



Managing Small Domestic Wastewater Systems: Part A, Asset Management

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Introduction

This publication is Part A of a five-part series *Managing Small Domestic Wastewater Systems* (TCEQ publication series RG-530) and includes worksheets and instructions to help you conduct an inventory of your utility's resources, prioritize repairs and replacements of assets, plan for future needs, and develop a budget. An electronic version of Part A is available at the TCEQ Small Business and Local Government Assistance section's Wastewater Compliance Tools at <www.tceq.texas.gov/goto/rg-530>.

As you work through Part A, you may find it beneficial to review other parts of the series to help you prepare a comprehensive asset-management plan. To view or download the complete series go to the webpage <www.tceq.texas.gov/goto/rg-530>. If you do not have internet access, call the SBLGA's hotline number 800-447-2827 to request a paper copy of the complete series *Managing Small Domestic Wastewater Systems* (RG-530).

Note: This publication is not a substitute for the actual rules. To obtain the most current, official copy of state rules, contact the Secretary of State's office at 512-463-2827. The rules are also available online at <[texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=2&ti=30](http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=2&ti=30)>.

Asset Management: The Basics

What is asset management?

Asset management can be defined as “a planning process that ensures that you get the most value from each of your assets and have the financial resources to maintain, repair, or replace them when necessary.” This includes “developing a plan to reduce costs while increasing the efficiency and the reliability of your assets.”* For a wastewater utility, an “asset” includes the treatment facility, along with any building, tool, piece

* *Asset Management: A Handbook for Small Water Systems*. U.S. Environmental Protection Agency, 2003, page 5.

of equipment, furniture, pipe, and machinery used in the operation of the system.

Asset management can help you get the most out of the assets that make up your system by prioritizing repairs and budgeting for equipment replacement. It can also help you maintain the financial capacity to make scheduled repairs and planned replacement of assets *before* there is a crisis.

When planning to replace assets, you should consider upgrading to energy-efficient and water-saving equipment and processes. Including these upgrades in your proposed plans may assist you in finding funding for your project. Part B of this series, *Sustainable Systems* (RG-530b), further discusses making energy assessments and choosing more efficient equipment.

This guide includes instructions and worksheets to help you complete each of the four steps of asset management. You should adjust your plan based on your own experience and the particular characteristics of your system. You should also reevaluate your plan every year, updating each of the worksheets in this booklet. Your plan is useful only as long as it reflects the current conditions of your wastewater utility.

To ensure that your system is sustainable for the next 5 to 30 years, it is important to evaluate immediate needs along with future needs. For successful asset management planning to occur, you must consider:

- potential growth or decline in population served
- inflation
- overall age and life span of the infrastructure within your system
- overall plant performance
- equipment and installation costs
- engineering costs

If you have not evaluated the sustainability of your utility and you are not maintaining compliance with your permit, you should refer to Part B of this series, *Sustainable Systems* (RG-530b), to ensure that you consider energy reduction and water conservation, as well as functional wastewater treatment in your upgrades. You may find it necessary to adjust your budget if you need to modify your existing system or build a new one.

For help with evaluating the effectiveness of your treatment processes, refer to Appendix A, Treatment Assessment Tool, in Part E of this series, *Resources* (RG-530e). This tool can help you track trends that may lead to additional financial planning for modifications to current treatment processes. Also, Tables 2 and 3 in Part E illustrate pros and cons of different treatment technologies which may help with making decisions about your treatment processes.

How do I practice asset management?

Step 1. Take an inventory of your system and prioritize your assets.

Document what assets you have and prioritize each asset based on how critical it is to your plant operations. This will help you make informed decisions to ensure that you have funds available for the maintenance, repair, or replacement of the vital parts of the system.

Step 2. Develop a comprehensive plan for managing your assets.

Based on your prioritization in Step 1, identify the maintenance, repairs, and replacements you expect to make in the next five years. Estimate how much money your system needs to set aside or reserve for these expenses.

Step 3. Develop a budget for managing your assets.

Based on your comprehensive plan from Step 2, identify your expected revenues for the next five years—and compare them to your expected expenses. This may involve a rate study.

Step 4. Implement your asset-management plan.

