

# 2017

North Carolina's Statewide Water and Wastewater

## **INFRASTRUCTURE MASTER PLAN**

*The Road to Viability*



*Water Infrastructure*  
ENVIRONMENTAL QUALITY

# CONTENTS



## **1** EXECUTIVE SUMMARY

## **9** SECTION 1 – INTRODUCTION TO THE STATE WATER INFRASTRUCTURE AUTHORITY AND THE STATEWIDE WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

- 1.1 The State Water Infrastructure Authority and Its Work
- 1.2 Master Plan
- 1.3 Plan Organization

## **14** SECTION 2 – MASTER PLAN VISION AND PURPOSE

- 2.1 Vision for North Carolina's Water and Wastewater Systems
- 2.2 Purpose of the Master Plan
- 2.3 Keeping the Master Plan Relevant

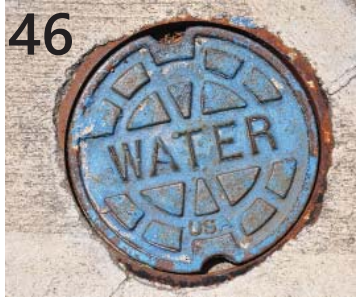
## **18** SECTION 3 – SELECTED FEDERAL AND STATE WATER INFRASTRUCTURE FUNDING PROGRAMS

- 3.1 Federal Assistance for Water Infrastructure
- 3.2 North Carolina Programs
- 3.3 Consolidation of State Water Infrastructure Programs in 2013
- 3.4 Future Funding

## **24** SECTION 4 – STATEWIDE NEEDS

- 4.1 North Carolina's Water Infrastructure
- 4.2 Recognizing the Management Challenges of Public Water and Wastewater Utilities
- 4.3 Focus Area 1 – Infrastructure Management
- 4.4 Focus Area 2 – Organizational Management
- 4.5 Focus Area 3 – Financial Management
- 4.6 Infrastructure Capital Needs and Costs

# CONTENTS



## **35** SECTION 5 – ACHIEVING THE VISION: INFRASTRUCTURE MANAGEMENT

- 5.1 Asset Management
- 5.2 Emerging Best Practices
- 5.3 The Role of the State in Achieving the Vision for Infrastructure Management

## **40** SECTION 6 – ACHIEVING THE VISION: ORGANIZATIONAL MANAGEMENT

- 6.1 Utility Governing Boards
- 6.2 Operations Staff
- 6.3 Customers and Stakeholders
- 6.4 The Role of the State in Achieving the Vision for Organizational Management

## **46** SECTION 7 – ACHIEVING THE VISION: FINANCIAL MANAGEMENT

- 7.1 Revenue Generation
- 7.2 Local Government Finance Requirements
- 7.3 The Role of the State in Achieving the Vision for Financial Management

## **52** SECTION 8 – ASSESSING A UTILITY'S FINANCIAL CAPACITY

- 8.1 Background
- 8.2 Affordability Criteria
- 8.3 Outcomes

## **54** SECTION 9 – TROUBLED SYSTEM PROTOCOL

## **55** SECTION 10 – MOVING FORWARD

- 10.1 Near Term Activities
- 10.2 Longer-Term Issues

## **59** APPENDICES

### **A. State Water Infrastructure Authority Legislation and Member Information**

A.1. Current State Water Infrastructure Authority Positions and Members

A.2 North Carolina General Statutes Chapter 159G-70 through 72

### **B. Resource Toolbox**

### **C. Local Government Finance and Accounting Requirements**

C.1 North Carolina General Statutes Chapter 159 – Local Government Finance

C.2 Governmental Accounting Standards Board

### **D. Attributes of Effectively Managed Water Sector Utilities**

### **E. References**

### **F. Acronyms**



## Executive Summary

Infrastructure is a cornerstone of the economy and there is no more basic infrastructure need than that for water. Clean, safe water – whether for drinking and cooking or for industrial and manufacturing purposes – is needed by every citizen and business in North Carolina. The development of water infrastructure over more than 100 years by local, state, and federal governments is a great accomplishment – yet that success is placed at risk when our water infrastructure is not maintained or modernized.

