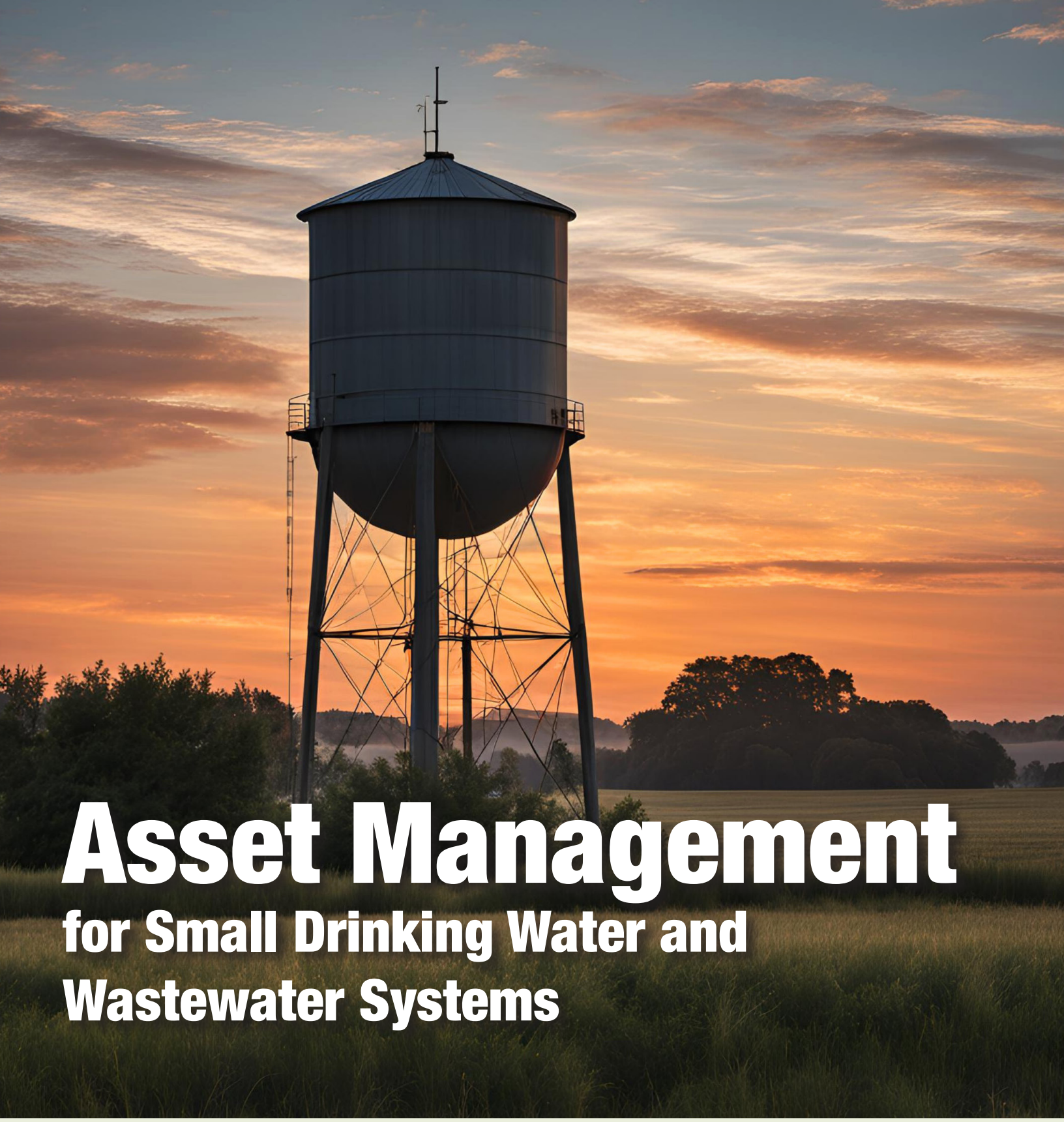

Asset Management

for Small Drinking Water and Wastewater Systems

RCAP

USER GUIDE

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Rural
Community
Assistance
Partnership

Asset Management Guide
for Small Drinking Water and Wastewater Systems

The Rural Community Assistance Partnership Incorporated
1725 I St. NW, STe 225
Washington, DC 20006

www.RCAP.org

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INTRODUCTION

Asset Management goes beyond just taking care of equipment; it involves a comprehensive process that considers the entire life span of each **asset**, from planning to removal, and affects every aspect of utility operation and management.

According to the US Environmental Protection Agency (USEPA), an **asset management plan** should answer:

1. What is the current state of the utility's assets?
2. What is the utility's required "sustainable" level of service?
3. Which assets are critical to sustained performance?
4. What are the utility's best "minimum lifecycle cost" capital improvements and operations and maintenance strategies?
5. What is the utility's best long-term financing strategy?

Fully implementing an asset management plan can fundamentally change the way the organization operates: the utility and its staff take a proactive approach to operations and management (O&M) and finances, not waiting for things to break down before repairing or replacing them, delivering more cost-effective, reliable service with minimal disruptions for customers.

While asset management planning is an investment that has helped many communities save money over the long term, many small and rural utilities face challenges in finding the time, expertise, and funds to plan and implement such changes. Fortunately, there is an increasing amount of training, tools, and financial support for small system management from the government and non-profit sectors.

Under the America's Water Infrastructure Act of 2018 (AWIA), all state drinking water programs revised their capacity development strategies to give more consideration to asset management planning. The updated strategies are currently being put into action, including giving priority points for infrastructure funding scoring, introducing new regulations, and establishing grant programs for asset management services.

In 2023, the US EPA Office of Water (EPA-OW) and the United States Department of Agriculture-Rural Development Rural Utilities Service (USDA-RD-RUS) issued a Memorandum of Agreement continuing their joint efforts to promote sustainable rural water and wastewater systems. It coordinates activities and financial assistance to encourage system-wide planning and infrastructure alternatives analyses that consider sustainability goals, such as asset management.

The focus of the USDA-RD-RUS Water and Environmental Programs (WEP) addresses the water and wastewater infrastructure requirements of small communities with populations of 10,000 or less. WEP offers a range of programs aimed at enhancing overall quality of life and driving economic growth by providing financial assistance for the construction of essential facilities like drinking water systems, sewer systems, waste disposal, and stormwater management. Funding options include loans and grants for eligible applicants who lack the necessary financial resources or credit to support their infrastructure needs.

The EPA-OW funds sustainable water and wastewater management initiatives and infrastructure upgrades through the Drinking Water State Revolving Fund (DWSRF) and the Clean Water State Revolving Fund (CWSRF). These programs allow states to allocate resources based on their specific environmental requirements.

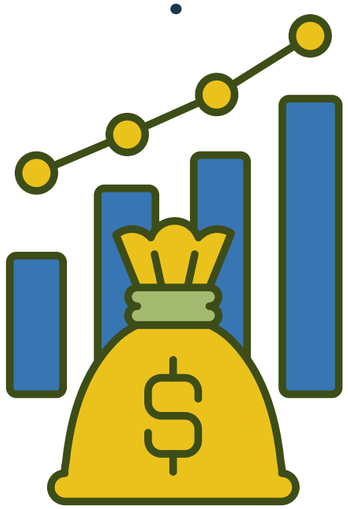
In addition, both agencies provide funding for technical assistance to small systems. EPA-OW's funding provides training and tools to enhance operation and maintenance practices. USDA-RD-RUS also funds assistance through technical assistance providers from non-profit organizations and the Circuit Rider program.

More information on these programs can be found in Appendix B of this guide.

How to Use the RCAP Asset Management Guide

Systems should be aware of any specific asset management requirements of their state and potential lenders before beginning their asset management plan.

This guide is intended to be the starting point for creating an asset management plan for small water and wastewater systems in rural and Tribal communities. Chapter One introduces asset management concepts. Each section of Chapter Two discusses a different component of a simple asset management plan. Chapter Three focuses on tips for implementing the plan. An Inventory Worksheet, potential funding programs, and resources available from various agencies can be found in the Appendices and online at www.rcap.org/amgworksheets.



CHAPTER ONE

Asset Management Fundamentals

1. Asset Management Terms

What is an "asset"?

For the purposes of this guide, a utility's assets include its physical components. Your system's major assets include tanks, pipes, pumps, valves, hydrants, and buildings. The utility incurred a significant expense to purchase and install them, and likely the cost of ongoing of maintenance and repairs, too. With time, these large, costly assets deteriorate, needing to be repaired or replaced. Asset management practices focus on extending the assets' lifecycles such that it lowers the cost of operation, repair, and replacement.

What is "asset management"?

According to USEPA, **asset management** is the practice of managing infrastructure assets to operate at the "best appropriate" cost while maintaining an acceptable **Level of Service** to customers. The agency identifies five core components of asset management:

- Asset Inventory
- Level of Service
- Critical Assets
- Lifecycle Costing
- Long-Term Funding Strategy

What is an "asset management plan"?