Once you complete the initial three steps of your asset-management plan, you need to implement it. Work with your management team—including council and board members, if appropriate—to complete your identified repairs and maintenance and to make sure that you have the technical and financial means to ensure reliable service.

1. Inventory Your System and Prioritize Your Assets

Use Worksheet 1, System Inventory and Prioritization, at the end of this section to create a comprehensive inventory of your system and to prioritize your assets. Developing an accurate inventory of your system's assets is important to their overall management, as all other steps will refer to the data gathered during this step. It will also help you to establish the relative importance or criticality of the equipment and components of your system. A utility's assets include the facilities that make up the wastewater system as well as all the equipment and supplies that are used to operate the plant.

Fill Out the System Inventory and Prioritization Worksheet

Before you begin to fill in the columns on Worksheet 1, fill in the date and check the appropriate box to indicate whether you are making the first inventory of your system or updating an existing inventory. You should update this worksheet at least once a year. You can either make minor adjustments to the worksheet as the condition of your assets change, or start a new worksheet each year.

1. Identify your assets.

List each of your utility's assets, including emergency generators, electrical systems, sewer pumps, blowers, aerators, meters, buildings, vehicles, structures, and all other physical assets and their year of installation. Be as specific as possible by including the location, manufacturer, material composition, horsepower (hp), gallon-per-minute (GPM) capacity, or other identifying characteristics for each asset, or refer to your operations and maintenance manual. This information will be useful when calculating replacement costs in step 7. For example, you might list a piece of equipment as "Totalizing flow meter 1, 0.90 PSI, 2003."

2. Describe the redundancy.

Briefly describe the redundancy of each of the system's assets. Are there backups? Are there different assets that can do the same job? Keep in mind: some redundancy may be required by rule.

3. Fill in the expected useful life.

Use the manufacturer's recommendations, if available, or the information in Table 1, Estimated Useful Life Span for Standard Equipment, to enter the expected useful life for each asset. Table 1 provides the estimated useful life span for many standard pieces of equipment, assuming proper maintenance has been conducted. For new equipment, use the higher end of the expected useful life.

Keep in mind the current condition of each asset as well as historical routine maintenance, repairs, and rehabilitation. If you don't have a recordkeeping system, refer to the Repair Work Order Worksheet in Part C of this series, *Operations and Maintenance* (RG-530c), to keep track of future maintenance and repairs. Focus on conditions that may affect the asset's useful life (e.g., rust or broken parts). If your asset is in poor condition, has not been maintained according to the manufacturer's recommendations, or operates under challenging circumstances (varying wastewater concentrations, extreme climate changes, proximity to coastal areas, etc.), then the expected useful life is likely to be on the lower end of the range. If the asset is in good condition and has been properly maintained according to the manufacturer's recommendations, use the higher end of the expected useful life. Choosing the lower end of the useful-life range will produce a more conservative estimate, which will help to ensure that you are prepared to replace the asset in a worst-case scenario.

4. Record the age.

For each asset, fill in how long it has been in use. If an asset has been previously used by another system, you should list the total age, not just the length of time your system has used it.

Table 1. Estimated Useful Life Span for Standard Equipment

Asset	Expected Useful Life (years)
Buildings	~30
Chlorination equipment	5-7
Computers	~5
Collection pipes	40-50
Conveyors	10-15
Electrical systems	10-12
Fencing	10-20
Generators	15-20
Lab and monitoring equipment	7-10
Landscaping and grading equipment	30-40
Meters	7-10
Office furniture and supplies	~10
Other treatment equipment	8-12
Pond transfer pipes	30-40
Screening systems	10-20
Sewer pumps	5-10
Storage cylinders	~5
Storage tanks, chemical	25-30
Tools and shop equipment	10-15
Transportation equipment	~10
Valves	35-40
Weirs	20-25

5. Calculate the remaining useful life.

For each asset, calculate the remaining useful life by subtracting its age (column 4) from its adjusted useful life (column 3).

6. Calculate the expected replacement year.

For each asset, calculate the expected replacement year by adding the remaining useful life (column 5) to the current year.

7. Calculate the cost to replace.

You can estimate the cost of buying and installing a new piece of equipment, based on your knowledge from completing similar projects, on information from a neighboring system that has done similar work, or on bids from vendors.

