

## **6. PLANNING VARIABLES, REGULATORY ANALYSES & PUBLIC INVOLVEMENT**

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# **PLANNING VARIABLES, REGULATORY ANALYSES & PUBLIC INVOLVEMENT**

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To prepare for the subsequent planning alternative development and evaluation, a series of studies were conducted to identify and evaluate the major factors that will impact MMSD's operations and planning efforts in the 50 year planning period. These studies include: planning variables identification; regulatory trend analyses; and public involvement. The details are described as follows:

- The consultants worked with the TAC and MMSD staff to identify the major planning variables that will govern or impact MMSD's available options for continuing to provide high quality service over the 50-year master planning period. Details are provided in Appendix D, TM4 – Planning Variables.
- A preliminary regulatory review was conducted to evaluate the existing and foreseeable future regulatory issues potentially affecting MMSD's planning and operations in the next 50 years. Details are provided in Appendix E, TM5 – Regulatory Review and Analyses.
- The public involvement efforts were conducted with interested communities and agencies. Phase I efforts included the development and distribution of an educational “fact sheet” and questionnaire, compilation of the questionnaire responses, and presentations of the master planning process and elements to numerous audiences. Details are provided in Appendix J, Phase 1 Public Involvement Summary. A second phase involved presentations of preliminary planning results at eighteen public meetings and an open house at Nine Springs. The second phase public meetings are also listed in Appendix J.

## ***Planning Variable Identification***

The planning variables and driving forces that were identified served as the basis for the development and evaluation of planning alternatives. The following planning variables were identified:

- Location of Treatment Plants

New satellite treatment plants may be constructed to address the issues with regard to capacity deficiencies, imbalanced inter-basin water transfer, and treated effluent reuse. New

satellite treatment facilities should be close to population centers and potential effluent end users. Proximity to wetlands for the use of effluent polishing could be desirable.

- Biosolids Management

MMSD currently uses anaerobic digestion to produce biosolids that are recycled to agricultural land. An initiative is underway to add flexibility by developing a soil like product that can be used in non-agricultural settings. The biosolids currently contain significant levels of phosphorus. There is already an excess level of phosphorus within certain portions of the Yahara watershed. For this reason, there may be a need in the future to export biosolids from the watershed. Emerging compounds of concern in biosolids may drive future regulations and limit the ability to beneficially reuse biosolids.

- Effluent Discharge and Reuse

Increasing regulatory pressure and energy costs may limit the long term viability of pumping all treated effluent to Badger Mill Creek and Badfish Creek. Also, water conservation within the watershed is considered a primary issue to address in the future. The volumes and locations at which MMSD discharges its effluent will be a major factor in sustaining water levels in streams and aquifers throughout the watershed.

- Regulatory Trends

Future regulatory requirements could significantly impact MMSD's planning and operations over the planning period. Areas of particular importance include: phosphorus criteria; total nitrogen criteria; chlorides; mercury and other toxics; thermal standards; microconstituents in effluent and biosolids; water quality assessments; Rock River TMDL development; water balance issues; groundwater rules for discharges to land and subsurface; and requirements for land application of biosolids.

- Stormwater management

Currently communities served by MMSD have separate storm and sanitary sewer systems. Stormwater is captured in dedicated storm sewers and discharged to detention basins or directly into adjacent water bodies. Currently the MMSD has no involvement in stormwater management, but might become involved if the following three conditions were met:

- a. A stormwater problem with water quality implications requires a regional solution;
- b. The involved municipalities are unable to implement a coordinated plan; and
- c. There is consensus that the MMSD is the appropriate agency to deal with the issue.

- Environmental Impacts

The overall environmental impact of MMSD's facilities and operations should be considered in the planning efforts. Examples include carbon footprints, waste stream/hazardous material, water resource consumption, and air quality.

- Future Flow Projections

Future flow projections have significant impacts on capacity requirements for both the collection system and treatment facilities. The following scenarios will impact the future flow projections:

- a. The Madison Design Curve currently being used for estimating peak flows could be too conservative.
- b. Impacts of water conservation
- c. Impacts of Inflow/Infiltration improvement
- d. Population growth rate
- e. Population growth distribution
- f. Increased precipitation associated with climate change

- Construction/Operational Costs

Construction and operational costs will be a major driver for all scenarios and alternatives. These costs include: energy, construction materials, land acquisition, manpower, contracted services, chemicals, fuel and utilities.

