CHAPTER 7
RECOMMENDED PLAN AND IMPLEMENTATION

This chapter summarizes the recommendations in the preceding chapter to upgrade and expand the Rice Lake WWTP to accommodate wastewater flows and loadings over the next 20 years. This chapter also includes a resources impact summary, detailed project capital costs, funding availability, impacts on sewer user charge rates, and an implementation schedule.

RECOMMENDED PLAN

The current Rice Lake WWTP capacity for BOD_5, TSS, and total P will be exceeded due to projected increases in wasteloads by the year 2030. In order to provide adequate capacity, it is recommended that the existing wastewater treatment plant be expanded and upgraded.

Figure 7-1 is a flow schematic of the recommended plan, and Figure 7-2 presents a site plan of the plant improvements. The recommended plan includes the major plant improvements presented in Table 7-1. Upon completion of construction, these improvements will allow the Rice Lake WWTP to handle the projected flows and loadings for the year 2030. Mass balance calculations for the upgraded treatment plant are contained in Appendix E with a basis of design presented in Appendix G.

Table 7-1
Rice Lake WWTP
Summary of Recommended Plant Improvements

Unit Process	No.	Size/Capacity	Status
Hauled Waste			
Grease Trap Waste Tank	1	13.25 ft x 13.25 ft; 17,500 gallons	New
Grease Trap Pumps	2	100 gpm each	New
Leachate Treatment System	1	60,000 gallons	New
Septage Receiving Tank	1	20.25 ft x 20 ft; 19,400 gallons	Existing
Septage Pumps	2	100 gpm each	New

Table 7-1
Rice Lake WWTP
Summary of Recommended Plant Improvements, cont.

Unit Process	No.	Size/Capacity	Status
Grit Removal			
Grit Tank	1	15.5 ft x 10 ft; 9,275 gallons	Existing
Grit Separator/Classifier	1	5.8 mgd peak flow	New
Raw Sewage Pumps	4	1,400 gpm each	Modified
Primary Treatment			
Primary Clarifiers	2	50 ft diameter	New
Process Building	1	1,200 sq ft	New
Primary Sludge Pumps	2	85 gpm each	New
Activated Sludge			
Anoxic Zone	1	25 ft x 27 ft; 75,735 gallons	Existing
Anaerobic Zone	1	25 ft x 27 ft; 75,735 gallons	Existing
Aeration Basins	5	Various; 916,700 gallons total	Existing
Aeration Basins	1	25 ft x 80 ft; 224,400 gallons	New
Aeration Basin Diffusers	6	13,000 lbs O_2/day	New
Aeration Basin Blowers	4	2,000 cfm each	New
Final Clarifiers			
Final Clarifiers	2	70 ft diameter	Existing
Aluminum Covers	2	70 ft diameter	New
Access Hatches	3	3 ft x 5 ft	New
RAS Pumps	3	1,700 gpm each	Modified
WAS Pumps	1	500 gpm	Existing
Phosphorus Removal			
Ferric Chloride Storage	1	2,500 gallon chemical tank	New
Chemical Metering Pumps	2	Diaphragm @ 10 gph	New
Anaerobic Digesters			
Primary Digester Cover	1	45-ft diameter	New
Secondary Digester Cover	1	45-ft diameter	New
Digester Mixing	2	27-inch draft tube mixers	New
Boiler/Heat Exchanger	1	737,000 BTU/hour	New
Gas Safety Equipment Lot	1	85 cfm peak day biogas flow	New

The existing hauled waste receiving area will be separated into three areas to provide more efficient treatment of the various hauled wastes. Grease trap waste will be sent to a storage tank, where it will be fed directly into the anaerobic digesters. Landfill leachate will be deposited into a pretreatment system that will lower ammonia loadings, and then fed into the aeration basins. The remaining hauled waste will be sent to the existing septage area, which will have new pumping and mixing equipment installed.

The grit removal system will have a new classifier installed with the capacity to treat the estimated peak day flows. A sluice gate will be added to the existing grit chamber bypass.

Primary treatment will be added to the WWTP's process train in the form of two 50-foot diameter primary clarifiers. A splitter box will be constructed to split the flow between the clarifiers, and a new Primary Treatment Building will be constructed to house the required equipment and controls. Changes to the raw sewage pumps will be made as necessary, to accommodate the primary clarifiers and new hydraulic profile.