When estimating the cost of replacing each asset, take into account the expected replacement year, because inflation can affect replacement costs. It is a challenge to place a specific value on future costs because we cannot predict changes in the economy. For assets that have a remaining useful life of more than 10 years, the utility should consider the average inflation rate over a 10-year period, or set aside some reserve funding to account for inflation.

Generally the best way to obtain an estimate of the inflation cost per year is to use a federal, state, or locally established inflation rate, if available. Local economic-development corporations, along with local universities, are a good source for local inflation rates. The Texas comptroller's website at <www.window.texas.gov> has information on inflation rates, as does the U.S. Bureau of Labor Statistics, on its Consumer Price Index webpage at <www.bls.gov/cpi>.

If you are unable to obtain this information from your local economic-development corporation or those government sources, we suggest you use an average inflation rate of 5 percent per year.

Costs for larger asset improvement projects are hard to verify due to the complexity of the project and you will most likely need assistance from a consultant. Table 2, Capital Cost Estimates, shows how these costs are typically structured.

Table 2. Capital Cost Estimates

Factor	Capital Cost
Equipment Cost	Technology-Specific Cost
Installation*	25 to 55 percent of Equipment Cost
Piping	31 to 66 percent of Equipment Cost
Instrumentation and Controls	6 to 30 percent of Equipment Cost
Total Construction Cost	Equipment + Installation + Piping + Instrumentation and Controls
Engineering	15 percent of Total Construction Cost
Contingency	15 percent of Total Construction Cost
Total Indirect Cost	Engineering + Contingency
Total Capital Cost	Total Construction Cost + Total Indirect Cost

*Installation costs could be higher, based on the complexity of the installation.

8. Set the priority level.

For each asset, consider how critical it is to the operation of your system, its remaining useful life, the availability of other assets to replace it or be used as a backup for it, its maintenance history, and any other factors important in evaluating its priority for receiving funding. Rank each asset from “1” to “5,” where “1” is the highest priority and “5” is the lowest. Use the information in Table 3, Prioritization Rating, to determine how each asset should be rated. Because there are only five priority levels, some assets will have the same priority.

When ranking assets, keep in mind that assets in the following three categories should be assigned a higher priority:

- Assets with a shorter remaining useful life, because you will need to rehabilitate or replace them relatively soon. How likely is it that the asset will fail? Base this evaluation on the asset’s age, condition, and failure history.
- Assets that are *critical* to your operation, because of the system’s responsibility for protecting public health and the environment.
- Assets for which your system has less redundancy, because the system would have trouble operating without them.

Table 3. Prioritization Rating

Description	Priority
Effective life exceeded and/or excessive maintenance cost incurred. A high risk of breakdown or imminent failure with serious impact on performance. No additional life expectancy; immediate replacement or rehabilitation needed. Asset is highly critical to infrastructure of system and in providing adequate treatment and maintaining compliance.	1
Very near end of physical life. Substantial ongoing maintenance with short, recurrent maintenance levels required to keep the asset operational. Unplanned corrective maintenance is common. Renewal (refurbishment or replacement) is expected within the next year or two.	2
Asset functions but requires a sustained high level of maintenance to remain operational. Shows substantial wear and performance is likely to deteriorate significantly. Renewal (refurbishment or replacement) is expected within the next two to three years.	3
Asset is sound and well-maintained but may be showing some signs of wear. Delivers full efficiency with little or no performance deterioration. Virtually all maintenance is planned and preventive. At worst, only minor repair might be needed at this time.	4
Asset is like new, fully operable, and well-maintained, and performs consistently at or above current standards. Little wear shown and no further action required.	5

MANAGING SMALL DOMESTIC WASTEWATER SYSTEMS: ASSET MANAGEMENT
Worksheet 1. System Inventory and Prioritization

This worksheet is designed to help you inventory and prioritize your utility's assets.
 Make copies if you need additional pages.