The **asset management plan (AMP)** is the product of the asset management process and includes the inventory, evaluation, and prioritization of a system's assets and required Level of Service. Maps, condition assessments, recommended repair/replacement schedules, cost analyses, staff information, operation & maintenance strategies, capital improvements plans, financial strategies, compliance history, and preparedness plans are referenced or included. Some plans also address climate change, energy efficiency and/or water conservation. (Tip: Check with your state's primacy or funding agency for specific content requirements.)

How far to drill down your asset management plan is up to the utility, but it's generally down to the work-order level: components which are repairable and have planned maintenance activities.

Asset management should be a continuously improving process in a utility. Make it a policy to review your plan and update your asset inventory regularly.

1.2 Benefits of Proper Asset Management

For smaller systems, the maximized equipment life, shorter downtimes, improved decision-making tools, and more efficient resource allocation associated with asset management can make a big difference in improving operational efficiency and financial sustainability. While cost savings aren't always immediate, a successful shift from reactive to preventative maintenance over time will reduce the frequency and expense of unplanned repairs.

An often overlooked benefit of an asset management plan is that it is also an effective tool for facilitating communication about the system's needs. With data found in an asset management plan, boards, managers, and operations staff can confidently evaluate and discuss the trade-off between service, cost, and managing risk.

For example, an RCAP technical assistance provider from New Hampshire recalls an operator from a small water system who said their asset management plan had become a "road map of communication" with decision-makers, helping them to understand the system's needs.

An asset management plan can also help system decision-makers communicate consistently with customers about the utility's need to provide the desired Level of Service.

Finally, the condition and needs assessments as communicated in an asset management plan will facilitate the completion of infrastructure loan and grant applications.

Appropriately managing assets is also one of the most important ways to improve infrastructure stability. According to the Rural and Small Systems Guidebook to Sustainable Utility Management (USEPA, 2016), infrastructure stability is improved by understanding the condition and costs associated with a utility's critical infrastructure assets. This includes inventorying assets, assessing their conditions, and prioritizing repair and replacement to maximize the condition of the components "over the long-term and the lowest possible lifecycle cost and acceptable level of risk."

Beyond infrastructure stability, asset management also has a key role to play in the sustainability of the utility overall. The USEPA's Planning for Sustainability Handbook (USEPA, 2016) discusses the importance of identifying sustainability priorities and potential opportunities for the utility. This is partially accomplished by an internal assessment of infrastructure and operations. An asset management plan identifies priorities for repair and replacement to meet identified service level goals.

A water or wastewater treatment system is often the biggest investment a small community will make. The USEPA's 2023 Drinking Water Infrastructure Needs Survey and Assessment (DWINSA) estimates there is a $625 billion (about $1,900 per person) funding shortfall to overcome in order to modernize and repair our water and wastewater infrastructure. Making data-driven financial decisions, as outlined in an asset management plan, can help communities address future needs and bridge that funding gap.

1.3 Making Asset Management Part of Utility Culture

It is becoming increasingly common for infrastructure financing and other public programs to require some formal asset management planning. This is because of the proven benefits of asset management to a utility's financial health and ability to service debt.

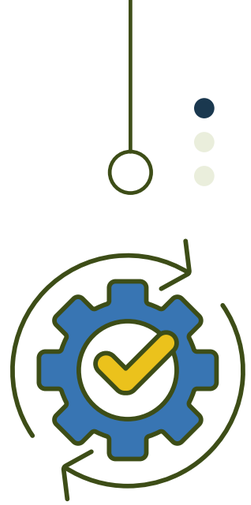
Creating the asset management plan is just the beginning. The best plan is merely a document unless it is incorporated into the organization's culture. Integrating asset management best practices into daily operations increases and enhances the information known about a system's major components; this data is then used to improve big picture decision-making. For example, implementation of a work order system enables staff to record the location, frequency, type, timing, and cost of each service repair so they can add it to the inventory database and better understand an asset's condition. To see the full benefits, it's important that everyone - staff, managers and board members - understands that the asset management concepts are important enough to incorporate into day-to-day tasks and decisions.

One way to encourage buy-in of the asset management program is to celebrate, at every opportunity, successes achieved due to asset management activities. Milestones such as improved compliance status, new maps, reduced water loss, fewer repairs, etc. should be shared and promoted.

Finally, the plan should be considered a "living" document, to be reviewed annually. What has changed? Which processes can be improved?

1.4 Roles in Asset Management Planning

It is important to identify everyone who should be involved in developing an asset management plan and include them throughout the planning process. The multidisciplinary team may include the utility clerk, financial advisor, operator, maintenance staff, and the utility board. Often in small communities, these roles are held by the same individuals. Creating a manual with clearly defined roles and responsibilities for the asset management process will help ensure all team members are cross-trained. Consider adding those roles and responsibilities to job descriptions, as well. The chart below describes what roles various utility personnel play in the asset management planning process:



Board Roles	Staff Roles
• Set and approve asset management policies that best meet the community needs. • Determine the best long-term funding strategy and what resources are available based on the situation. • Determining the hierarchy of needs, prioritization of the assets based on likelihood to fail, criticality and financial impact. • Determine the best operations and maintenance plans to align with long-term funding strategies: what alternatives exist, and which are most feasible. • Ensure utility's assets are maintained according to Level of Service requirements. • Review budget annually. • Monitor implementation/set timelines. • Review/evaluate outcomes.	• Lead implementation of plan according to policies & timelines set by board. • Facilitate communication of needs to the board. • Careful record and bookkeeping (operational logs, work orders, financials). • Conduct research for pricing/value of current assets and needed assets. • Help with conducting the condition assessment on major assets. • Help with determining required Level of Service, O&M schedule, and prioritization process. • Produce list of assets • Mapping assets

CHAPTER TWO

The Asset Management Plan

This chapter will guide your utility's asset management team through the process of putting together a basic asset management plan. To better understand what will be involved, we encourage your team to review all the sections before starting. Always consult with your state primacy and potential funders to ensure that your plan will be properly organized and will include all the information required.

2.1 Organizational Information

The introductory sections of the asset management plan provide an overview of your system and its management. The introduction of your plan should include:

- Purpose of Plan
- Mission Statement
- System Overview and Service Area
- Asset Management Team
- Community Outreach Efforts
- Feedback/Continuous Improvement

The purpose of the plan describes the reason for undertaking this effort. For example, is it to comply with a state regulation, a funding application, or other requirement? Perhaps the plan is being created to improve the utility's long-term sustainability.

Mission statements define an organization's culture and provide direction for long-term decisions and day-to-day operations. If your utility doesn't have a Mission Statement, consult a technical assistance provider, web search, or nearby utilities for sample statements to consider adopting.

Describe your system and service area. At a minimum, include the number of connections by type, basic geographic characteristics, type of treatment, capacity versus current treatment volume, and age.

Introduce the asset management team by which roles they occupy in the organization. The team should represent a cross-section of the utility so that all processes and procedures are covered.

What kind of outreach is your utility undertaking (or planning to undertake) to share the information gathered and the recommendations made in your plan? Will the public have access to a physical copy? Digital? Will there be public meetings?

Describe the process and timeline for continuously improving and updating the plan's components. How will the inventory be updated?

Finally, include information on your system's management. At a minimum, this should include:

- List of board members and terms
- Organizational chart
- Copies of or references to organizational/founding documents

A list of board members' names and terms shows who was in charge at the time of the plan's completion. An organizational chart helps the reader understand how many staff the utility employs or contracts, and the relationships between each. Utilities should keep their organizational/founding documents as part of the permanent records. The exact paperwork will vary depending on the type of utility and how it was formed, but usually indicates the service area, who approved it, and its governing structure.

2.2 Level of Service

Level of Service (LOS) plays a pivotal role in asset management. It measures the performance and quality of services provided by assets to meet the needs and expectations of stakeholders. It encompasses a range of factors such as reliability, availability, safety, and quality of service.

In this section, we'll show you how Level of

Service goals are used in asset management, and how a small utility can measure and enhance its Level of Service. As you go through the process, you may discover areas that need improvement to reach your Level of Service goals. Any actions needed to improve service should be included in your asset management plan.

Importance of Level of Service Goals in Asset Management

Level of Service goals direct your utility toward proactive, rather than reactive, decision-making. Like other asset management practices, they help you direct resources toward repairing or replacing assets at the appropriate time. Just as a vehicle needs preventative maintenance, so do major assets in a utility.

Level of Service goals spell out your utility's vision for what actions will be taken (by whom and when) in enough detail that you can clearly communicate expenses and expectations—and evaluate if the goals are achievable.

Developing Level of Service Goals

Level of Service goals are often housed in a document called a Level of Service Agreement. They identify deficiencies and objectives or performance targets for short- and long-term operations and maintenance. Your Level of Service goals should be achievable given your utility's resources and timeframes, support your system's mission, and be agreed upon by the asset management team. Guidance often refers to creating "SMART" LOS goals:

- Specific
- Measurable
- Attainable
- Relevant
- Time-Based

EXAMPLE LEVEL OF SERVICE GOALS

The West Virgina Department of Health has made available user-friendly guidance at:

https://oehs.wvdhhr.org/media/kadjab4g/level-of-service-goals-guidance.xlsx

Level of Service in the Asset Management Plan

Typically, the Level of Service section in an asset management plan includes:

- Internal goals for system performance such as water loss, down time, availability, Inflow & Infiltration (I&I), etc.
- External goals which impact customers directly such as service area, source water, and **Water and Wastewater Agency Response Networks** (WARN) participation
- How the system communicates to customers, such as Consumer Confidence Reports (CCR), website, mailers, bill inserts, social media, or events
- How the system receives feedback from customers (e.g. polls, surveys, or forms; social media; public comment at meetings; mailed surveys, etc.)