**Over the next 20 years, capital cost estimates for water system needs range from \$10 to \$15 billion, while costs for wastewater system needs range from \$7 to \$11 billion – more likely at the higher end of these ranges.** While North Carolina has a competitive advantage over many other states with respect to water resources, these resources are made usable by the infrastructure systems that clean and transport the water. North Carolina’s water and wastewater infrastructure must be ready for the needs and challenges of the future.

Infrastructure investments that have been deferred year after year result in an infrastructure gap or deficit. The owners of utilities and other water professionals must be prepared to invest in their economic future by taking the steps needed to address infrastructure challenges and keep North Carolina ahead of other states in economic development.

The State Water Infrastructure Authority (Authority) was created by the General Assembly in 2013 to assess the state’s water and wastewater infrastructure needs, the role of the state in funding needed infrastructure, and the funding programs currently available to local governments and utilities. While subsidized loans are the primary vehicle to help make infrastructure more affordable, the Authority recognizes that **only a fraction of today’s infrastructure capital needs can be met with currently available state or federal subsidized funding levels. The Authority has initiated a different approach to assist water utilities in closing the gap.**

## Vision for the Future

The state will best be able to meet its water infrastructure needs by ensuring individual utilities are, or are on a path to be, viable systems

.....

A viable system is one that functions as a long-term, self-sufficient business enterprise, establishes organizational excellence, and provides appropriate levels of infrastructure maintenance, operation, and reinvestment that allow the utility to provide reliable water services now and in the future

# Vision for the Future

The Authority’s vision is for viable water utilities across North Carolina. **The state’s role is to foster the long-term viability of individual water and wastewater utilities by providing access not only to capital funds but also to resources that help utilities address organizational and financial management challenges that may be contributing to physical infrastructure limitations.**

This Master Plan is intended to apply broadly to owners and operators of water and wastewater utilities and systems that serve the public. The Authority’s goal is for these utilities to:

- Recognize that users and beneficiaries of water infrastructure must pay, to the greatest extent possible, for the cost of operating, maintaining, and renewing that infrastructure
- Be proactive in the management of water infrastructure by understanding the condition of infrastructure, identifying the most critical components, and establishing prioritized long-term renewal and modernization plans which promote transparent decision-making with customers and stakeholders
- Establish financial plans that enable the utility to fund both operation and maintenance as well as long-term infrastructure renewal without long-term reliance on grant funds

The purpose of this Master Plan is to provide the North Carolina General Assembly, utility governing boards, and the public with a roadmap for water and wastewater utility viability.

**Best practices in utility management are essential for viable utility systems that are robust in three key integrated focus areas:**