Date _____ Initial Inventory Update

1. Asset and Year Installed	2. Redundancy	3. Expect Useful Life (years)	4. Age (years)	5. Remaining Useful Life (years)	6. Expected Replacement Year	7. Cost to Replace (\$)	8. Priority (1 to 5, high to low)
<i>Example: Totalizing flow meter (0.90 PSI), 2003</i>	<i>None</i>	<i>15</i>	<i>12</i>	<i>3</i>	<i>2018</i>	<i>\$5,000</i>	<i>2</i>

1. <i>Asset and Year Installed</i>	2. <i>Redundancy</i>	3. <i>Expect Useful Life (years)</i>	4. <i>Age (years)</i>	5. <i>Remaining Useful Life (years)</i>	6. <i>Expected Replacement Year</i>	7. <i>Cost to Replace (\$)</i>	8. <i>Priority (1 to 5, high to low)</i>

2. Develop a Comprehensive Plan

Use the Comprehensive Planning Worksheet (Worksheet 2) at the end of this section to generate a cost-management plan for your system's assets.

Adapted from an EPA worksheet, our Worksheet 2 is a tool to assist in identifying the funding and other resources required for long-term, continued operation.

Fill Out Worksheet 2: Comprehensive Planning

Before you begin to fill in the columns on the worksheet, fill in the date, and check the appropriate box to indicate whether you are generating the first comprehensive plan for your utility's assets or updating an earlier plan. You should update this worksheet at least once a year. You can either make minor adjustments to the worksheet as the condition of your assets change, or start a new worksheet each year.

1. List your prioritized assets.

List the assets from Worksheet 1, with the highest-priority (lowest-numbered) assets first.

2. List maintenance, repair, and replacement activities.

For each asset, list the maintenance, repair, and replacement activities that you expect to perform over the next five years. If you plan to add a new clarifier, state, "add new clarifier." Include enough detail for each activity so that you can determine its cost. Be sure to include anticipated employee costs.

3. Estimate years until action is needed.

For each activity, fill in the number of years before you will need to perform that task. For annual activities, enter "1." For replacement activities, enter the remaining useful life you estimated in column 5 of Worksheet 1.

4. Estimate cost.

Fill in the estimated cost for each activity. Make sure it's the complete cost, including preparation, cleanup, removal, and disposal of any waste.

If you expect to sell an asset at the end of its useful life, subtract the estimated sale price from the cost of a new item, and enter the difference.

5. Calculate the financial reserve required per year.

For each asset, calculate the reserve required by dividing the cost by the years until the action will be needed. This is the estimated amount of money that your utility needs to set aside each year ("Reserve Required per Year" on the worksheet) for that asset.

6. Calculate the total financial reserve required in the current year.

Add the reserves required per year for each item to calculate the total reserve required in the current year. This is the estimated amount of money that your system needs to set aside, starting this year, in order to pay for all of the maintenance, repair, and replacement.

7. Repeat the process for the next four years.

To create a five-year plan, you should complete a separate comprehensive planning worksheet for each of the next four years. This will allow you to compare how much reserve money will be required if the cost is spread out over a longer period of time.

You can then use this information to determine whether a potential rate increase, customer surcharge, state or federal grant or loan, or other source of funding will be required.

MANAGING SMALL DOMESTIC WASTEWATER SYSTEMS: ASSET MANAGEMENT
Worksheet 2. Comprehensive Planning

This worksheet is designed to help you generate a comprehensive plan for maintaining your utility's assets. Make copies if you need additional pages.

Date _____ Initial Plan Update

1. Asset <i>(list from highest to lowest priority)</i>	2. Activity	3. Years Until Action is Needed	4. Cost (\$)	5. Reserve Required per Year (\$) <i>(No. 4 / No. 3)</i>
<i>Example:</i> 1. Collection pipe between 1st and 2nd Streets	Replace	2	\$60,000	\$30,000
<i>Example:</i> 2. Collection pipe between 3rd and 4th Streets	Replace	3	\$60,000	\$20,000

1. Asset <i>(list from highest to lowest priority)</i>	2. Activity	3. Years Until Action is Needed	4. Cost (\$)	5. Reserve Required per Year (\$) <i>(No. 4 / No. 3)</i>
6. Total Reserve Required in the ____[†] Year:				

[†] *Fill in the blank as to whether this is the reserve required for the 1st, 2nd, 3rd, 4th, or 5th year of your comprehensive plan.