2.3 The Asset Inventory

An **asset inventory** is a crucial part of a system's asset management plan, providing a detailed list or survey of all system assets including source, treatment, transmission, and distribution infrastructure. Your system's plan should include the name, condition, location, age, useful life, **criticality**, and likelihood and **consequence of failure** for each asset.

To create this inventory, systems will need to review service area and facility maps, **Geographic Information System (GIS)** databases and other available databases, as-built drawings, O&M manuals, invoices, operator knowledge, visual observations and interviews with stakeholders and consultants.

Visually inspect system facilities and service areas. Determine the criticality of each asset with input from system management and staff. Include photographs and documentation of the latitude and longitude data of each asset when possible. This location and condition data are valuable for creating GIS maps which, in turn, are useful tools for inventorying system assets.

This asset management guide includes an asset inventory worksheet template and example. You can download these as Excel spreadsheets at www.RCAP.org/amgworksheets.

Setting Up and Maintaining the Inventory

Your system's inventory should include the following for each asset:

- Name, Quantity and Size (i.e. 1000 linear feet of 6" PVC pipe)
- Condition
- Location
- Year Installed/Age
- Expected Useful Life
- Criticality
- Likelihood and Consequence of Failure

It may be necessary to group smaller assets together into one for ease of inventory. For example, a system of pipe installed at the same time and of the same material can be entered as one asset in your inventory. Assets may also be grouped based on their connections, such as source, treatment, and distribution networks.

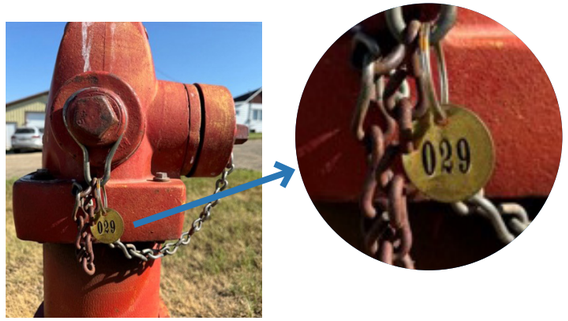
Naming Strategies: Consider adopting a standardized naming convention (similar to retail stock keeping units, or SKUs) for your assets. Asset names can be any combination of letters and numbers representing the item, location, year bought, etc. Having a method for naming assets helps keep your inventory log organized as it expands and changes with time and technology.

Organization Strategies

Next, decide on your organization system. GIS software is a useful tool that will be covered in the next section. Many small and rural systems opt to use a spreadsheet, especially when first beginning their inventory. The RCAP asset inventory spreadsheet template is available for download at www.RCAP.org/amgworksheets. Use it for listing and analyzing your assets and their attributes when you don't have or don't need asset management software.

Tips from other small systems

- Use a numbering system.
  - ◊ Assign each asset a number and use it instead of the asset's full name on associated cards, folders, and documents. It will save time and confusion. Add a brass number tag to the asset itself where possible.



- Assign a file folder (or index card) to each asset.
  - ◊ Each folder should have pictures of the asset along with date installed, condition, and measurements of how to locate. Make one for every curb stop, hydrant, etc. in the service area. Be sure there's a back-up system in place; a lost card risks an asset's entire history.
- Record locations using a standardized system relative to permanent objects.
  - ◊ Measure distance from objects that are rarely moved, such as a hydrant, house, or power pole. For example, a valve is under a road. The utility's system takes two measurements from two different permanent objects. So, a typical location would read: 5' west of hydrant, 10' north OR 35' East of NW corner of house, 3' south.
- Plan to update your inventory regularly.
  - ◊ The index cards work so long as they are updated, so set a policy to create a new card or folder when a new asset is acquired and to update/review the existing list annually.

Updating the Inventory

Make it standard operating procedure to update the inventory whenever the opportunity arises. For example, when responding to work orders, staff should collect details such as age, condition, location, dates of repair work, and location. Be sure that all new assets are added to your inventory promptly. (Ideally, during the handover process from the engineers to the organization.) Keeping your asset inventory up-to-date has the added benefit of making other plans, assessments, applications and reports easier to complete. Additionally, if your system transitions to a GIS software-based inventory, you'll save time and expense on setup by having accurate, up-to-date information.

Setting up the RCAP Inventory Worksheet (first tab/worksheet)

Using an Inventory Worksheet is an easy way to track your asset inventory. This worksheet will help you:

- Identify your system's assets
- Assess the condition of your assets
- Provide a place to record the history of your assets
- Determine your assets' useful lives
- Record your assets' ages
- Estimate the remaining useful lives of each asset.

Download the spreadsheet at www.RCAP.org/amgworksheets

1. Enter the date the worksheet was finished and the individual responsible for its completion.
2. Enter the asset name or inventory/ID number in the "Asset/ID" column.
3. Enter the quantity of each type of asset.
4. Add the location of the asset, in the way that makes the most sense for your utility. This could be GPS coordinates, landmarks, etc.

Remaining Useful Life

Knowing an asset's expected **remaining useful life** allows for better planning, maintenance, and replacement decision-making. It promotes optimal utilization of limited resources, and ultimately minimizes unexpected disruptions. It also aids in evaluating the cost-effectiveness of repairs versus replacements, ensuring that assets are utilized optimally throughout their lifecycle. Several variables impact the longevity of system assets, including frequency of maintenance and upkeep, under or overuse, and environmental factors like floods, droughts, sub par water and soil quality, or other harsh climate conditions. The USEPA's Estimated Useful Life Table shows the expected useful lifespans of common system assets.

Sample Inventory Worksheet

Date Worksheet Completed:	Date
Completed By:	Operator Anytown, USA

Asset/ ID	Qty.	Location	Est. Useful Life Remaining (Yrs)
Asset 1 (name, type, ID)	1	NE 10th and Main	-4
Asset 2	1	SW 4th and Elm	6

Estimated Useful Life

Source: *EPA, Asset Management: A Handbook for Small Water Systems*

Asset	Expected Useful Life (in years)
Intake Structures	30-45
Wells & Springs	25-35
Galleries and Tunnels	30-40
Chlorination Equipment	10-15
Other Treatment Equipment	10-15
Storage Tanks	30-60
Pumps	10-15
Buildings	30-60
Electrical Systems	7-10
Transmission Mains	35-40
Distribution Pipes	35-40
Valves	35-40
Blow-off Valves	35-40
Backflow Prevention	35-40
Meters	10-15
Service Lines	30-50
Hydrants	50-60
Lab/Monitoring Equipment	5-7
Tools & Shop Equipment	10-15
Landscaping Grading	40-60
Office Furniture/Supplies	10
Computers	5
Transportation Equipment	10

It's worth noting that while charts and guides can provide general information and guidelines, they may not always account for specific nuances or variations that are unique to a particular product. When possible, consult the manufacturer's recommendations or manuals to ensure that you are following the most accurate and up-to-date instructions to achieve optimal performance, safety, and longevity of the product.

Manufacturer's recommendations can also provide valuable information on warranty coverage and maintenance schedules. By adhering to these guidelines, individuals can ensure that they are not voiding any warranties and can take advantage of any available support or repairs provided by the manufacturer.

Remaining Useful Life in the RCAP Inventory Worksheet (second tab)

This estimation is based solely on the asset's estimated age and is used for the Condition Score calculation. The actual remaining useful life of each asset depends on a variety of factors. Therefore, this estimation of useful life should not be the only factor in determining a particular asset's management plan.

IMPORTANT: the asset names and quantities will automatically populate with what was entered in the first tab. Do not enter any information in the greyed output cells.

Remaining Useful Life in the RCAP Inventory Worksheet (continued)

1. Enter the year of installation in the third column.
2. In the fourth column, enter the estimated useful life. The USEPA's chart is on the same page for your reference, but this can come from a variety of sources/research.
3. The Excel spreadsheet will calculate the last year of expected useful life and estimated remaining years of useful life for the asset in the grey cells.
4. The remaining useful life will appear on the master inventory page (first tab/sheet).
5. Move on to the third tab/sheet for the next step.

Asset Lifecycle

RCAP INVENTORY SPREADSHEET
at www.RCAP.org/amgworksheets

To estimate on paper:
Last year of expected life =
year installed + expected useful life

Estimated remaining useful life =
last year of expected life – current year

A negative number means it has exceeded its expected life.

Est. Remaining Life		Year	2024		
Date Worksheet Completed:	Any Day				
Completed By:	Operator Anytown, USA				

Asset	Qty.	Year Installed	Expected Useful Life	Last Yr. of Expected Useful Life	Useful Life Remaining
Asset 1 (name, type, ID)	1	1980	40	2020	-4
Asset 2	1	2020	10	2030	6

Estimated Useful Life (USEPA)

Asset	Expected Useful Life (in years)
Intake Structures	30-45

Condition Assessment

The condition of an asset contributes to its expected useful life and should be carefully evaluated. Decide on a standard system for describing the condition of assets. A simple, subjective rating system such as "very poor to excellent" is sufficient for an early plan. Are there any existing issues that may affect each asset's condition? For example, is there rust on the surface or hairline cracks forming? Technical assistance providers, engineers, operators, service and equipment providers, O&M logs and operational records can also help with the condition assessment process.

