

8. ALTERNATIVE RANKING CRITERIA

8.1. Background	1
8.2. Economic Criteria.....	2
8.3. Technical Criteria	2
8.4. Social Criteria.....	4
8.5. Environmental Criteria	4
8.6. Determination of Level of Importance	5

ALTERNATIVE RANKING CRITERIA

Background

Several meetings and workshops were conducted with the MMSD and TAC to identify applicable evaluation criteria and determine their levels of importance. A survey was also conducted to solicit opinions on evaluation criteria from TAC members and MMSD staff. Details of the master planning ranking criteria development are attached in Appendix H, TM8 – Planning Alternative Evaluation Criteria.

The identified planning criteria are categorized into the following 4 groups:

- Economic criteria
The impacts the planning alternatives have on the economic conditions of the MMSD's stakeholders and on the MMSD's own financial performance.
- Technical criteria
The impacts the planning alternatives have on the technical aspects of the MMSD operation, such as the ease of maintenance, system reliability, system flexibility, etc.
- Social criteria
The impacts the planning alternatives have on the social systems within which the MMSD operates, including public acceptance, staffing requirements, etc.
- Environmental criteria
The impacts the planning alternatives have on natural systems, including ecosystems, land, air and water, and the alternatives' carbon footprints.

These evaluation criteria incorporate the major elements of typical sustainability evaluations of water and wastewater utilities. Adoption of these criteria in the evaluation process will allow evaluating and ranking planning alternatives from a multiple dimension perspective.

All the identified evaluation criteria were described and discussed. Levels of importance (Low, Medium and High) were then assigned to each of 10 criteria based on the combined efforts of the TAC, MMSD and the consultant.

Economic Criteria

Life Cycle Cost

An MMSD mandate is to provide cost-effective wastewater conveyance, treatment and biosolids management services. Life cycle cost is used as a basis for making economic comparisons between alternatives. The life cycle cost is the total discounted dollar cost of owning, operating, maintaining, and disposing of the planning alternatives over the 50 year planning period. The life cycle cost includes the components listed below:

- **Initial Capital Costs**

Initial capital costs include the purchase of land, buildings, equipment, and construction activities to bring all the component projects associated with a planning alternative to a fully operable status. Initial costs do not include labor costs except for the labor used for construction.

- **50-Year Replacement Cost**

All of the costs associated with the replacement of the structures, equipment, and other major components of the facilities included in a planning alternative to maintain the proper operation efficiency and physical conditions of the facilities during the 50 year planning period.

- **Annual Operation/Maintenance Costs**

The annual operation/maintenance costs are composed of all the expenses including labor, materials, and other expenses for maintaining day-to-day facility functions and preserving the operating efficiency and physical condition of the facilities included in a planning alternative.

Technical Criteria

Regulatory Constraints

Alternatives must meet all regulatory requirements. However, the regulatory requirements associated with any given planning alternative may be easier or more difficult to meet, depending on a number of factors. For example, the regulatory requirements associated with an effluent discharge to an Exceptional Resource Water (ERW) or to a lake would be more stringent than those associated with discharge to a warm water stream.

Proven Effectiveness

The selected alternative(s) must be able to provide reliable service during the planning period. This criterion is used to evaluate planning alternatives for their reliability in providing required service. For example, fifteen years ago, biological phosphorous removal was not as proven a technology for removing phosphorous as chemical addition. As such, it would not have been considered to be as well “proven” as chemical addition. The proven ability of an alternative to meet the regulatory goals will need to be considered.

Flexibility, Expandability, and Compatibility

The selected alternative(s) must have the ability over time to be easily connected with the existing system. This allows for ease of construction and financial burden to the MMSD. The selected alternative(s) must be compatible with the existing collection system and treatment facilities, and maximize continued use of the existing facilities. The selected alternative(s) must also be compatible with other regional planning goals. This criterion is used to rank alternatives for their potential to meet the following requirements:

- Can the alternative be readily modified to meet potential future needs such as re-routing wastewater, meeting more stringent future permit limits and regulations, etc?
- Can it be readily expanded to meet future flows and loadings?
- Is the alternative compatible with the existing collection system and treatment facilities?
- Does it maximize continued use of existing facilities?
- Can it be easily connected to existing system over time?
- Is it compatible with other regional planning goals?