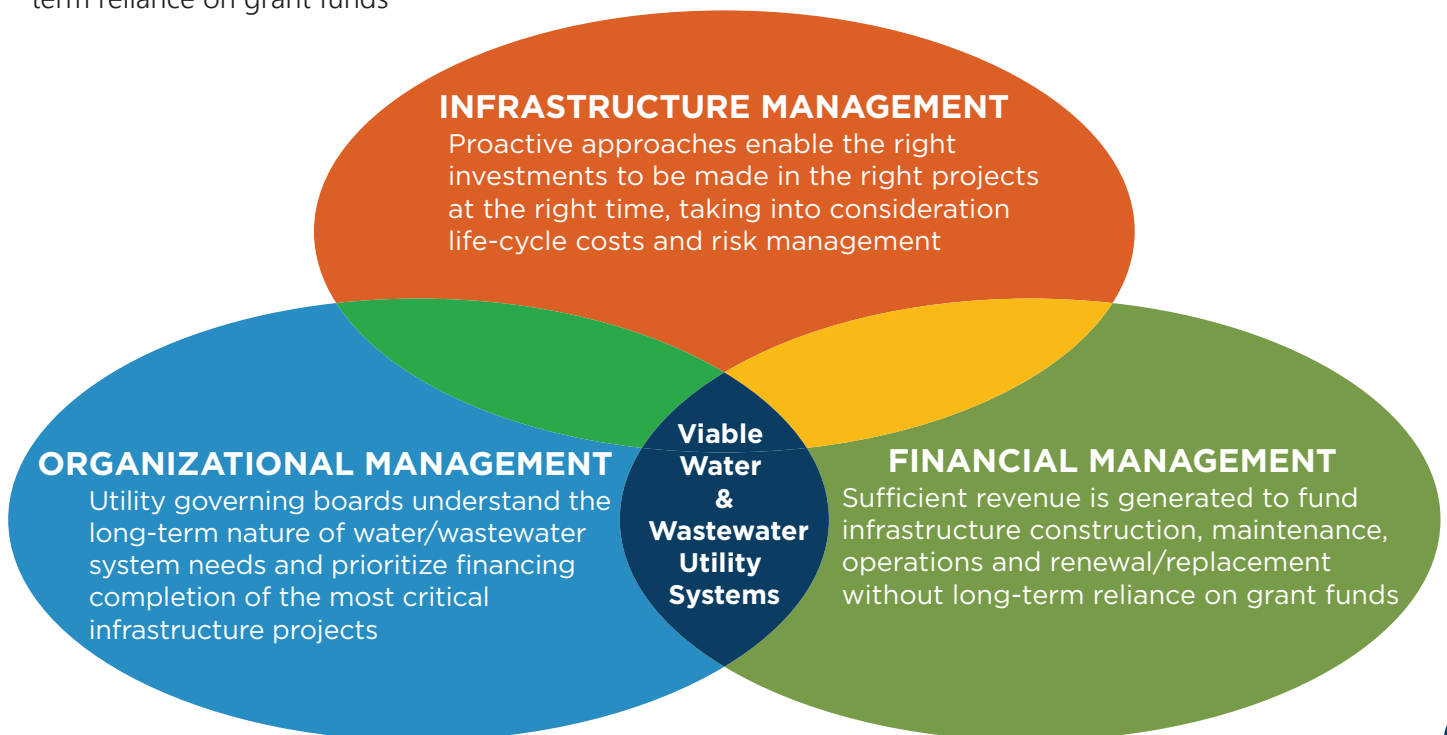
**Infrastructure Management** – By taking proactive approaches to enable the right investments to be made in the right projects at the right time, taking into consideration life-cycle costs and risk management



**Organizational Management** – Through governing boards (elected officials, appointed officials and owners) understanding the long-term nature of water/wastewater systems and prioritizing the financing and completion of the most critical infrastructure projects



**Financial Management** – Through sufficient revenue generation to fund infrastructure construction, maintenance, operations, renewal/replacement, and reserves for unexpected events without long-term reliance on grant funds



## Achieving the Vision

Achieving viable water utilities across North Carolina requires actions by the state, local governments and water utility providers to:

- **Ensure that, to the greatest extent practicable, water utilities operate as enterprise systems that generate sufficient revenue to cover all operating, maintenance, and capital expenditures, as well as funding reserves for unexpected events.** This can happen when:
  - Governing boards and utility staff understand the long-term nature of infrastructure planning and management and the long-term needs of their systems
  - Governing boards and utility staff engage with the state's Local Government Commission to set up appropriate utility financial management policies and procedures
  - Governing boards and utility staff take advantage of the extensive utility resources offered by support organizations, associations, and programs including the University of North Carolina School of Government/Environmental Finance Center, Local Government Commission, Councils of Government, and the North Carolina Rural Water Association, among others
  - Agencies and organizations improve upon educational tools and information about water infrastructure management that is oriented to governing boards and the public, and strengthen networks with utilities to facilitate the application and use of the tools and information
  - Agencies explore opportunities with the state university and community college systems offering coursework in utility finances and public administration including instruction about water infrastructure
  - Utilities implement infrastructure asset management plans and best practices to increase the efficiency of their systems
  - Utilities seek to expand opportunities for partnership solutions