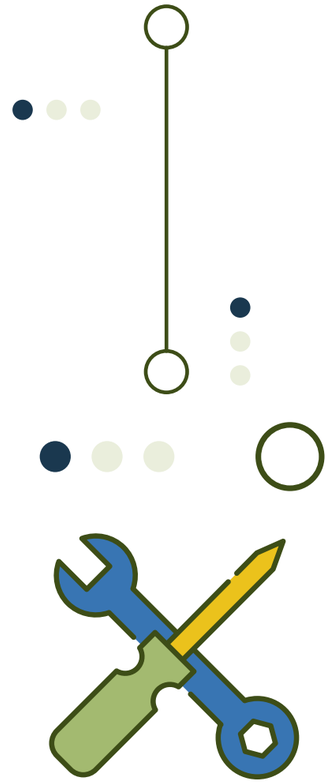
What about those assets that can't be easily reached? In many communities, important assets are buried underground. When an asset can't be visually inspected, you may refer to the Estimated Useful Life Chart and consider any historical records of leaks, breaks, and valve maintenance. Strive to increase your inventory's complexity and accuracy over time.

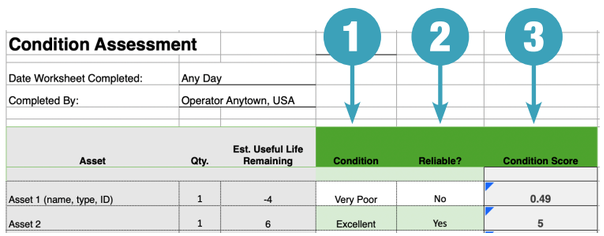
To help, the West Virginia Department of Health has made a condition assessment matrix available for free download at https://oehs.wvdhhr.org/media/20jaww2u/04b-h-s_psd_conditions_ranking_charts.xlsx

Determine Condition Score in the Inventory Worksheet (third tab)

IMPORTANT: The asset names, quantities, and estimated remaining useful life will automatically populate in the first three columns of the Excel spreadsheet.

1. Assign each asset a condition ranking in the fourth column from the left, "Condition". The worksheet uses a drop-down menu of "very poor", "poor", "fair", "good", and "excellent" choices.
2. In the fifth column, "Reliable?", indicate whether the asset is generally considered to be reliable. If it frequently requires repairs outside of routine maintenance, choose "no". If the asset can be relied upon to operate most of the time, choose "yes" from the drop-down menu.
3. From your inputs, the Excel spreadsheet will calculate each asset's Condition Score in the last column. (The grey cells will auto-populate, so leave them blank.)
4. The Condition Score will now appear on the Master Inventory Page in Excel.





Likelihood of Failure, Consequence of Failure, and Criticality

Once you know what assets you have, their age, and their current condition, the next task is to rank your assets according to their significance to your system. **Criticality** is the measure of risk associated with an asset. Knowing which assets are more critical helps in determining how to prioritize the spending of limited funds, where to deploy finite personnel resources, how to manage individual assets over time, and facilitates capital improvement decision-making. It's important that your asset management team be multidisciplinary, representing the diverse interests and expertise needed to manage and operate your utility. Considering feedback from different viewpoints helps ensure a comprehensive perspective of asset priorities. Having detailed records and logs will be helpful for this step in the asset management process. It takes careful planning to develop a workable system that can be easily and regularly updated, but the reward is having ready access to information about your system when you need it. For some small utilities, a spreadsheet, work order system, and maps is sufficient. Many are also using digital asset inventory programs such as Geographic Information Systems (GIS)-integrated software platforms.

Regularly review and revise the asset prioritization based on changes in risk factors, asset conditions, and technological advancements. Two questions to ask are: how likely is the asset is to fail (called **Likelihood of Failure**, or LOF), and what would the consequences of such failure be (called Consequence of Failure, or COF)?

Likelihood of Failure (LOF)

The combination of factors below can be used to predict the likelihood of asset failure.

AGE: To determine the age of a component, consult your system's "as-built" maps and other construction records, purchase orders, operation & maintenance manuals, operational staff, and/or the consulting engineer. An asset's age can give a good insight into the likelihood of failure. As an asset ages, its condition deteriorates. However, age isn't the only factor in determining an asset's remaining useful life. Regular maintenance, inspections, and monitoring (condition and history) also contribute.

CONDITION: Along with an asset's age, you need to look at its condition. Has the asset received regular maintenance, or has it been somewhat neglected? Inspection, monitoring, and routine maintenance schedules help prolong the life of assets.

HISTORY: Maintenance and performance history are also useful in determining LOF. An asset may be old but properly maintained with no history of failure. Despite its age, the likelihood of failure is lower. Conversely, you may have a newer pump that's had numerous breakdowns, despite having regular maintenance. The likelihood of failure is greater even though it is a newer pump.

Maintenance and performance history can be determined by looking at operation & maintenance logs, work orders, repair logs, and/or purchase orders. As mentioned, some utilities store this data in GIS integrated inventory/mapping software.

Consequence of Failure (COF)

The consequence of failure can range from minor operational disruptions to significant risks to health and safety, the environment, and finances. In your consequence analysis, consider asset interdependence; a disruption in one part of the system may affect others. Is there redundancy, or back-up, for the asset? To help you evaluate the consequence of failure of your assets, we've listed below many types of *severe consequences* of asset failure.

OPERATIONAL:

- Reduced treatment capacity leading to the inability to treat water to meet the demand, leading to water shortages or restrictions
- Increased operational costs due to emergency repairs, employee overtime, and costly temporary solutions
- Damage to assets unrelated to the water or wastewater system (For example, a water pipe break causing a roadway sinkhole.)
- Interruption of daily operations and services

HEALTH AND SAFETY:

- Ability for pathogens to enter public or private drinking water supplies
- Ability for other contaminants to enter public or private drinking water supplies
- Frequent and/or severe violations of permits
- Other chronic or acute negative health consequences

ENVIRONMENTAL:

- The release of untreated wastewater into the environment affecting aquatic ecosystems and public bodies of water
- Environmental regulation violations (& potential fines or penalties)

FINANCIAL:

- The cost of repairing or replacing failed assets significantly impacts small utility's cash on hand & **reserves**
- The cost to repair or replace failed assets requires the utility to take on unexpected debt
- Extended down time causing loss of revenue/production
- Reputational/Social:
  - ◊ Reduced confidence in the system's ability to provide safe services to residents
  - ◊ Inconvenience to the customer, which may vary from minor to significant social costs

Criticality Total Score in the RCAP Inventory Worksheet

To standardize and document your analysis, we recommend using a rating scale such as "1 to 5"; however, utilities with many assets may want to use a wider scale (e.g. "1 – 10" or higher) to more easily differentiate the assets' Criticality Total Scores. If you're using the worksheet in Excel, you can choose 1 through 5 from the drop down menu.

First, rate the asset's Likelihood of Failure on a standard scale. Refer to the characteristics described above: what is the asset's maintenance history? How old is it? What is its current condition?

- In the "Likelihood of Failure" column, assign "1" to an asset with low LOF and "5" to an asset with a high LOF. For example, a new component in pristine condition with a clean maintenance history would score "1" for its low LOF. An older asset for which maintenance has been significantly deferred would receive a high LOF score.

1

Criticality Score

Date Worksheet Completed:	Any Day
Completed By:	Operator Anytown, USA

Asset	Qty.	Condition Score	Likelihood of Failure (1 to 5)	Consequence of Failure 1 to 5	Redundancy?	Criticality Total Score
Asset 1 (name, type, ID)	1	0.49	5	1	no	4.8
Asset 2	1	5	1	5	yes	3

Criticality Total Score in the RCAP Inventory Worksheet (continued)

Secondly, evaluate the Consequence of Failure of each asset: How much would it cost to repair? What are the consequences for public health? How is the community's opinion of the system affected? How many other assets could potentially be damaged if this asset fails? How much of the community would be affected?

- In the "Consequence of Failure" column, assign "1" to an asset that would have relatively minor impact on service if it were to fail, and "5" to an asset that would cause the most severe CoF.

Thirdly, the next column asks if there is **redundancy** to the asset: is there more than one, or any back-up to the asset? Choose "Yes" or "No" from the drop-down menu.
Lastly, the spreadsheet calculates and copies the Criticality Total Score onto the Master Inventory page.