- Public Acceptance

Public acceptance will play an important role as MMSD evaluates effluent reuse opportunities; construction of regional treatment plants; construction of un-manned neighborhood treatment plants; and alternative biosolids management options.

## ***Regulatory Review and Analyses***

The following existing and foreseeable future regulatory issues potentially affecting MMSD's planning and operations in the next 50 years were reviewed during the planning process for certain operational situations.

- NSWTP Continued Discharge to Badfish Creek

1. Rock River Basin phosphorus and sediment TMDL: The TMDL is being developed by EPA. It appears MMSD will have a waste load allocation (WLA) for total P as a result of this TMDL. This will impact the District's discharge to Badfish Creek.

2. Statewide phosphorus criteria: Based on current draft administrative code language, the resulting phosphorus water quality criteria (WQC) for Badfish Creek and the Yahara River would be 0.075 mg/L and 0.100 mg/L, respectively. Depending on the background concentration of phosphorus in Badfish Creek (i.e., from groundwater or other sources of dilution water), some dilution may be allowed when determining the associated water quality-based effluent limit (WQBEL) for phosphorus.
  3. A revised permit phosphorus limit should be anticipated in the District's 2014 WPDES permit.
- NSWTP with Increased Discharge to Badger Mill Creek

Permitted pollutant loadings to Badger Mill Creek included in MMSD's current WPDES permit are based on a discharge volume of 3.6 mgd. MMSD may consider alternatives that increase this discharge. Badger Mill Creek is a tributary to the Sugar River. The Sugar River has been designated an exceptional resource water (ERW). For an increased discharge, the effluent limits could be impacted by the more stringent rules related to the Sugar River.

1. Phosphorus criteria: Based on current draft administrative code language, the resulting phosphorus water quality criteria would be 0.075 mg/L for Badger Mill Creek. Depending on background concentrations, some dilution may be allowed when determining the WQBEL for P. However, the P concentration for an increased discharge at this location may be limited further because the Sugar River is designated as an exceptional resource water (ERW).
  2. DNR interpretation of antidegradation requirements: Antidegradation rules are contained in NR 207. Since the Sugar River is an ERW, it is subject to more stringent antidegradation requirements. In general, a new discharge to an ERW needs to meet upstream water quality. Regulations are not as stringent for an increased existing discharge; however, the permittee would still need to demonstrate there will either be no significant lowering of water quality or that the project has sociological and economic benefits.
- NSWTP with Discharge to Lake Waubesa via Nine Springs Creek

MMSD may consider discharging highly treated effluent to Nine Springs Creek or wetlands tributary to Mud Lake and Lake Waubesa. However, the effluent limits would likely be most impacted by the more stringent regulations and statutes related to Lake Waubesa as follows:

1. Thermal standards: If this discharge location is construed as an existing outfall for MMSD, it is possible that it would be eligible for a variance to the proposed thermal standards outlined in draft revisions to NR 102 and NR 106. Otherwise, some mitigation of effluent temperature may need to be included for a discharge at this location.
2. P criteria: The current draft administrative code language for P criteria would result in a P WQC around 0.040 mg/L for shallow lakes like Lake Waubesa. Depending on the background concentration of P in the lake, some dilution may be allowed when determining the WQBEL for P.
3. DNR interpretation of requirements in Wisconsin State Statute 281.47: This statute was the driver for MMSD diverting effluent around the Madison lakes beginning in the late 1950s. The statute does not explicitly prohibit direct discharge of effluent to the chain of lakes including Lake Waubesa, but it does place conditions that must be met for direct discharges to occur. The DNR is given authority to determine whether these conditions are met. Based on DNR discussions during Madison Gas and Electric's (MGE's) cogeneration facility planning, it appears the effluent quality would need to be close to background surface water quality for P prior to approval of a Lake Waubesa discharge. Background concentrations may be lower than the 0.040 mg/L proposed shallow lake criteria.