The secondary treatment portion of the plant will utilize an expanded aeration activated sludge system. The aeration basin volume will be expanded by 25% to handle increased wasteloads at the plant and maintain compliance with effluent limits. Secondary treatment equipment, including fine-bubble membrane diffusers, blowers and RAS pumps, will be replaced or refurbished with the intent of improving the efficiency of the aeration system. Various piping and structural changes will be made to accommodate new equipment. A chemical phosphorus removal system will be installed as a backup and for future use as a primary removal system.

New steel covers will be installed on the primary and secondary anaerobic digesters; the primary digester will be equipped with a floating cover and the secondary digester will have an 8,500 cubic foot gas-holding cover installed. Both digesters will have the existing gas mixing systems replaced with new mechanical draft tube mixers, and will both be designed for sludge heating in order to provide operational flexibility. The existing sludge heating system will be replaced with a new dual fuel boiler and heat exchanger. New biogas safety equipment will also be installed.

There are a number of other items indentified in the ONR that will also require replacement and/or upgrading as part of the overall project. The major items are listed below:

- HVAC upgrades in the Administration and Preliminary Treatment Buildings
- Upgrade of plant SCADA system
- Upgrade of plant lighting
- New Preliminary Treatment electrical control room

NO-ACTION ALTERNATIVE

The current Rice Lake WWTP has an average design capacity of 2.2 mgd, 6,238 lbs BOD_5/day, 5,431 lbs TSS/day, and 110 lbs phosphorus/day. The current loadings at the plant are approximately 90% of its design capacity. The wasteloads are projected to increase to 7,265 lbs BOD_5/day, 6,577 lbs TSS/day, and 115 lbs phosphorus/day by the year 2030. Sections of the plant date from the 1950s and 1980s, and many of the facilities and equipment have exceeded their useful lives.

The "No Action" alternative represents continued operation of the existing facilities with no additions to the facilities and no changes to present operation and maintenance procedures. This alternative recognizes the fact that the present facilities and staff are producing effluent that is generally in compliance with permit requirements.

However, the "No Action" alternative does not address several key issues. First, the treatment plant does not possess adequate capacity to handle the increasing loads over the 20-year study period. Second, it is unlikely that the existing treatment plant will be able to meet a future ammonia effluent limit. Third, much of the mechanical equipment in the plant is aging and will exceed its useful lifespan during the planning period. Decreased efficiency and aging of the equipment could lead to short-term permit violations and increased costs to repair and maintain the equipment.

Additionally, the WWTP is still accepting leachate from several nearby landfills, due to DNR suggestion. If treatment processes designed to reduce the leachate ammonia concentrations are not constructed, the plant's secondary treatment will likely continue to have operational issues, including interference with biological phosphorus removal and denitrification in the final clarifiers leading to solids overflow. Allowing these issues to continue could lead to significant permit violations.

The "No Action" alternative would likely lead to future effluent permit violations, which could subject the City to stringent fines. The DNR could then impose a schedule to comply with effluent limits, which would mean that the City would still have to upgrade and expand its treatment plant. However, once a community is in violation of its discharge permit, they are no longer eligible for a low interest loan from the Clean Water Fund, and a moratorium on new sewer construction is imposed.

The Red Cedar River is classified by the DNR for fish and aquatic life and warm water sport fishery. Permit violations would cause stream degradation because of the discharge of additional quantities of suspended solids and oxygen consuming material (BOD_5). The negative effect on

fish and aquatic life would also affect other downstream recreational uses in the Red Cedar River. Due to the eventual possibility of DNR prosecution, environmental damage, and negative economic impact, the "No Action" alternative is eliminated from further consideration.

UPGRADE OPERATION AND MAINTENANCE ALTERNATIVE

This alternative includes improvements to the methods of operating and maintaining the present facilities, along with minor facilities improvements. No areas have been identified where changes in operations and maintenance would have a significant impact on treatment capacity of the facility. Operations personnel have already optimized the facilities' treatment capabilities in order to meet permit limits.

The "Upgrade O&M" alternative fails to address the same key problems noted in the "No Action" alternative: future limits and projected increases in loads. The same problems of future DNR prosecution, environmental damage, and negative economic impact could potentially occur. Therefore, the "Upgrade O&M" alternative is eliminated from further consideration.