By supporting utilities as they implement the three management focus areas, the state can help assure that its limited capital resources are used most effectively and, in many cases, the improvements achieved will ultimately allow many utilities to access non-subsidized forms of capital



The State's Local Government Commission has been recognized as a "local government lifeline"

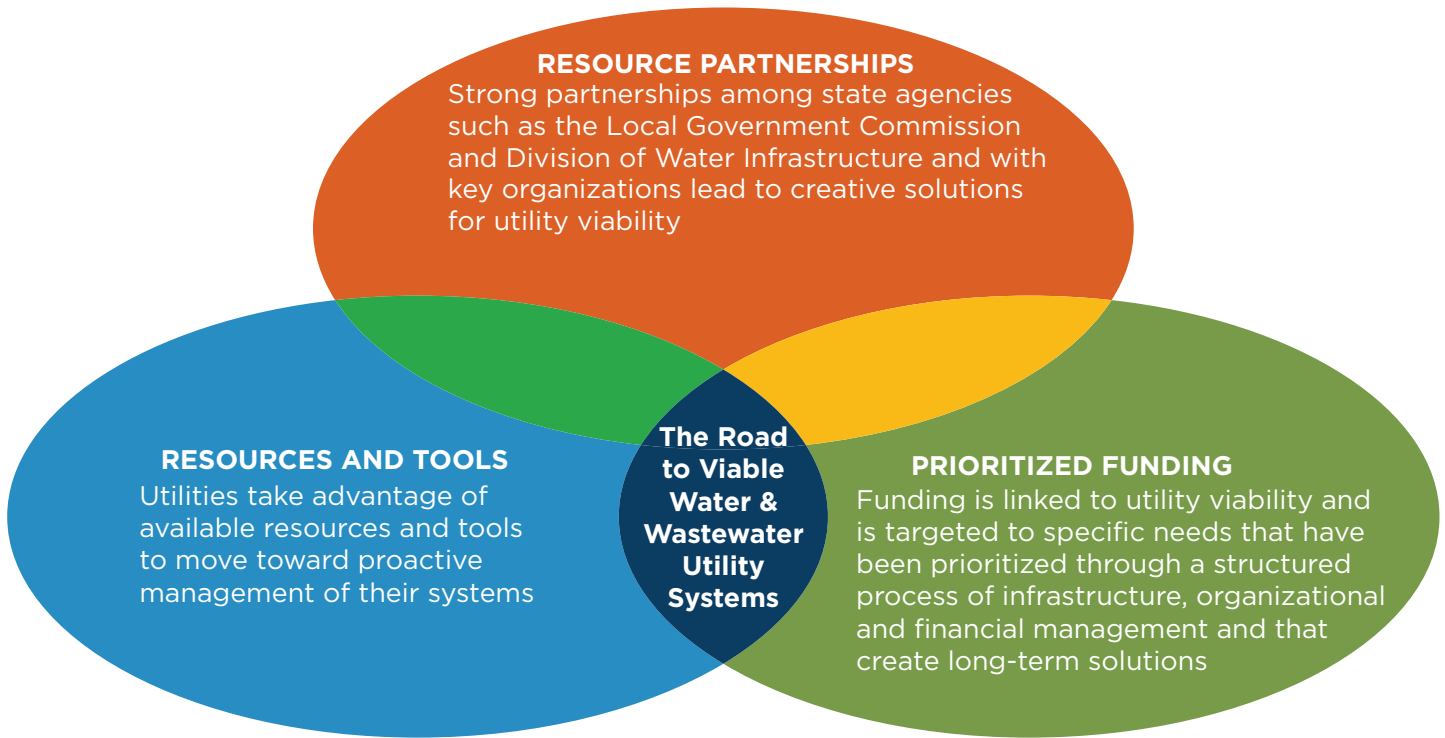
- **Promote viable water utilities through the state water infrastructure funding programs by:**
  - Assisting utilities that operate in some of the state’s most rural, economically distressed areas, and that have some of the highest utility rates in the state, in creating permanent management and infrastructure solutions
  - Making project funding decisions that recognize that many entities can afford to incur some amount of debt or obligate some amount of funding toward a project
  - Prioritizing applications for funding that represent best practices for utility management
  - Continuing to fund and offer Asset Inventory and Assessment Grants
  - Continuing to fund and offer Merger/Regionalization Feasibility Grants to support utilities as they study the advantages of regional economies of scale in management, access to capital, and capacity of water and wastewater treatment facilities
- **Acknowledge that when water utilities are not viable or are not on a path to become viable, solutions are needed that go beyond simply constructing or repairing infrastructure. Permanent solutions can be created when:**
  - The governing boards of local government utility systems work with the Local Government Commission to craft possible courses of action
  - Utility governing boards explore potential advantages of a range of partnership solutions that might include shared management opportunities, contract operations, public-private partnerships, privatization, inter-local agreements, and other activities or arrangements
  - Utilities transition to local funding solutions and end long-term reliance on grant funding
  - Resource partners such as the North Carolina Division of Water Infrastructure, U. S. Department of Agriculture Rural Development, Southeast Rural Community Assistance Project, North Carolina Department of Commerce Rural Economic Development Division, and the North Carolina Councils of Government coordinate possible paths forward
  - The governing boards and staff of utilities seek training through the Local Government Commission, UNC School of Government/Environmental Finance Center, the Southeast Rural Community Assistance Project, and the North Carolina Rural Water Association, among others