2 3 4

Criticality Score

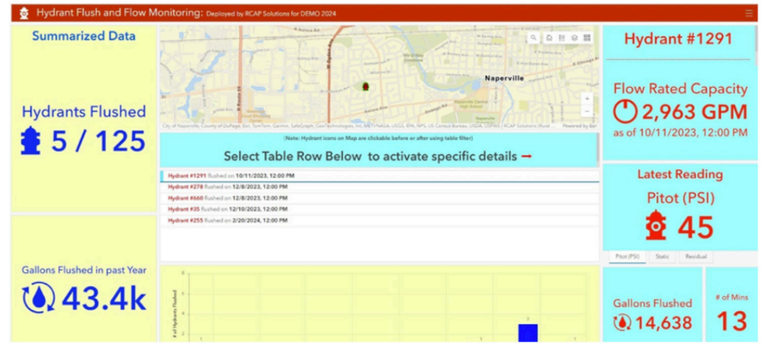
Date Worksheet Completed:	Any Day
Completed By:	Operator Anytown, USA

Asset	Qty.	Condition Score	Likelihood of Failure (1 to 5)	Consequence of Failure 1 to 5	Redundancy?	Criticality Total Score
Asset 1 (name, type, ID)	1	0.49	5	1	no	4.8
Asset 2	1	5	1	5	yes	3

Mapping Assets with GIS

Asset management inventories are comprised of several interdependent components. (GIS) software is a valuable tool that can accommodate these dependencies and relationships. GIS is a system used to create, manage, analyze, and map spatial data. Over time, GIS software has become more user-friendly and accessible across various industries through web-based and mobile applications. Even small, rural water and wastewater utilities are starting to use GIS in asset management programs to update changes and record newly discovered assets within their systems. It has proven advantages over standard tabular asset management software programs due to its visual appeal, efficiency, and practical benefits. GIS will continue to be an essential tool in asset management for the foreseeable future.

As water and wastewater utilities move toward using technology for digital forms of asset management, it is essential that maintenance and inspection activities are recorded electronically for future review. By analyzing such data, operational staff can identify locations that frequently need repairs and may have leaks or structural issues. The data can also be used to help track repair progress.



"Hydrant Flush and Flow Monitoring powered by GIS courtesy of RCAP Solutions 2024"

Benefits of Using GIS in Asset Management

- User-Friendly:
  - ◊ It can be easily customized to suit various data requirements, accessible through desktop or mobile devices, and equipped with query and analysis tools.
- Real-time Records and Inventory:
  - ◊ GIS aids in seamless data integration for optimizing utility operations, recording maintenance orders in real-time, and managing operation and maintenance records efficiently.
- Training and Capacity Building:
  - ◊ GIS databases help in preserving institutional knowledge, facilitating training for new employees and promoting sustainable asset management practices.
- Regulatory Compliance:
  - ◊ GIS enhances operations performance and record-keeping, ensuring better compliance by managing and tracking asset information effectively.
- Risk Management and Security:
  - ◊ GIS offers a secure data storage structure, with analytical tools detecting patterns and trends to alert staff of potential risks.
- Community Engagement:
  - ◊ GIS mapping helps improve community involvement and openness. Different license tiers and related permissions can be established to share data with employees, board members, decision-makers, engineers, contractors, clients, and the public.

Starting Out with GIS Maps

Bringing the assets to a web platform allows desktop and mobile users to access them, each with permission levels customized to their individual requirements. With map/ assets accessible to web users, data and related reference material can be easily accessed and modified on any mobile or desktop device. Utility staff without prior GIS experience will want to consult a GIS professional and/or technical assistance provider to discuss options.

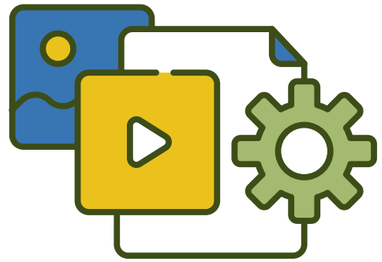
As you plan, locate and review existing asset management records and maps to make data collection and entry easier. Historic documents like **as-builts** can be scanned or referenced to help draw water or sewer lines and to identify other assets. You may also want to perform a "scrub" of existing data to remove any irrelevant information. There are several affordable mobile applications available for download that help create GIS-based inventories by collecting photos and attributes such as GPS coordinates, project/asset characteristics and more. The data can then be exported in various formats or synched with a web map for sharing and analysis.

MORE GIS RESOURCES FOR SMALL SYSTEMS

RCAP:
The Role Mapping Serves for Your Small, Rural or Tribal Utility – https://www.rcap.org/wp-content/uploads/2022/11/GIS_flippingbook_v2.pdf

ESRI:
Mapping Small and Rural Water Systems
https://www.esri.com/en-us/landing-page/industry/water/2019/mapping-rural-and-small-water-systems

EPA:
Drinking Water Mapping Application to Protect Source Waters (DWMAPS) Data Layers – https://www.epa.gov/sourcewaterprotection/drinking-water-mapping-application-protect-source-waters-dw-maps-data-layers



2.4 Operation & Maintenance Strategies

A successful asset management program maximizes the expected useful life and minimizes lifecycle costs of its assets. It's important to remember that the costs associated with O&M are part of the overall lifecycle costs. That's why a utility's O&M plan, strategy, or program is a crucial component of its broader asset management plan. A utility's **O&M plan** identifies operating guidelines and maintenance duties to maintain effective operations and compliance with regulations. Because the frequency of maintenance and operation patterns directly impact an asset's useful life, an optimal O&M plan will prescribe running mechanical components and conducting preventative maintenance on a schedule that ensures longevity at the lowest overall cost.

To create and/or update an O&M plan, work with operations staff, outside consultants including technical assistance providers, and review manufacturer recommendations. Keep O&M manuals on-site for operations personnel and primacy agency staff review. Although maintenance costs may initially increase upon implementation of an O&M Plan, a longer lifecycle generally results in lower maintenance and emergency repair costs over time. The cost savings can be used toward planned repairs and replacements.

What is the Optimal O&M Strategy for Your Utility?

Once you've built your inventory, you'll want to prioritize O&M around those assets you've decided are most critical to meeting your desired Level of Service. Least critical assets will most likely be run to failure and replaced quickly, so, when first starting out, focus efforts on your most critical assets (see the "Criticality" section). O&M activities are often divided into two types: planned and unscheduled.

Your strategy or plan should list O&M activities, responsible party, and frequency. It should also describe normal or control positions for valves, switches, gauges etc. and any seasonal differences. Include a list of suppliers for frequently ordered spare parts or services. You will also want to determine a strategy for tracking lifecycle costs, including planned and unscheduled maintenance. Be sure to build in ways to track progress as you implement your O&M plan.

Keep your plan in an easily accessible location for quick reference. It will be essential during staff transition, training, and when more than one person is responsible for operations. Annually reassess whether your O&M strategy should be updated. As your system changes, so should your plan.

Deferred Maintenance

The fact is, many systems are deferring some maintenance. **Deferred maintenance** means delaying or not performing O&M tasks according to the recommended schedule. In budget terms, it's pushing the expense of partial or complete maintenance tasks down the road to a future date. Whichever way you look at it, it leads to under performing assets with shorter lifecycles and should be avoided. There may be circumstances in which deferred maintenance is the chosen strategy, such as when non-critical, low-cost assets of shorter life spans run to failure in favor of focusing a limited maintenance budget on more expensive, critical components.

Like all O&M activities and costs, deferred maintenance costs should be recorded. This information will help you plan for the asset's eventual replacement. It is also used in assessing financial fitness: too much deferred maintenance may indicate the utility's finances aren't sustainable. Generally, maintenance needs not covered through revenue or reserves will, over time, end up as capital expenses.

O&M Resources

There are several resources to help you determine the proper O&M for your assets. Instructions specific to your components can be found in the manufacturer's manuals. You may also want to consult operations staff and the design engineer. The USEPA created an O&M task schedule and log cards (EPA 816-B-04-002) for small ground water systems, consisting of log cards and a guidance booklet. The cards are divided into sections of daily, weekly, and monthly tasks. An electronic copy of the materials is available for free download at www.RCAP.org/amgworksheets.

PLANNED MAINTENANCE ACTIVITIES

Monitoring:
Plan to observe, e.g. x levels
Routine Maintenance:
regularly performed tasks
Repair:
fixes structure temporarily but "doesn't address asset's decline"
Preventative:
to prevent asset failure
Standard Operating Procedure:
planned tasks to ensure proper functioning of plant & compliance
Alternative SOPs:
planned tasks completed if anything changes e.g. scheduled offline

UNSCHEDULED MAINTENANCE ACTIVITIES

Unexpected Monitoring:
forced to monitor for X
Extra Routine Maintenance:
example: increased frequency of task
Unplanned Repairs/Rehabilitations/ Replacements
Alternative and Emergency SOPs:
includes asset failures, natural disasters

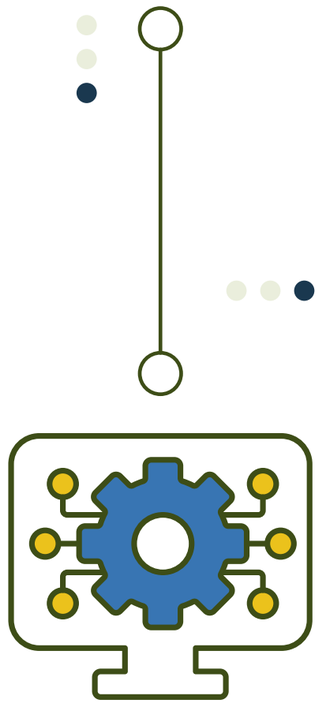
O&M Resources Continued

- Washington's Small Water System Management Program Guide includes an O&M Checklist. Find it on pages 32-35 at https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs/331-134.pdf
- West Virginia Department of Health's Asset Management Page has several O&M-related tools, including an O&M activity worksheet, example task list and more at https://oehs.wvdhhr.org/eed/infrastructure-capacity-development/asset-management-for-your-water-system/

What to Include in the Plan

This section in your Plan will provide general information on your system's operating procedures and maintenance activities. According to EPA's Asset Management Reference Guide, your O&M section should discuss:

- Standard, alternate, and emergency operating procedures
- Routine, preventative, and emergency maintenance
- Any deferred maintenance



2.5 Capital Improvements

Capital Improvement Plans

Capital Improvement Plans (CIPs) are used to estimate the short- and long-term rehabilitation and replacement needs of a system's assets, based on inventory and O&M data. **Capital projects** add new assets to the system that upgrade or improve existing capacity. **Renewal projects** aim to bring an existing asset back to its original condition, without increasing its design capacity. These are large expenditures that fall outside of the annual O&M budget.