RESOURCES IMPACT SUMMARY

The recommended plan will upgrade and increase the capacity of the existing Rice Lake WWTP. It will have an overall positive impact on the surrounding environment including the Red Cedar River and the entire Rice Lake community. This is in contrast to the negative impacts of the "No Action" and "Improved O&M" alternatives.

Water Quality

The recommended plan will improve the water quality of the Red Cedar River, because the existing treatment plant is at 90% of its design capacity. In addition, the improvements will provide better ammonia treatment than the existing facilities. It is anticipated that the effluent discharged from the improved plant will consistently be of better quality than the effluent that is currently discharged.

Soil erosion and sedimentation occurring during construction of the recommended plan should be minimal. The construction plans and specifications will contain provisions for the installation of erosion control measures to protect adjacent areas from run-off and siltation.

Air Quality

The recommended plan should improve air quality, because the overloaded treatment plant will be expanded to accommodate current and future wasteloads. While the plant has not received any odor complaints, an overloaded treatment facility is susceptible to periodic odors.

Plant staff may notice temporary dust from excavating equipment during construction. However, the construction specifications will require that fugitive dust control measures be implemented. Furthermore, the treatment plant site is located in a relatively isolated area, so adverse impacts on City residents should be minimal.

Historic and Archeological Sites

The proposed treatment plant expansion will take place on the existing plant site. This site had previously been disturbed during prior plant construction in 1982 and 1997 during a major overhaul of the facilities. No archaeological sites have been identified on the current plant site.

Floodplains and Environmentally Significant Lands

The existing treatment plant facilities and proposed new facilities on the existing site are constructed outside of the floodplain. The entire existing plant site contains either treatment structures or open space. There are no environmentally significant lands where new facilities or structures are proposed to be constructed.

Public Health

The recommended plan will provide substantial benefits to public health. Increased treatment capacity and sludge stabilization will reduce the likelihood of pathogens in the environment and exposure to the public.

CAPITAL COST AND FUNDING

The estimated capital cost for the recommended plan is $7,674,000, as summarized in Table 7-2. This capital cost includes construction, engineering, legal, and administrative costs. More detailed construction cost estimates are located in Appendix F.

Table 7-2
Rice Lake WWTP
Summary of Total Project Costs

Item	Cost
Hauled Wastes	
Grease Trap Receiving Improvements	$60,000
Leachate Pre-treatment	$710,000
Septage Receiving Improvements	$39,000
Grit Removal	
Grit Removal Improvements	$220,000
Primary Treatment	
(2) Primary Clarifiers	$441,000
Primary Treatment Equipment	$332,000
Process Building	$300,000
Secondary Treatment	
(1) Aeration Basin	$337,000
Secondary Treatment Equipment	$325,000
(2) Aluminum Dome Covers	$240,000
Anaerobic Treatment	
(2) Digester Covers	$432,000
Digester Heating Equipment	$364,000
Gas Safety Equipment	$141,000
Miscellaneous Improvements	
Electrical Control Room	$75,000
Phosphorus Removal System	$93,000
SCADA System	$250,000
HVAC Improvements	$23,000
Lighting Improvements	$98,000
Sitework and Demolition	$138,000
Instrumentation and Control	$205,000
Mechanical	$279,000
Electrical	$205,000
Subtotal Construction Cost	$5,307,000
General Conditions, Bonds, and Insurance	$437,000
Contingencies	$929,000
Construction Cost	$6,673,000
Engineering and Administration Fees	$1,001,000
Total Project Cost	**$7,674,000**

The most likely source of funds for this project is the plant's Equipment Replacement Fund. An additional funding source is a low interest loan from the Clean Water Fund. The DNR Bureau of Environmental Loans administers the Clean Water Fund program that provides reduced interest rate loans for eligible wastewater projects. The current interest rate for eligible projects is 2.365% (55% of market rate). This interest rate changes with each State bond sale. Septage receiving improvements are eligible for loans with a 0% interest rate. Chapter NR 162 of the Wisconsin Administrative Code contains the rules for the Clean Water Fund program. Flows from industrial dischargers and reserve capacity at the treatment plant for flows beyond 10 years from the time of the project completion are not eligible for the low interest rate financing. The costs associated with facilities to treat these flows would be financed at the current market interest rate of 4.30%.

