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Managing Small Public Water Systems: Part A, Asset Management

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Introduction

This publication is Part A of a five-part series titled Managing Small Public Water Systems[1] (RG-501). It includes worksheets and instructions to help you:

- conduct an inventory of your public water system's resources,
- prioritize repairs and replacements of assets,
- plan for future needs, and
- develop a budget.

The asset management worksheets are also available online as a Microsoft Excel workbook. The full asset management series is also available on the TCEQ Small Business and Local Government Assistance (SBGLA) Section's Public Water Supply Compliance Resources[2] webpage.

Note: This document is a general guide to the laws and regulations on public water systems. It does not replace those laws and regulations, which take priority over any information supplied here. To obtain the most current, official copy of state rules for public drinking water, refer to Title 30, Texas Administrative Code, Chapter 290.[3]

1. www.tceq.texas.gov/assistance/water/managing-small-public-water-systems-rg-501
2. www.tceq.texas.gov/assistance/water/pdws/pws.html
3. www.tceq.texas.gov/goto/rules/30-tac-290

Understanding and Practicing Proper Asset Management

The Environmental Protection Agency (EPA) recommends that public water systems develop an asset management plan to maximize the value of their assets and be financially prepared to rehabilitate and replace them when necessary (see EPA's Simple Tools for Effective Performance Guide[4]). For a water system, an "asset" includes, but is not limited to, their source of water (aquifer or surface water), along with any building, tool, piece of equipment or machinery, and piping used in the operation of their system.

Asset management can help you—the manager or operator of a water system—get the most value out of the assets that make up your water system by prioritizing repairs and budgeting for equipment replacement. It can also help you support your financial capability to make scheduled repairs and planned replacements of assets before there is a crisis.

When replacing assets, you should consider upgrading them to energy-efficient and water-saving equipment and processes. Including these upgrades in your proposed plans may help you find funding for your project. Part B of this series, Source Assessment and Planning[5] (RG-501b), further discusses making energy assessments and choosing more efficient equipment.

To ensure 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 the population you serve.
- Equipment and installation costs.
- Inflation.
- Overall age and life span of the infrastructure within your system.
- Engineering costs.

This guide includes instructions and worksheets, discussed in the following steps, to help you create your own asset management plan. Adjust the plan based on your experience and the individual needs of your water system. This plan should be reevaluated annually by updating each of the worksheets provided in this booklet. Your plan is most effective when it reflects the current condition of your water system.

Step 1. Inventory your system and prioritize your assets.

List all your assets and prioritize each asset based on how critical it is to the operation of your public water system. This will help you make informed decisions to ensure that

4. www.epa.gov/dwcapacity/simple-tools-effective-performance-step-guide-series
5. www.tceq.texas.gov/downloads/assistance/publications/rg-501b.pdf

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 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. A rate study may be needed to increase revenue for future expenses.

Step 4. Implement your asset management plan.

Once you complete the first three steps of your asset management plan, you then need to implement it. Work with your management team (including any council or board members) to complete your identified repairs and maintenance, and verify you have the technical and financial means to provide reliable service.

Inventory Your System and Prioritize Your Assets

A public water system's assets include the facilities that make up the water system and all of the equipment and supplies that are involved in the plant's operation. Use Worksheet 1: System Inventory and Prioritization (located at the end of this section) to create a comprehensive inventory of your water system and prioritize your assets. Developing an accurate inventory of your water system's assets is important to overall asset management. This will help you establish the relative importance of equipment and other components of your system that are critical to operations.

The most significant asset of a water system is the water source. A properly run system is worthless without a reliable water source and delivery system. It is important to assess the health and sustainability of your water source. Use Part B of this series, Source Assessment and Planning (RG-501b), for guidance in managing your water source. You may find it necessary to adjust your budget if you need to drill a new well or make an interconnection with another water system.

You will need to assess your source to ensure that it is able to provide water for your system and is dependable for the long term. If you have assessed your source and you know your source is dependable for the long term, you may not need to include expenses for well drilling or rehabilitation in this year's budget. However, it is good practice to assess your source annually to ensure that your system maintains an adequate water supply.

How to Fill Out Worksheet 1: System Inventory and Prioritization

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 making an initial inventory of your system or updating an existing inventory. You should update this worksheet at least once a year. For updating this worksheet, you can either make minor adjustments to your worksheet as the condition of your assets change, or start a new worksheet each year.

Step 1. Identify your assets.