3. Calculate Your Budget

Use the Annual Budget worksheet (Worksheet 3) at the end of this section to calculate an annual budget for your utility.

Fill Out the Budget Worksheet

Before you begin to fill in the columns on the worksheet, fill in the date, indicate the fiscal year that the budget covers, and check the appropriate box to indicate whether you are generating the first budget for your utility or updating an earlier budget. You should update this worksheet at least once a year. You can either make minor adjustments to the worksheet as the condition of your assets changes, or start a new worksheet each year.

1. List your revenues.

In the “Revenues” column, list all your utility’s revenue sources and the dollar amount each source is expected to provide in the coming fiscal year. In the space labeled “Sewer Charges,” enter the revenue you expect to collect for sanitary-sewer services. For “Fees and Service Charges,” list all late fees, fees for establishing and transferring service, impact fees, and other fees. In the “Interest” space, enter any interest you expect to accrue on the system’s investments. If your utility has other sources of income not listed on the worksheet, enter them in the blank lines below “Other.” Calculate your total annual revenue by adding all the revenues you listed. Enter this number in the box labeled “1. Total Annual Revenue.”

2. List your expenses.

In the “Expenses” area, list the sources of your utility’s expenses and the dollar amount each source is expected to draw in the coming fiscal year. If your utility has other general expenses not listed on the worksheet, enter them in the blank lines below “Other.” Calculate your total annual expenses by adding all the expenses you listed. Enter this number in the box labeled “2. Total Expenses.”

3. Calculate your net income.

Calculate your net income by subtracting your expenses from your revenue. Enter this number in the box labeled “3. Net Income.”

4. Enter your net income.

Transfer the result of box 3 to the box labeled “4. Net Income.”

5. Enter your total required reserves.

In the “Total Required Reserves” (box 5), insert the amount of total reserves in the current year from Worksheet 2, Comprehensive Planning (line 6).

6. Calculate additional reserves needed now and into the future.

Subtract your total required reserves (box 5) from your net income (box 4). Enter this number in the box labeled “6. Additional Reserves Needed.”

If the result is a positive number, you have no shortfall to make up for and can set aside the required funds in a reserve account. If the result is a negative number, you should start planning ways to make up for the shortfall.

To make up for the needed resources, you might increase rates, charge customers a surcharge, or seek state or federal funding through grants or loans. The Texas Water Infrastructure Coordination Committee, described in Part E of this series, *Resources* (RG-530e), can help your system identify appropriate funding sources

7. Plan for the future.

To get a picture of future financial needs, complete the budget worksheet for the next four years—or longer, depending on the system’s needs. This will allow you to forecast expenditures for expensive repairs or replacement items. Therefore, you can avoid drastic increases in rates, surcharges, or loans that the system may have to pay back for many years to come.

MANAGING SMALL DOMESTIC WASTEWATER SYSTEMS:
ASSET MANAGEMENT

Worksheet 3. Annual Budget

This worksheet is designed to help you identify your utility’s revenues and expenses and calculate your budget. Make copies if you need additional pages.

Date _____ Fiscal Year of Budget _____

Initial Budget Update

Revenues	Operating Income	Description
Sewer Charges		Revenue from the sewer utility—include all customers (actual or projected receipts)
Usage Fees and Service Charges		Include late payments, forfeited deposits, surcharges, impact fees, etc.
Reserve Interest Earned		Interest accrued from reserve accounts or other investments
Other Income (specify):		Itemize other income not elsewhere classified
Other Income (specify):		
Other Income (specify):		
1. Total Annual Revenue	\$	

Expenses	Operating Costs	Description
Regular Maintenance and Repair		Cost of performing regular or routine maintenance and repair on equipment
Utilities, Rent, and Other Overhead		Other overhead may include billing, building maintenance, cleaning, etc.
Salaries and Benefits		Include administrative and operations staff
Operating Supplies		Operating supplies not classified elsewhere
Equipment Leases		Include all equipment leases