Assuming that the project is 60% eligible for the reduced interest rate loan (2.365%), 5% eligible for the 0% interest loan, with the remaining amount financed at market interest rate (4.30%), the debt retirement for a 20-year bond to finance $7,674,000 would be approximately $513,000 per year. The exact percentages of the improvement costs that would be covered by the low interest and zero interest loans will need to be evaluated through a parallel cost estimate.

The capital costs for the leachate pre-treatment portion of the project are estimated to be $1,300,000. Table 7-3 shows the equipment costs and supplemental costs as they relate to leachate treatment.

Table 7-3
Rice Lake WWTP
Summary of Leachate Pre-treatment Costs

Item	Cost
Leachate Treatment	
Leachate Storage	$85,000
Treatment Equipment	$625,000
Sitework and Demolition	$11,000
Instrumentation & Control	$63,000
Mechanical	$57,000
Electrical	$63,000
Subtotal Construction Cost	$904,000
General Conditions, Bonds, and Insurance	$72,000
Contingencies	$154,000
Construction Cost	$1,130,000
Engineering and Administration Fees	$ 170,000
Total Project Cost	**$1,300,000**

SEWER USER CHARGE IMPACTS

The landfill leachate treatment system will be funded separately through fees charged to the landfills. The remainder of the project capital cost will be paid for through a combination of funds from the Utility's Equipment Replacement Fund (ERF) and a Clean Water Fund loan.

The impact on user charge rates is dependent on the exact method of allocating the annual revenue requirement for capital and operating costs over the various user categories, usually determined through a detailed user charge study. The new user charge rates will have to generate sufficient revenue to pay for the annual debt service for the new loan plus the O&M costs for the expanded plant. The current average residential sewer bill is approximately $35 per quarter. Revenue needs will require rate increases to bring the residential rate up by the end of the year 2011. The actual required increase will depend on the amount of funding taken from the ERF, as shown in Table 7-4. It should be noted that the final cost allocation and user charge rates will be determined from a user charge study after final project costs, CWF program impacts, and method of financing are determined.

Table 7-4
Residential Rate Impact Analysis
Rice Lake WWTF Upgrade Project

Contribution from ERF	Project Loan Amount (1)	Annual Debt Service $/year	Sewer Charge $/1000 gals	Quarterly Charge	Net Increase above existing rate(2) $/quarter	% Increase
$0	$6,400,000	$428,426	$2.69	$42.90	$7.56	21.4
$2,400,000	$4,000,000	$267,766	$2.49	$40.45	$5.11	14.5
$4,400,000	$2,000,000	$133,883	$2.32	$38.41	$3.06	8.7
$5,400,000	$1,000,000	$66,942	$2.24	$37.39	$2.04	5.8

Notes:
1. Total project cost = $7,700,000 / $1,300,000 deducted for leachate treatment
2. Existing average residential rate = $35.34/quarter, incl. $10.08 fixed charge

Institutional Responsibilities

The financial, legal and institutional authority of the City of Rice Lake Utilities is vested in Wisconsin State Statues. The Utilities will provide management capabilities for the operation and maintenance of a wastewater treatment facility. It will be the responsibility of the Utilities to

provide the necessary operating personnel to perform the following activities:

1. Perform all regular and incidental maintenance operations at the treatment facility, as required, to ensure optimum treatment efficiency.
2. Collect and analyze samples of the raw influent, plant effluent, and all other samples as required, by State of Wisconsin regulations.
3. Operate the wastewater treatment facility in a clean, efficient and safe manner.

IMPLEMENTATION SCHEDULE

The steps and anticipated schedule for implementing the recommended plant are outlined below:

Conduct Public Hearing	May 2009
Submit Facilities Plan to DNR	May 2009
DNR Approval of Facilities Plan	July 2009
Begin Design	July 2009
Submit Plans and Specifications to the DNR	January 2010
Bidding	February 2010
DNR Approval of Plans and Specifications	March 2010
Submit Clean Water Fund Application*	March 2010
Award of Contract	March 2010
Begin Construction	April 2010
Final Completion/Startup of Facilities	June 2011

* Required for Clean Water Fund Loan

PUBLIC PARTICIPATION

This section will be added at a later time.