Providing grant funds simply to construct or repair infrastructure – without requiring long-term management plans for infrastructure, organization and finances – does not move a utility toward viability

**Grant funds will be targeted to projects to help utilities transition to permanent local funding solutions**



- **Move forward in achieving viability in the three focus areas through:**
  - **Resource partnerships** among state and federal agencies, key organizations and utility providers for more cohesive support as they work to reach and maintain viability by leveraging existing resources and programs
  - **Resources and tools** that support proactive utility management
  - **Prioritized funding** that is linked to utility viability



## The Funding Road Ahead

Water and wastewater infrastructure needs for North Carolina over the next 20 years are estimated to range from \$17 billion to \$26 billion, which equals \$0.9 billion to \$1.3 billion per year.

Only a small fraction of these capital needs can be met with grant funds from state and federal sources. Including the additional \$100 million in grant funds for the next two fiscal years provided by the Connect North Carolina Bond, just 7% of drinking water infrastructure needs and 8% of wastewater infrastructure needs can be met by grants.

The remaining needs – 92% for wastewater and 93% for drinking water – must be funded by the utility providers. If not funded, these add to the backlog of infrastructure investments that continue to be deferred.

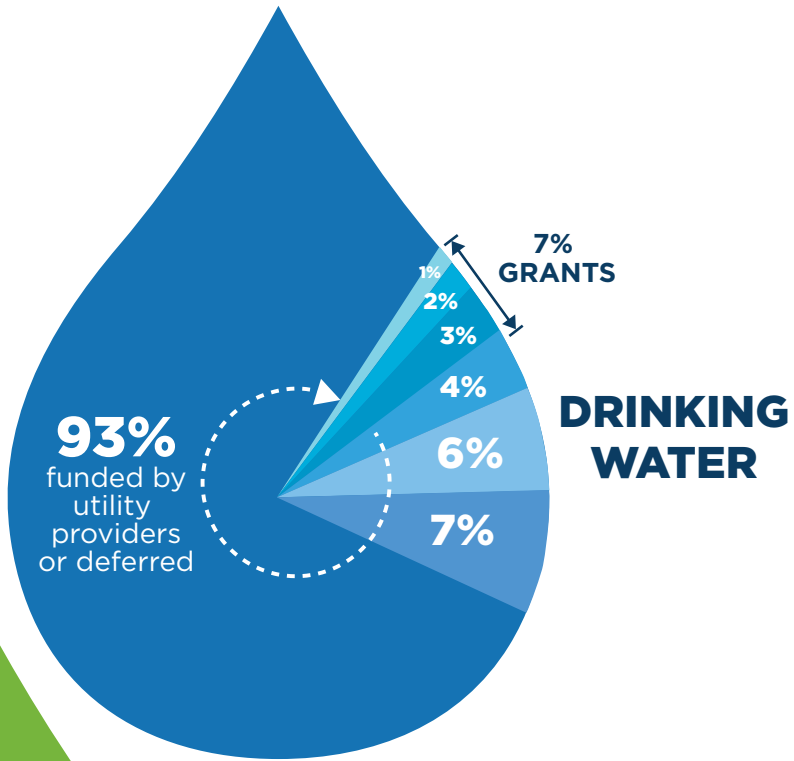
The American Water Works Association suggests that additional revenue funds need to come from local utility customers, most likely through higher rates. Utilities must ask their customers to invest more and in turn must be able to explain how the investment will provide actual benefits to the community. (1)