List each of your public water system's assets, including pumps, chlorinators, wells, tanks, buildings, vehicles, intake structures, booster or pump stations, water mains, and all other physical assets, in addition to the year of installation for each. Be as specific as possible by providing identifiers such as:

- location
- manufacturer
- material composition
- horsepower (hp)
- gallon-per-minute (gpm) capacity

For example, you might list a piece of equipment as “Well 1 pump (25 hp, 200 gpm), 2025” or a section of your distribution system as “10-inch PVC on Main St.”

This information may also be included in your Operations and Maintenance (O&M) manual. Part C of this series, Operations and Maintenance[6] (RG-501c), can assist you in developing an O&M manual if you do not already have one. This information will be useful when calculating replacement costs in Step 7.

Step 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?

Step 3. Fill in the expected useful life.

Use the manufacturer’s recommendations, if available, or the information in Table 1 to enter the expected useful life for each asset. Table 1 provides the estimated useful life span for many standard pieces of equipment, assuming regular maintenance.

Keep in mind the current condition of each asset as well as routine maintenance activities, repairs, and rehabilitation. Work orders can help you track your maintenance and repairs.

Focus on conditions that may affect your assets’ useful life (for example, rust or broken parts):

- If your asset is in poor condition due to improper maintenance (e.g., not following manufacturer’s recommendations) or operates under challenging circumstances (such as poor water quality or excessive use), then the expected useful life is likely to be on the lower end of the range.
- If the asset is in good condition and 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 may help to ensure that you are prepared to replace the asset in a worst-case scenario.

6. www.tceq.texas.gov/downloads/assistance/publications/rg-501c.pdf

Table 1: Estimated Useful Life Span for Standard Equipment

Asset	Expected Useful Life (years)
Backflow prevention	8-15
Blow-off valves	35-40
Buildings	Around 30
Chlorination or disinfection equipment	10-15
Computers	Around 5
Distribution pipes	35-40
Electrical systems	7-10
Fencing	10-20
Galleries and tunnels	30-40
Generators	10-20
Hydrants	Around 40
Intake structures	35-45
Lab and monitoring equipment	5-7
Landscaping and grading equipment	Around 40
Meters	10-15
Office furniture and supplies	Around 10
Other treatment equipment	10-15
Pumps	10-15
Service lines	Around 30
Storage tanks	Around 30
Tools and shop equipment	10-15
Transmission mains	35-40
Transportation equipment	Around 10
Valves	35-40

Step 4. Record the age.

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

Step 5. Calculate the remaining useful life.

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

Step 6. Calculate the expected replacement year.

For each asset, calculate the expected replacement year (column 6) by adding the remaining useful life (column 5) to the current year.

Step 7. Calculate the cost to replace.

You can calculate your estimate on the cost of buying and installing a new piece of equipment based on:

- Your knowledge from completing similar projects.
- Information from a neighboring system that has done similar work.
- Bids from vendors.

When estimating the cost of replacing each asset, factor in the expected replacement year, as 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 system should consider the average inflation rate over a 10-year period or set aside reserve funding to account for inflation.

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 reliable sources for local inflation rates. The Texas Comptroller's website[7] has information on inflation rates, as does the U.S. Bureau of Labor Statistics.[8]

If you are unable to obtain this information from your local economic-development corporation or one of the previously listed sources, we suggest you use an average inflation rate of 5% per year.

Step 8. Set the priority level.

For each asset, consider:

- how critical it is to the operation of your system,
- its remaining useful life,

7. comptroller.texas.gov/economy/key-indicators/
8. www.bls.gov/cpi/

- the availability of other assets to replace it or use 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 provided in Table 2 to determine each asset priority level. Since there are only five priority levels, some assets will have the same priority level.

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

- Assets with a shorter remaining useful life because you will need to rehabilitate or replace them soon. Consider 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.
- Assets for which your system has less redundancy because the system would have trouble operating without them.

Table 2: Prioritization Rating

Prioritization Rating	Description
1	• Effective life exceeded or excessive maintenance cost incurred. • A considerable risk of breakdown or imminent failure with a serious impact on performance. • No additional life expectancy—immediate replacement or rehabilitation needed. • The asset is extremely critical to the infrastructure of the system and in providing safe drinking water and maintaining compliance.
2	• The asset is near the end of physical life. • Substantial ongoing maintenance with short, recurrent maintenance levels required to keep the assets operational. • Unplanned corrective maintenance is common. Expect renewal of the asset (refurbishment or replacement) within the next year or two.
3	• The asset functions, however, may require a sustained high-level of maintenance to remain operational. • Shows substantial wear and is likely to cause significant performance deterioration. Expect renewal (refurbishment or replacement) within the next two to three years.
4	• The asset is sound and well-maintained but may show some signs of wear. • Delivers full efficiency with little or no performance deterioration. • It will have planned and preventive maintenance. At worst, the asset may only require minor repairs.
5	• The asset is like-new, fully operable, and well-maintained. • Performs consistently at or above current standards. • It shows minor wear, and no further action is required.