Expenses	Operating Costs	Description
Chemicals		Chemicals expensed in prior years, but not used, should be included for initial budgets
Monitoring and Testing		Include laboratory fees for projected monthly and annual sampling requirements
Insurance and Bonds		Costs of insuring buildings, equipment, etc.
Professional Services		Accounting, legal, engineering & other professional (not related to capital projects)
Training and Licenses		Cost of operator training courses and license renewal fee
Security		Cost of maintaining security related items (i.e., fencing, alarms, etc.)
Debt Repayment		Include interest paid on debt
Transfer to Reserved Funds		For capital expenditures
Other (specify):		Itemize other expenses not classified elsewhere
Other (specify):		
Other (specify):		
Other (specify):		
Other (specify):		
2. Total Expenses	\$	
3. Net Income (Revenue – Expenses)	\$	

Additional Reserves Needed	Amount
1. Net Income (from 3. Net Income)	\$
2. Total Required Reserves (from Comprehensive Planning Worksheet 2)	\$
3. Additional Reserves Needed (Net Income – Total Required Reserves)	\$

4. Implement Your Asset-Management Plan

Congratulations! You have completed the initial three steps of your asset-management plan: inventory development and asset prioritization, comprehensive planning, and budget building. Now you must work with your management team, including council and board members, if appropriate, to implement the plan. This process should help ensure you have the technical and financial means necessary to offer reliable service. Ideally, you should create a plan for at least the next five years.

Hold a Meeting

Arrange a meeting with your management team. Give these items to each management team member:

- Map of the system.
- List of current assets, identifying for each the value, or cost to replace, and the remaining useful life (from Worksheet 1).
- List of priority asset maintenance, repairs, and replacements (from Worksheet 1).
- List of costs associated with the expected repairs or replacements (from Worksheet 2).
- Current budget allotment as well as the projected budgetary requirements (from Worksheet 3).

Prioritize

You may find that your current budget will cover only one or two of your priority needs. Explain why these items are priorities and the manner in which you plan to take care of them. Discuss each of the items on the priority list and how you plan to address them, creating an action timeline with a projected budget. If the current budget is lower than what you need to take care of priority items, discuss potential funding options for management input and approval, and develop a plan to obtain needed funding.

Communicate Regularly

Keep your management team updated with quarterly progress reports. This will reinforce your dedication to the plan and help make certain that your system is functioning optimally. It will also ensure that you maintain management support throughout the implementation process.

Update Changes

Keep up with the changes that occur as your plan is implemented, including changes in the system's equipment, finances, and personnel. This will help ensure that you successfully manage your utility's assets.

Conduct a Rate Study

If you determine that your utility is not bringing in enough money to be sustainable or to complete necessary improvements, you may need to raise your rates. You should conduct a rate study before raising your rates.

Keep in mind, rate studies are often required before outside funding can be obtained. For help with rate studies and rate setting, the Public Utility Commission of Texas (PUC) offers free one-on-one assistance.

The PUC's publication Utili-Facts explains types of assistance available and how to get assistance. For more information about this program go to www.puc.texas.gov/consumer/facts/factsheets/waterfacts/UtilityOnsiteAssistance.pdf or call the PUC's Water Utility Division at 512-936-7405.

Need more help?

The TCEQ's Financial, Managerial and Technical Assistance Program offers free contractor on-site assistance to help you analyze your planning options and help you with all aspects of running and funding your wastewater system. For more information about the program, visit the webpage www.tceq.texas.gov/utilities/fmt, call the Water Supply Division at 512-239-4691, or contact the SBLGA representative in your

region by calling our toll-free, confidential compliance hotline, 800-447-2827.

Many state and federal funding agencies have grants and loans available for planning and development of new wastewater treatment plants and infrastructure improvements. The Texas Water Infrastructure Coordination Committee (TWICC) is a group of local, state, and federal agencies that collaborate to identify issues with water and wastewater infrastructure and compliance, and to seek affordable, sustainable, and innovative funding strategies for the protection of public health and efficient use of government resources in Texas. You can contact TWICC by phone at 512-463-7870, by e-mail at <TWICC@twdb.state.tx.us>, or by fax at 512-475-2086 or visit the website at <www.twicc.org> to learn more information about the program.

For More Information

For confidential assistance with environmental compliance, contact the Small Business and Local Government Assistance Hotline at 800-447-2827, or visit <www.TexasEnviroHelp.org>.