The CIP should be drafted by a team representing all aspects of the utility. The system's head operator, superintendent, and/or public works manager will have the most accurate information on current asset conditions and operational timing. Financial records and other plans should be consulted as well. Consider involving outside consultants or a technical assistance provider for assistance.

If you've been using the RCAP inventory spreadsheet (download for free at www.RCAP.org/amgworksheets), you can get an idea where to begin by sorting the Master Inventory table by "Criticality Score" to begin your analysis (click on the arrow beside the header you wish to sort). Use the Estimated Useful Life to predict the timeframe for replacements.

Capital Improvements in the Asset Management Plan

Your asset management plan should describe future capital and renewal projects and associated expenses for the next 5 to 20 years. If a (CIP) already exists, the asset management plan can refer to it for timing and cost information. Any capital improvements beyond 20 years, or any other long-term plans, should be mentioned as well. It's important to update the CIP projects listed in the asset management plan as the system's needs change.

2.6 Financial Strategy

It's never too soon to create a strategy for funding the capital improvements budget, handling a potential rise in your monthly or yearly operation and maintenance costs, and/or boosting your utility's savings, or "reserves". It's important to have a solid financial plan in place to make sure the system has enough funding for both current and future operations and maintenance as well as capital needs and can achieve its desired Level of Service goals.

Be sure to involve your utility's financial clerk or treasurer and board. You can also contact a technical assistance provider or other professional to develop the funding plan. They can help you discuss the pros and cons of various funding scenarios. Your utility's strategy may incorporate one or more of the following:

ADEQUATELY FUNDED RESERVES

In a utility budget, funds for repairs and replacements are set apart from the day-to-day operations funds in **"**reserves**"**. A budget may have multiple reserve funds for various purposes such as asset depreciation, debt service, and/or emergency repairs. Monthly routine operation and maintenance costs should not be included in your reserves. Consider a utility's reserve funds as savings accounts, and its operations & maintenance (O&M) fund as a checking account from which day-to-day functions are paid. Properly funding reserves leads to better service reliability, financial stability, and long-term savings. Utilities can better handle unexpected events, minimizing service disruptions and improving customer satisfaction. Having funded reserve accounts also enhances a utility's financial sustainability, allowing them to address unforeseen challenges without resorting to unplanned debt.

Reserve funds are to be kept separate from the day-to-day O&M funds, at least "on the books" if not in a separate bank account. Do not spend funds set aside for Debt Reserves without the permission of your lender. It's not enough to simply create the account; it must also be funded, either all at once or over time. Small utilities especially may find it challenging to set aside reserve funds, but it is more manageable to save small amounts than to come up with a large sum in the event of asset failure.

LOANS AND GRANTS

Even when reserves are funded, most small utilities partially or wholly finance their large capital improvement projects. US government agencies such as the US Department of Agriculture's Rural Development (USDA-RD) and State Revolving Funds (SRF) make low-interest loans and grants available to small, rural water and wastewater systems. Talk to a technical assistance provider about your utility's eligibility for these and other programs available in your area. Contact information for the agencies is in Appendix A. Keep in mind that, even if financing is in the plans, having a healthy reserve account will improve your utility's creditworthiness and will help meet any "out-of-pocket" cash match requirements for grants.

OTHER FINANCING OPTIONS

Other financing instruments to consider are bonds and special assessment taxes. Reach out to a local technical assistance provider or municipal financial advisor for options in your area.

EFFICIENCY AND FINANCIAL STUDIES

Review your current policies and procedures and look for ways to improve your utility's financial stability by increasing revenue or decreasing costs. There are many free resources available, including online tools and onsite technical assistance providers, that can assist you with the evaluations and implementation of policy and procedural changes. Several are listed in the Appendices. If your rates or fees have not been reviewed in the last three years, do a "check-up" to see if they are still meeting your short- and long-term needs. Is the rate structure fair and equitable across all user blocks? Look for billing and collection procedure improvements that might increase revenue. Offer online and phone payment options. Verify that every property is connected and billed correctly. Compel payment in a legal and timely manner. Is it possible to offer a payment plan or set up a donation fund for lower-income customers?

System-wide energy and water loss (drinking water systems) audits can identify inefficiencies in water and energy use and opportunities for cost savings. While you're reviewing records, take a look at any existing contracts and look for potential cost savings through renegotiation with alternative providers or products, or reduced scope of services. Consider shared services/equipment agreements with nearby systems to reduce upfront and maintenance costs.

What to Include in the Plan

The asset management plan should include or reference the following:

- Current rate structure and methodology
- Future rate adjustments
- Annual operating budget
- Capital budget reserve accounts (such as operating cash reserve, emergency reserve, short-lived asset reserve, and capital reserve)
- Loans and bonds
- Financial history
- Financial forecasts including financial ratios, revenue and expenses for the next 5 – 10 years

2.7 Compliance Performance

Proper asset management can help a small utility stay in compliance with regulations while continuing to provide reliable service to its customers for the least possible cost. Assets that are properly maintained are less likely to interrupt service or cause the system to fall out of compliance due to equipment failure. A utility which, in accordance with its asset management plan, has set aside adequate funds for reserves and O&M can better afford repairs and replacements. Proper preventative maintenance costs less than emergency repairs over the long term, further improving the utility's financial capacity to address compliance issues.

Utility staff and decision-makers investing in asset management planning are generally dedicated to the utility's well-being. The asset management plan provides them with the data they need to make decisions to improve performance, so that the system routinely meets regulatory requirements. To better understand your utility's compliance performance, start by meeting with operational staff. Make it a point to meet at least monthly with the system manager, superintendent, and operator. Ensure operations personnel provide a monthly board report and promptly forward any communication from your state's primacy agency to the manager/superintendent or board. A review of onsite operation logs and records, wellhead protection plans, source water protection plans, compliance plans, enforcement action records, and testing/monitoring schedules can provide further insight on your utility's performance. Your state's primacy agency is responsible for enforcing regulations such as the Clean Water Act and the Safe Drinking Water Act.

Compliance History in the Asset Management Plan

Include in your asset management plan:

- A summary of the utility's compliance history or "track record" for meeting regulations of all levels.
- Any significant deficiencies or major shortcomings identified by your primacy agency, along with any plans or communication related to compliance. If there are multiple deficiencies, you may want to condense them into a table along with their respective corrective measures.

2.8 Preparedness and Other Utility Planning

The Preparedness section of the asset management plan details the actions that will be taken to maintain assets during emergencies or unexpected situations. It should refer to the **emergency response plan** without duplicating all its information.

The asset management plan should also reference security measures like locks, fences, Supervisory Control and Data Acquisition (SCADA) systems, and backup generators to protect safe and continuous operation. Note: Be careful not to disclose anything that could compromise your system's security. This section should also list integrated emergency preparedness such as mutual aid agreements through the **WARN** or other networks, and contingency plans for service continuity. This will inform your approach to preparedness and emergency response in asset management.

Integrating Other Utility Plans into Asset Management

Small water and wastewater utilities face unique challenges, including limited resources, aging infrastructure, and increased vulnerability to emergencies. Integrating asset management into strategic planning gives decision-makers a more holistic view of a utility's challenges and available resources. The following plans will inform your utility's approach to preparedness and emergency response in asset management:

STRATEGIC PLANS

Strategic planning is the process of defining an organization's direction and making decisions on allocating its resources. For small water and wastewater utilities, strategic planning should encompass long-term goals and consider external factors influencing operations. Key components include:

- Vision, mission, and values
- SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)
- Goal setting and performance metrics
- Stakeholder engagement

EMERGENCY RESPONSE PLAN (ERP)

[US EPA's ERP Template]

Having a written and electronic plan for emergencies

is crucial, and for some systems a legal or funding obligation, for utilities to effectively respond to and recover from emergencies, such as natural disasters, accidents, or system failures. ERPs are also a compliance requirement for many systems through their primacy agency or funders. Key components include:

- Risk assessment and vulnerability analysis
- Emergency preparedness and response protocols
- Communication strategies
- Training and drills
- A set periodic review of the ERP with updates

RISK AND RESILIENCY PLANS

(US EPA's Checklist and RCAP's Worksheet)

Risk and resilience considerations are essential for protecting utility operations from internal and external threats. This involves:

- Identification and assessment of risks
- Identifying critical assessment and a plan to protect
- Implementation of risk mitigation measures
- Development of resilience strategies
- Continuous monitoring and adaptation

UTILITY PARTNERSHIPS OR REGIONAL PLANS

(RCAP: The Role Mapping Serves for Your Small, Rural or Tribal Utility)

Regional utility collaborations can help small utilities by sharing resources, expertise, and cost savings. There are varying degrees of partnerships which include:

- Shared infrastructure and resources
- Mutual aid agreements
- Regional planning and coordination
- Interconnected emergency response plans
- Physical entities helping to provide water between systems in emergencies

2.9 Optional Plan Information

The following give more insight into your utility's operations and management and should be referenced when such an item/information exists and is up-to-date.