Worksheet 1: System Inventory and Prioritization

This worksheet is to help you create an inventory and prioritize your water system's assets. Make copies if additional pages are needed.

Date: _____ ☐ Initial Inventory ☐ Update

1. Asset and year installed	**2. Redundancy**	**3. Expected 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)
Example *Well 1 pump (25 hp, 200 gpm)*	*Backup pump (25 hp; 200 gpm)*	*15*	*1*	*14*	*2040*	*$35,000*	*4*
Example *Chlorinator, 2018*	*No backup*	*10*	*8*	*2*	*2028*	*$6,000*	*1*

1. Asset and year installed	**2. Redundancy**	**3. Expected 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)

Develop a Comprehensive Plan for Managing Your Assets

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

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

How to Fill Out Worksheet 2: Comprehensive Planning

Before you begin to fill in the worksheet, fill in the date and check the appropriate box to indicate whether you are generating the first comprehensive plan or updating an earlier plan for your water system assets.

You should update this worksheet at least once a year. You can make minor adjustments to the worksheet as the condition of your assets change or start a new worksheet each year.

Step 1. List your prioritized assets.

List the assets from **Worksheet 1**, with the highest priority (lowest numbered) assets first. If you plan to drill a new well, include it as an asset (for example, New Well #5).

Step 2. List repair and replacement activities.

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

Step 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.**

Step 4. Estimate cost.

Fill in the expected cost for each activity. Make sure it is 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 the new asset and enter the difference.

Step 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 is needed. This is the estimated amount of money that your public water system needs to set aside per year ("Reserve Required per Year" on the worksheet) for that asset.

Step 6. Calculate the total financial reserve required in the fiscal year.

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

Step 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 the amount of reserve money required to spread the cost over a longer 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 necessary.

Worksheet 2: Comprehensive Planning

This worksheet is designed to help you generate a comprehensive plan for maintaining your water system's assets. Make copies if additional pages are needed.

Date: _____ ☐ Initial Inventory ☐ Update

1. Asset (list from highest to lowest priority)	**2. Activity**	**3. Years Until Action is Needed**	**4. Cost** ($)	**5. Reserve Required per Year** ($) (Divide No. 4 by No. 3)
Example: *Chlorinator*	*Replace*	*2*	*$6,000*	*$3,000*
	Purchase Redundant Unit	*3*	*$6,000*	*$2,000*

1. Asset (list from highest to lowest priority)	**2. Activity**	**3. Years Until Action is Needed**	**4. Cost** ($)	**5. Reserve Required per Year** ($) (Divide No. 4 by No. 3)

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.*	

Develop a Budget for Managing your Assets

Use Worksheet 3: Annual Budget at the end of this section to calculate an annual budget for your water system.

How to Fill Out Worksheet 3: Annual Budget

Before you begin to fill in the worksheet, you will need to 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 water system or updating an earlier budget.

You should update this worksheet at least once a year. You can make minor adjustments to the worksheet as the condition of your assets change or start a new worksheet each year.

Step 1. List your revenues.

In the "Revenue" table, list all of your water system's revenue sources and the dollar amount projected for each income source in the fiscal year.

- If your water system has other sources of income not listed on the worksheet, enter them and the expected income amount in the blank lines below "Other Income."

Calculate your total annual revenue by adding all the income amounts you listed. Enter this number in the box next to "1. Total Annual Revenue."

Step 2. List your expenses.

In the "Expenses" table, list the sources of your water system's expenses and the dollar amount each source may cost in the fiscal year.

- If your water system has other general expenses not listed on the worksheet, enter them and their expected costs in the blank lines below "Other."

Calculate your total annual expenses by adding together all the expected costs you listed. Enter this number in the box next to "2. Total Expenses."

Step 3. Calculate your net income.

Calculate your net income by subtracting your expenses from your revenue. Enter this number in the box next to "3. Net Income." Put the same number in the box next to "4. Net Income" to start the next step.

Step 4. Determine your additional required reserves.

Next to box "5. Total Required Reserves," insert the total reserves required from **Worksheet 2, Box 6** for the appropriate fiscal year.

Subtract your total required reserves (Box 5) from your net income (Box 4). Enter this number in the column next to Box 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 resources needed, you might increase rates with the approval of the Public Utility Commission of Texas (PUCT), charge customers a surcharge, or seek state or federal funding through grants or loans. The Texas Water Infrastructure Coordination Committee (TWICC), described in Part E of this series, Resources[9] (RG-501e), can help your system identify appropriate funding options.