Ease of Operation

Some alternatives may be more difficult or challenging to operate. For example, operation of a facility utilizing membrane filtration may be more difficult than operating the MMSD’s current facility. The selected alternative(s) must consider the level of complexity involved in operating the facilities included in the planning alternatives. This criterion will be used to rank all planning alternatives for efforts involved in the facility operation.

Social Criteria

Public Acceptance

Public acceptance has significant impacts on the implementation of planning alternatives. The selected planning alternative(s) must have the support of the public or a plan must be developed to gain this support. This criterion ranks all the planning alternatives for the likelihood of being accepted or resisted by the public.

Staffing Implications

Alternatives may have different staffing implications, both in terms of staffing level and required skills. For example, operation of multiple plants may be more labor intensive than operation of a centralized system. In addition, operating an advanced treatment system to produce high quality effluent may require a more skilled workforce than operating a secondary treatment system. This criterion will be used to rank all planning alternatives for these staffing requirements.

Environmental Criteria

Maintains Watershed Balance

Stream flow augmentation and water balancing within the watershed are issues to address in the Master Plan. The volumes and locations at which the MMSD discharges its effluent based on recommendations in the Master Plan will have significant impacts on sustaining water levels in streams and aquifers, and maintaining watershed balancing throughout the watersheds. This criterion will be used to rank all the planning alternatives for their potential in augmenting low flow in streams and alleviating imbalanced inter-watershed water transfer.

Opportunities for Effluent Reuse

One of the potential outcomes of the Master Plan is to maximize the use of treated effluent as a resource. Effective effluent reuse could reduce the need for groundwater withdrawals from the Madison area aquifer and improve the sustainability in water resource utilization in the Madison and the Dane County areas. The available effluent reuse options include:

- Turf irrigation
- Groundwater recharge

- Industrial water use
- Other uses

Some alternatives may present greater opportunity to beneficially reuse effluent because of location of facilities, level or treatment, etc. This criterion will be used to rank all the planning alternatives for their potential to beneficially reuse effluent.

Carbon Footprint

Carbon footprint is a measure of the impact that the planning alternatives have on the environment in terms of the amount of the greenhouse gases produced. It will be evaluated for the utilization of electricity, natural gas, gasoline, etc. Some alternatives may have a larger carbon footprint than others. This criterion will be used to rank all the planning alternatives for their magnitude of carbon emissions.

Determination of Level of Importance

The levels of importance for all planning alternatives were determined based on independent rankings by the TAC, MMSD and the consultant. Each evaluation criterion was assigned a weighting score ranging from 1 to 50 according to their relative importance. The more important an evaluation criterion is, the higher score it was assigned. To force a differentiation among the criteria, the sum of the weighting scores for all 10 criteria was set to 100. The importance scores from the TAC, MMSD staff and the consultant team were then averaged to calculate the final scores for all evaluation criteria. The details of the process for determining the relative importance of all evaluation criteria are shown in Table 8-1.

Table 8-1. Planning Alternative Evaluation Criteria

No.	Evaluation Criteria	TAC Ranking Score	MMSD Ranking Score	Consultant Ranking Score	Average
1	Life Cycle Cost	15	33	30	26
2	Public Acceptance	10	14	15	13
3	Watershed Balance	12	10	10	11
4	Flexibility/Expandability/Compatibility	12	9	7	9
5	Effluent Reuse	13	7	8	9
6	Regulatory Constraints	8	9	10	9
7	Proven Effectiveness	10	7	8	8
8	Carbon Footprint	9	3	3	5
9	Ease of Operation	6	5	4	5

10	Staffing Implications	5	4	5	5
----	-----------------------	---	---	---	---

The evaluation criteria and their respective levels of importance were then used to evaluate and rank the near-term and long-term master planning alternatives to determine the optimum alternatives for implementation during the 50 year master planning period.