Energy Efficiency

It's important for systems to check the energy efficiency of all assets, not just the ones that are powered. By using energy management techniques like conducting energy assessments or audits, the system can better grasp the energy needs of its assets. Assets that are not performing well and are affecting the system's energy usage negatively need to be identified for either rehabilitation or replacement. If your utility is or will be implementing any energy management initiatives in the future, include in your asset management plan:

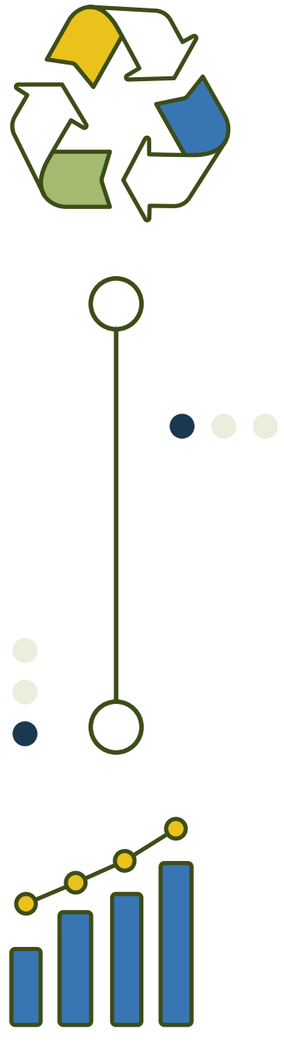
- Any evaluations to identify where energy efficiency improvements are needed
- Any energy audits that have been carried out and what progress has been made in implementing energy management recommendations

Water Efficiency

Drinking water systems of all sizes lose a significant amount of revenue each year due to the inability to account for all the water that's treated. As the saying goes, "if it can't be tracked, it can't be billed." It's crucial for systems to include water efficiency measures like audits and leak detection testing in their asset management strategy to reduce water loss.

A Water Efficiency section of the asset management plan should cover any efforts to prevent water loss and improve water efficiency that the system has already taken or will take in the future, such as:

- Water audit and leak detection methods and frequency
- Strategies for reducing water loss
- Consumer water conservation programs or incentives



CHAPTER THREE

Putting the Plan in Motion

Though this guide offers recommendations for successfully creating an asset management program, it's important to acknowledge there's no one-size-fits-all solution when it comes to managing assets. Developing strategies that consider the resources, priorities, risk tolerance, and specific challenges of each utility is crucial. Smaller systems may struggle with staffing and financial resources needed to undertake new programs and activities.

Compounding those challenges is the fact that many assets are often buried, out of sight and out of mind of elected officials, utility boards, and their voters and customers. Especially in areas where source water is plentiful, the upkeep of "invisible" assets may not be a high priority. In this chapter, we will provide some tips for small systems to successfully implement an asset management plan. This includes developing and utilizing a solid communication strategy and taking steps to ensure your plan will adapt and grow along with your utility.

3.1 Start Where You Are

Taking on an asset management plan is a significant endeavor for any size utility. Smaller utilities especially will need to decide how to make best use of limited human and financial resources to reach their goals. Below is a summary of strategies for small systems.

FINANCIAL STRATEGIES: Once gathered, use O&M and cost data to prioritize inventory renewal and replacements. Simplify and streamline capital improvement plans based on those asset inventory priorities. Plan to utilize special funding sources available to small, rural systems including grants and low interest loans. Contact qualified technical assistance providers for help with adjusting rates and procedures so that revenues cover short- and long-term financial needs.

PLANNING AND SUPPORT: Utilize free resources available for small utilities from entities such as USDA-RD, USEPA, and your state or regional t\ Tribal capacity development coordinators. Non-profit technical assistance providers can help review plans and explore whether partnering or contracting services with other systems makes financial sense.

STAFFING: For extra help with asset management planning, reach out to technical assistance organizations and/or your state or regional Tribal council's capacity development office. They can help you form an in-house asset management committee and guide it through the planning process. Ask about financial assistance in the form of grants for asset management planning.

ASSET INVENTORY: Decide what makes sense for your utility. It can be as simple as a spreadsheet or index card box. There are increasingly lower cost solutions for GIS software, and some non-profit technical assistance organizations now offer lower cost mapping and other services.

CONDITION ASSESSMENTS: Technical assistance providers, who are often former operators, can show your team how to inspect your utility components or help them access equipment that would be cost-prohibitive for a small system to purchase.

LEVEL OF SERVICE (LOS): Online examples and onsite technical assistance providers can be a resource for your LOS Agreement. Use the finished Agreement as a tool for communication through organization and customer base to increase understanding, support, and ultimately effectiveness in meeting LOS targets and other AM activities.

DETERMINING ASSET CRITICALITY: Utilize free tools such as worksheets, tables, and examples available online for small systems. Again, technical assistance providers can guide your team through the activity.

3.2 Foster Customer and Employee Support

It's crucial to explain the asset management plan's benefits for customers and utility staff to understand and become invested in it. Engaging with stakeholders such as customers, board members, and utility personnel is key to gaining support for short- and long-term infrastructure planning.

Early in the process, develop a communications strategy. It should include instructions for sharing information about the plan (both internally and externally); receiving and responding to information; and website, press, and/or social media procedures.

Manage expectations about when results will be realized. Over-promising and under-delivering will undermine confidence in your plan, so be realistic about costs, timelines, and other performance indicators.

Justify long-term planning based on asset lifecycle costs. While reducing the frequency of preventative maintenance may seem like a way to ease the annual O&M budget, the shortened asset life spans and increased frequency of repairs will increase costs – which are passed along to customers - over the long term.

Explain how running to failure and/or deferring maintenance can prevent the utility from meeting Level of Service goals. In addition to increasing lifecycle costs, deferring maintenance also negatively impacts the utility's ability to deliver safe, reliable products and meet regulatory requirements.

Show exactly how any rate increases would be used, dollar for dollar. Utilize tables and images. Multimedia presentations such PowerPoint or Canva are eye-catching and easy to upload and share.

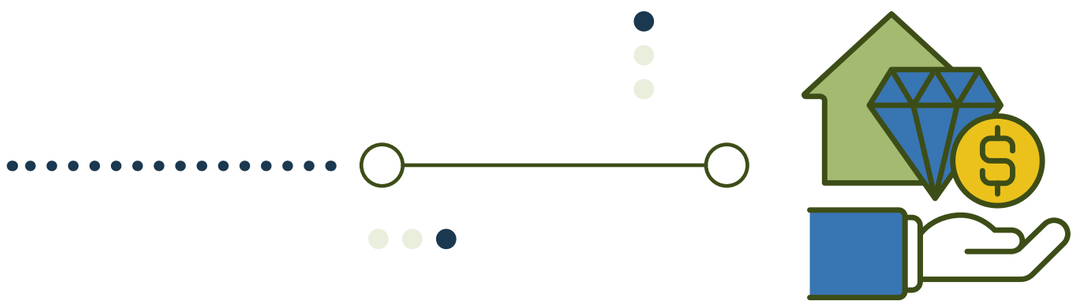
Discuss costs relative to other everyday expenses. For example, compare the cost of a gallon of gas or a coffee beverage compared to the cost of receiving a gallon of clean, safe water delivered straight into your home.

3.3 Continuous Improvement

Your asset management plan should reflect your utility's changes over time. Keeping your plan up to date will help you make big-picture decisions in a timely manner and facilitate future funding applications. Some tips:

- Update your work annually and keep records in a secure location as they could contain sensitive information about your system
- Develop a system for updating the asset inventory
- Develop a system for accepting, recording and reviewing feedback from stakeholders, including utility board and staff

RCAP has information, training and assistance available for all aspects of asset management planning. To find a technical assistance provider near you, please go to www.rcap.org.



GLOSSARY TERMS

As-builts – Revised set of drawings submitted by a contractor upon completion of a project or a particular job.

Asset – All the equipment, buildings, land, people, and other components of a system.

Asset Inventory – A detailed list or survey of all system assets including source, treatment, transmission, and distribution infrastructure.

Asset Management – The practice of managing infrastructure assets to operate at the "best appropriate" cost while maintaining an acceptable Level of Service to customers.