Step 5. Plan for the future.

To get a picture of future financial needs, complete a new budget worksheet each year for the next four years, or longer depending on your system’s needs. This will allow you to forecast expenses for expensive repairs or replacement items, such as storage tanks, work trucks, and electronics.

By doing this, you can avoid drastic increases in rates, surcharges, or loans that the system may have to pay back for many years to come.

9. www.tceq.texas.gov/downloads/assistance/publications/rg-501e.pdf

Worksheet 3: Annual Budget

Use this worksheet to help you identify your water system's revenues and expenses and calculate your budget. Make copies if additional pages are needed.

Date: _____ Fiscal Year of Budget: _____

☐Initial Budget ☐Update

Revenue

Revenue Source	Income Amount	Description
Water Charges		Revenue from the sales of water – include all customers (actual or projected receipts)
Usage Fees		Include overdue payments, forfeited deposits, surcharges, impact fees, tap fees, etc.
Reserve Interest Earned		Interest accrued from reserve accounts or other investments
Other Income		Itemize other income not classified elsewhere
1. Total Annual Revenue	**$**	

Expenses

Expense	Expected Cost	Description
Regular Maintenance and Repair		Cost of performing regular or routine maintenance and repair on equipment
Utilities, Rent, and Other Overhead		Other overhead costs may include billing, building maintenance, cleaning, etc.
Salaries and Benefits		Include administrative staff and operations staff
Operating Supplies		Operating supplies not classified elsewhere
Equipment Leases		Include all equipment leases
Chemicals		Include chemical expenses for prior years, but not used in initial budgets
Monitoring and Testing		Include laboratory fees for projected monthly and annual sampling requirements

Expense	Expected Cost	Description
Insurance and Bonds		Costs of insuring buildings, equipment, etc.
Professional Services		Accounting, legal, engineering, and other professionals (not related to capital projects)
Training and Licenses		Cost of operator training courses and license renewal fees
Security		Cost of maintaining security related items (e.g., fencing, alarms, etc.)
Debt Repayment		Include interest paid on debt
Capital Improvement Savings		Set aside funds to budget for full or partial capital expenses
Other:		Itemize other expenses not classified elsewhere
2. Total Expenses	**$**	

Net Income

3. Net Income (Revenue - Expenses)	**$**	

Additional Reserves Needed

	Total Amounts
4. Net Income (from 3. Net Income)	**$**
5. Total Required Reserves (from Worksheet 2: Comprehensive Planning)	**$**
6. Additional Reserves Needed (Net Income - Total Required Reserves) (+/-)	**$**

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 the following items to each member:

- A map of the system.
- A list of current assets identifying the value for each, or the cost to replace them, as well as the remaining useful life of these assets (**Worksheet 1**).
- A list of priority asset repairs and replacements (**Worksheet 1**).
- A list of costs associated with the expected repairs or replacements (**Worksheet 2**).
- The current budget allotment as well as the projected budgetary requirements (**Worksheet 3**).

Prioritize

Discuss each of the items on the priority list and how you plan to address them, creating an action timeline with a projected budget.

You may find that your current budget will cover only one or two of your priority needs. Explain why these items are priorities and how you plan to take care of them.

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

Track the changes that occur when you implement your plan, including changes in the system's equipment, finances, and personnel. This will help ensure that you successfully manage your water system's assets.

Conduct a Rate Study

If you conclude that your water system is not earning enough money to be sustainable or complete necessary improvements, you may need to raise your rates.

You will need to contact PUCT for information and assistance with rate increase applications. You can contact PUCT at 888-782-8477 or by e-mail at DUO@puc.texas.gov. You can also visit PUCT's website[10] for more information on rate increases.

Need more help?

TCEQ's Financial, Managerial, and Technical Assistance Program (FMT) offers free on-site assistance by contractors to help you analyze your planning options, and can assist you with all aspects of running and funding your public water system. For more information about the program, visit the FMT Program webpage[11] or call the Water Supply Division at 512-239-4691. You can also contact an SBGLA representative in your region[12] or call the toll-free SBLGA compliance hotline for confidential assistance at 800-447-2827.

Many state and federal funding agencies have grants and loans available for the planning and development of new water treatment plants and infrastructure improvements. 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 the efficient use of government resources in Texas. You can contact TWICC by e-mail at TWICC@twdb.texas.gov, or visit TWICC's website[13] 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 the SBLGA webpage.[14]

10. www.puc.texas.gov/
11. www.tceq.texas.gov/drinkingwater/fmt
12. www.tceq.texas.gov/agency/directory/region
13. twicc.org/index.html
14. www.texasenvirohelp.org