- Upper Lake Mendota Watershed Discharge

MMSD may consider constructing a satellite WWTP with discharge of highly treated effluent to the upper Yahara River or wetlands tributary to Lake Mendota. The effluent limits would likely be subject to the more stringent state statutes related to Lake Mendota as follows:

1. Phosphorus criteria: Based on current draft administrative code language, the resulting phosphorus water quality criteria would be around 0.015 mg/L for Lake Mendota. Depending on the background concentration of P in the lake, some dilution may be allowed when determining the WQBEL for P. The DNR has noted that a TMDL-like approach could be required before setting WLAs, LAs, and WQBELs for a Lake Mendota discharge so that load and wasteload allocations can be assigned to all the sources of P to the lake.

- Sugar River Watershed Discharge

MMSD is considering construction of a satellite WWTP with discharge of highly treated effluent to the Sugar River or its tributaries. A discharge to the Sugar River would be affected by the issues summarized below:

1. Phosphorus criteria: Based on current draft administrative code language, the resulting phosphorus water quality criteria would be 0.075 mg/L for the Sugar River; however, antidegradation requirements contained in NR 207 would also apply. For an Exceptional Resource Water (ERW), this essentially means the new discharge would need to meet background water quality. For example, if the background P concentration in the Sugar River is 0.050 mg/L, the effluent limit could be 0.05 mg/L.
2. Chlorides: Since the Sugar River is designated an ERW, it is possible the chloride concentrations in the discharge would need to meet background concentrations in accordance with NR 207. The DNR has expressed some willingness to discuss this issue further with the MMSD, particularly if there is a net environmental benefit associated with the discharge such as restoration of water balance or other benefits.
3. Ammonia, biochemical oxygen demand (BOD), and other limits: It is possible that the effluent limit for ammonia, BOD, total suspended solids (TSS), and other parameters may need to be equal to background concentrations of these parameters because of the ERW designation for the Sugar River. The DNR Guidance on the “13 pound rule” contains calculations related to assimilative capacity and may impact BOD limits for non-variance streams; this guideline may apply if the background concentration does not.

- Koshkonong Creek Discharge

Another alternative MMSD may consider is a cooperative agreement with Sun Prairie to treat a portion of MMSD’s wastewater flow. This would result in an increased discharge to Koshkonong Creek. An increased discharge to Koshkonong Creek may be affected by the issues summarized below.

1. Phosphorus criteria: Based on current draft administrative code language, the resulting phosphorus water quality criteria would be 0.075 mg/L for Koshkonong Creek and 0.040 mg/L for Lake Koshkonong. Depending on background P concentrations, some dilution may be allowed when determining the WQBEL for P.

- Other Surface Water Discharge Locations Including Stream Base Flow Augmentation

Other surface water discharge locations may be considered, such as a new discharge to the Yahara River just downstream of Lake Waubesa. A discharge at this location would likely have similar issues and benefits as those discussed above for a discharge to Nine Springs Creek and Lake Waubesa.

Base flow augmentation using highly treated WWTP effluent may also be considered in the future, particularly for urban streams. For example, relatively small volumes of effluent could be further treated at the Sun Prairie WWTP or a future north MMSD WWTP and discharged to streams in the northeast portion of the Lake Mendota or north Lake Monona watersheds. Starkweather Creek has experienced a reduction in dry weather base flows over the years, possibly caused by the high percentage of impervious surfaces in the watershed and pumping of groundwater in Madison, and could be a good candidate to receive flow augmentation in this manner. A discharge of treated effluent at this location would have similar issues and benefits as those discussed above for a discharge to the upper Yahara River and Lake Mendota.

- Groundwater Recharge

Groundwater recharge using effluent is being practiced in several locations around the state, particularly in the Wisconsin River Valley and other locations where soils are sandy and thus conducive to infiltration. A typical method of effluent groundwater recharge is to use seepage cells (also called absorption ponds), which are regulated under NR 206. Current effluent limitations for discharge to absorption ponds include:

BOD	50 mg/L
TN	10 mg/L
TDS	500 mg/L
Chloride	250 mg/L

Groundwater monitoring is usually required for absorption ponds and the relevant groundwater standards at the design management zone boundary (250 feet from the seepage cell boundary) or at the property line would apply. These are contained in NR 140. The groundwater preventive action limit (PAL) for chloride is 125 mg/L and the enforcement standard (ES) is 250 mg/L.