Asset Management Plan – Prescribes the timing, cost, financing for implementing asset management, including operation, replacement, and renewals.

Capital Improvement Plan – Prescribes the cost, timing, and financing for capital improvement projects.

Capital Projects – Add new assets to the system that upgrade or improve existing capacity.

Condition Assessment – A systematic and structured process used to evaluate the condition, performance, and overall health of a piece of equipment.

Consequence of Failure – What would happen if an asset were to fail (become inoperable).

Criticality – The measure of risk associated with an asset.

Deferred Maintenance – Delaying or not performing maintenance tasks according to the recommended schedule.

Emergency Response Plan (ERP) – Describes the procedures, resources, and strategies to implement in preparation for and responding to natural and man-made disasters and emergencies.

Geographic Information System – GIS is a technology used to create, manage, analyze, and map data.

Level of Service – Measures the performance and quality of services provided by assets to meet the needs and expectations of stakeholders.

Likelihood of Failure (LOF) – How likely an asset is to fail.

Risk and Resiliency Plan – Assists systems in methodically evaluating threats, from both human and natural causes, that might jeopardize safe, reliable service.

Renewal Projects – Bring an existing asset back to its original condition, without increasing its design capacity. These are large expenditures that fall outside of the annual O&M budget.

Reserves – Funds set aside to cover unexpected costs or future obligations.

Redundancy – Having backup system or component(s) that can relieve the primary system or component(s) in the event a system or component is brought offline or fails.

Remaining Useful Life – The length of time a machine is likely to operate before it requires repair or replacement.

Water and Wastewater Agency Response Network (WARN) – a mutual aid network of utilities assisting other utilities in responding to and recovering from emergencies.

APPENDIX A

Funding Programs for Asset Management

As we discussed in the "Financial Strategies" section, your utility's capital improvements funding strategy may include pursuing loans and/or grants to bridge any funding gaps. Below are some government-sponsored financial resources available to support small system asset management activities and/or asset replacement, renewal, and upgrades. Some programs also offer financial assistance for planning activities, from asset management to preliminary engineering. Contact your local technical assistance provider or primacy agency for more information on the following programs and additional opportunities available in your area.

Water and Wastewater Funding Programs

U.S. DEPARTMENT OF AGRICULTURE RURAL DEVELOPMENT'S WATER AND ENVIRONMENTAL PROGRAM

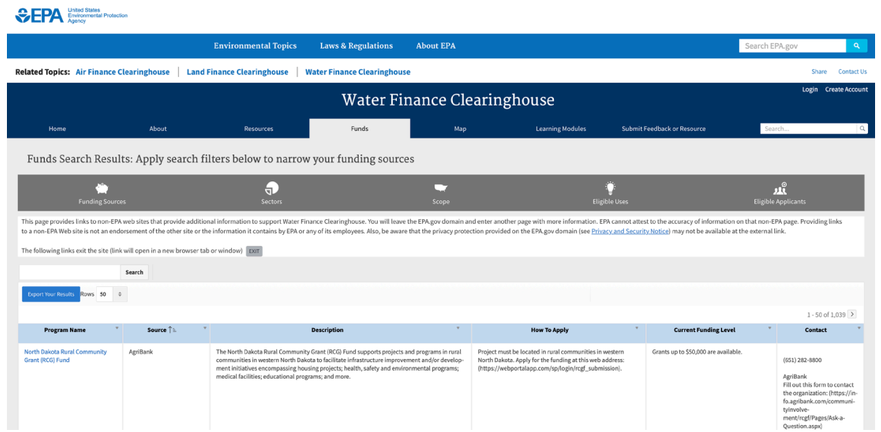
Focused on the infrastructure needs of rural communities with populations of 10,000 or less, USDA has field staff located in each state who are available to guide your community or utility throughout the funding process. https://www.rd.usda.gov/about-rd/offices/state-offices

Did you know USDA RD offers over 70 programs to help small communities and their utilities? See them all in this USDA RD Program Matrix: https://www.rd.usda.gov/files/RD_ProgramMatrix.pdf

- Special Evaluation Assistance for Rural Communities and Households (SEARCH) provides funding to income-eligible small rural communities, tribes, other government entities and nonprofit utilities for feasibility studies, preliminary engineering, and design. https://www.rd.usda.gov/programs-services/water-environmental-programs/search-special-evaluation-assistance-rural-communities-and-households-grant
- Water & Waste Disposal Predevelopment Planning Grants help eligible communities, governments, nonprofit organizations and tribes plan and develop USDA RD grant and loan applications. https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-predevelopment-planning-grants
- Water and Waste Disposal Loan and Grant Program assists qualified government entities, nonprofit utilities, and tribes with funding the construction of drinking water, sewer, solid waste, and storm water improvements. https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-grant-program
- USDA-RD also has water and waste facility loans and grants to alleviate health risks for Colonias and Tribal Lands. https://www.rd.usda.gov/programs-services/water-environmental-programs/water-and-waste-facility-loans-and-grants-alleviate-health-risks-colonias and https://www.rd.usda.gov/programs-services/water-environmental-programs/water-and-waste-facility-loans-and-grants-alleviate-health-risks-tribal-lands

THE WATER FINANCE CLEARINGHOUSE

This is an online portal developed by the EPA and a valuable resource for communities seeking information and services to guide their decision-making on drinking water, wastewater, and stormwater infrastructure. It's comprised of two databases: one for funding sources related to water infrastructure and another for various resources like reports, web links, and webinars. These tools play a crucial role in assisting communities in accessing the capital required to fulfill their infrastructure needs. https://www.epa.gov/waterdata/water-finance-clearinghouse



Drinking Water Funding

DRINKING WATER STATE REVOLVING FUNDS (DWSRF)

https://www.epa.gov/dwsrf

The DWSRF functions through federal and state/territory government partnerships and provides low-interest loans and other financing to eligible recipients for a wide range of drinking water infrastructure projects and their planning. Loan terms are specific to each state/territory, so reach out to your local office or technical assistance provider for more information on how to apply. https://www.epa.gov/dwsrf/state-dwsrf-website-and-contacts

Additionally, the 2024 USEPA document State Asset Management Initiatives lists the asset management initiatives undertaken by each state as outlined in their capacity development strategies. These include regulatory mandates, grant programs, scoring incentives for the DWSRF, and other resources that public water systems can leverage to enhance their financial stability and reliability in delivering safe drinking water. https://www.epa.gov/system/files/documents/2024-01/2024-state-asset-management-initiatives-document_508.pdf

Wastewater Funding

CLEAN WATER STATE REVOLVING FUND

www.epa.gov/cwsrf

The Clean Water State Revolving Fund, like the DWSRF, is made possible by federal and state/territory government partnerships. The program offers affordable funding to eligible communities and entities for various water quality projects and planning, such as publicly owned treatment works, nonpoint source pollution control, decentralized wastewater treatment systems, stormwater mitigation, green infrastructure, estuary protection, and water reuse. Contact your local program or technical assistance provider for more information. https://www.epa.gov/cwsrf/state-cwsrf-program-contacts

APPENDIX B

Resources for More Information & Assistance

Technical assistance providers from government agencies and non-profit organizations such as the Rural Community Assistance Partnership offer services for free or reduced cost to eligible rural communities under 10,000 in population. They can help with identifying funding scenarios, completing loan and grant applications, GIS mapping, as well as utility finance, asset management, and capital improvements planning. Reach out to your primacy agency for more information. To learn about RCAP and their onsite technical assistance services, online resources, and training opportunities visit www.rcap.org

The Reference Guide for Asset Management Tools was created by a US Environmental Protection Agency multidisciplinary team to combine state asset management tools available to users through this guide. The guide covers the components of an asset management plan, implementation tools, and effective utility management tools. https://www.epa.gov/sites/default/files/2020-06/documents/reference_guide_for_asset_management_tools_2020.pdf

The USEPA Handbook on Planning for Sustainability for Water and Wastewater Utilities is a guidebook that outlines steps utilities can take to improve their current planning procedures to ensure that investments in water infrastructure are cost effective throughout their lifecycle and align with the community needs and goals. https://www.epa.gov/sites/default/files/2016-01/documents/planning-for-sustainability-a-handbook-for-water-and-wastewater-utilities.pdf

RCAP's The Basics of Financial Management for Small Utilities
https://online.flippingbook.com/view/620896142/

RCAP's Guide to Sustainable Infrastructure for Small System Public Services
https://www.rcap.org/resources/sustainable-infrastructure-for-small-system-public-services-a- planning-and-resource-guide/

Utilize **RCAP's free financial management e-modules** to learn more about financial management topics at your own pace:

- How2: Make Rate-Setting Policy Decisions (1 hour) https://rcap.talentlms.com/catalog/info/id:219
- How2: Set Rates for a Sustainable Utility (2 hours) https://rcap.talentlms.com/catalog/info/id:220
- Regionalization and Resilience: Collaboration in Times of Crises (1 hour) https://rcap.talentlms.com/catalog/info/id:223

APPENDIX C

Blank Inventory Worksheet

Feel free to copy and print from here or download the Excel file at www.RCAP.org/amgworksheets.

Asset/ ID	Qty.	Location	Year Installed	Condition	COF	LOF