | 0.02 | 200 | 0.02 | 0.67 |
| Town of Yorkville | 0.4 | 200 | 1983 | Tributary to Hoods Creek | 0.15 | 0.07 | 0.11 | 400 | 0.11 | 0.72 |

[a] *The City of South Milwaukee wastewater treatment plant is assessed in more detail in Chapter X of this report.*

[b] *Based upon interpolation between the year 2000 population and the 2035 recommended plan level as set forth in the regional land use plan for Southeastern Wisconsin, unless noted differently.*

[c] *Based upon Wisconsin Department of Administration estimate for each civil division.*

*Source: Wisconsin Department of Natural Resources and SEWRPC.*