For this type of discharge, it appears the largest hurdles for MMSD to overcome would be TN and chloride effluent concentrations. Biological nitrogen removal can be used to reduce TN to below 10 mg/L. If a variance could not be obtained, chloride concentrations would need to be reduced through source reduction or reverse osmosis treatment prior to discharge

to an infiltration gallery and may also need to be reduced prior to a discharge to absorption ponds.

- Nonresidential Irrigation

The current MMSD permit contains provisions related to use of effluent on the Nine Springs Golf Course in Fitchburg as a demonstration project. This type of discharge would be regulated under NR 206. Current regulations include a BOD effluent limitation of 50 mg/L. Hydraulic loading rates and load and rest cycles are determined on a case-by-case basis and generally depend on the soil type. Likewise, TN and fecal coliform limits are determined on a case-by-case basis. Groundwater monitoring is often required for these systems, particularly when significant pretreatment is not provided. Groundwater standards for chloride (125 mg/L PAL and 250 mg/L ES) may be of greatest concern for MMSD's effluent.

Nonresidential irrigation would generally involve spray or drip irrigation of treated wastewater onto agricultural fields, grass lands, golf courses, or similar areas. Generally TN applications are limited to crop uptake rates, which are on the order of 165 lb/acre-year for corn and 300 lb/acre-year for certain grasses like reed canary grass. Groundwater monitoring is often required for determining compliance with groundwater standards.

- Industrial or Commercial Reuse

Wastewater effluent can be used for industrial noncontact cooling and other noncontact uses. Wisconsin currently has no standards for the treatment of effluent for use in an industrial facility.

It may also be possible for effluent to be reused for noncontact industrial cooling water. Several individuals responding to the MMSD interest survey indicated that commercial car wash use may be another viable alternative; however, the locations of such facilities may be too diffuse for cost-effective conveyance of the treated effluent. The concept should be initially explored with the largest water users in Dane County who are believed to use fresh water for nonpotable uses.

- Residential Reuse

It has been proposed by several individuals that treated effluent could be reused for toilet flushing, residential lawn irrigation, and other residential nonpotable water uses. Such a concept would require effluent treatment to a very high level (potentially California Title 22

standards as noted above for food crop irrigation), require force mains to convey the treated effluent to the residential developments, and require a new infrastructure similar to the “purple pipe” reuse water distribution systems used in the Southwest and elsewhere. This concept may be worth considering for new developments where installation costs would be lower compared to existing developments. However, it is likely that costs of such systems would outweigh the benefits, at least in the short term in the Madison area. For the short term, it appears that residential water conservation measures may provide similar benefits at a significantly lower cost.

- Wetlands Restoration

The DNR has indicated that a discharge to wetlands may be subject to less stringent requirements than a discharge to an ERW stream or the Madison lakes, particularly for restored wetlands. A viable option for a potential Mendota Plant would be to discharge effluent to wetlands to provide the base flow for the wetland system that has been lost because of groundwater table lowering from water supply withdrawals in Madison, Waunakee, DeForest, Windsor, and Sun Prairie. This option may also be useful in lieu of a direct stream or lake discharge in the vicinity of the Sugar River or Nine Springs Creek/Lake Waubesa.

Wetland discharges are regulated under NR 103. NR 103 applies to natural and restored wetlands but not to constructed wetlands for wastewater treatment or polishing; the latter systems are typically constructed with liners separating them from natural waters and are considered a wastewater treatment unit process.

- Biosolids Management

The following biosolids regulations have been identified as possibly being applicable to MMSD’s future operations. Within the next 20 years, these regulations along with increased development in the Madison area may result in the requirement for more land and increased hauling distances in the Metrogro program. These regulations may also place additional restrictions on the MetroMix program. In the longer term, MMSD may need to consider additional alternatives for at least a portion of its biosolids such as landfilling. Landfilling may still be considered a beneficial reuse option if biosolids are used as cover material, are used to facilitate decomposition, are part of a landfill bioreactor, or if biosolids additions promote the formation of landfill gas that is then recovered and used to generate electricity.

1. State (NR 204) and federal (40 CFR Part 503) biosolids regulations
2. Runoff management rule (NR 151)
3. Impaired waters (303(d)) listings and TMDLs
4. Local ordinances relating to the use of lawn fertilizers containing phosphorus

## ***Public Involvement***

The initial (Phase 1) public involvement efforts were conducted with interested communities and agencies in early 2008. Phase I efforts included the development and distribution of an educational “fact sheet” and questionnaire, compilation of the questionnaire responses, and presentations of the master planning process and elements to numerous audiences.

- **Fact Sheet and Questionnaire**

A two-sided color fact sheet was developed to summarize some of the key concepts of the master planning process. In particular, the fact sheet was designed to educate the audience with respect to some important statistics and history of MMSD and introduce some key issues that MMSD will need to address over the next 50 years. These key issues include the impacts of wastewater effluent diversion around the Madison Lakes on surface water and groundwater resources, as well as potential wastewater reuse concepts.

The questionnaire was mailed to the public works committee, utilities committee (or commission) or governing body, the administrative and management staff of each of MMSD’s customer communities. It was also mailed to the City of Sun Prairie, City of Stoughton, and Village of Oregon. In addition, the questionnaire was mailed to the Dane County Lakes and Watershed Commission, the Capital Area Regional Planning Commission, and approximately 40 environmental advocacy groups that are active in the Madison area. Approximately 260 questionnaires were mailed.

MMSD also posted the questionnaire on its Web site and invited interested parties to complete the form on-line. MMSD developed a summary of the questionnaire response statistics and comments made by the respondents and distributed that summary to the Master Planning Advisory Committee in a March 14, 2008, memorandum from MMSD.

- **Summary of Presentations**

Fourteen presentations were made by the MMSD staff during the months of February, March, and April in 2008. The presentations and following discussion typically lasted from 20 minutes to one hour, depending on the number of questions and comments received. Presentations were made to the following audiences on the indicated dates:

1. February 19, 2008–City of Verona Public Works Committee
2. February 20, 2008–City of Middleton Water Resources Committee
3. February 28, 2008–Village of DeForest Public Works Committee

4. March 11, 2008–Village of McFarland Public Utilities Committee
5. March 13, 2008–Dane County Lakes and Watershed Commission
6. March 17, 2008–City of Madison Commission on the Environment
7. March 17, 2008–City of Fitchburg Public Works Committee
8. March 25, 2008–Town of Blooming Grove Board
9. March 26, 2008–City of Madison Board of Public Works
10. March 27, 2008–Capital Area Regional Planning Commission
11. March 31, 2008–Village of Waunakee Utilities Commission
12. April 1, 2008–City of Sun Prairie Committee of the Whole
13. April 21, 2008–Village of Shorewood Hills Village Board
14. April 29, 2008–Village of Maple Bluff Public Works Committee

All comments and questions were noted at each of the meetings, as were the responses to any questions. A summary of comments and questions was developed for each of the presentations.

- Presentation Responses – Common Themes and Comments

While each presentation resulted in a unique set of comments and questions, there were a few common themes that came up during the discussions following many of the presentations. A listing of these common themes follows:

1. Many of the audiences were very familiar with the water resources issues in Dane County. It is noted that the audiences are likely more educated with respect to water resources issues than the general public would be.
2. MMSD's customers are supportive of the master planning process and would like to see MMSD investigate wastewater reuse alternatives. Many commented that new subdivisions could start requiring that wastewater reuse infrastructure be constructed with other utilities.
3. Groundwater depletion seems to be more of a concern than low flows in surface waters, although these are directly related to each other in some locations.
4. Other areas of the country, especially in the south and west, are already reusing treated wastewater.
5. Water conservation was brought up at several presentations.
6. The potential risk of pharmaceuticals in the environment is a concern.

7. The question of how to pay for wastewater reuse infrastructure, as well as potential satellite WWTPs, was asked at several of the presentations.