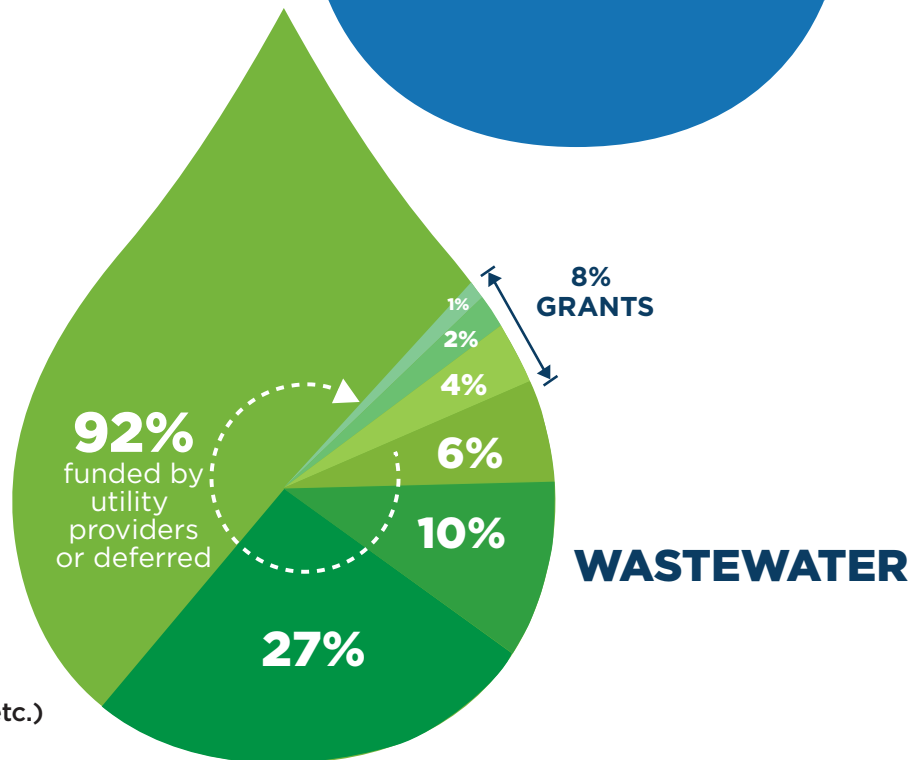
# Estimated Drinking Water and Wastewater INFRASTRUCTURE NEEDS and FUNDING SOURCES for FY2017 and FY2018



- State Drinking Water Reserve Grants (1%)
- Community Development Block Grant - Infrastructure (2%)
- Drinking Water Connect NC bond grants (3%)
- USDA - Rural Development (4%)  
(3% loans + 1% grants)
- Drinking Water State Revolving Funds (6%)
- Drinking Water Connect NC bond loans (7%)
- Drinking water needs deferred or funded by other means (bonds, etc.)



- State Wastewater Reserve grants (1%)
- Community Development Block Grant - Infrastructure (2%)
- Wastewater Connect NC bond grants (4%)
- USDA - Rural Development (6%)  
(5% loans + 1% grants)
- Wastewater Connect NC bond loans (10%)
- Clean Water State Revolving Funds (27%)
- Wastewater needs deferred or funded by other means (bonds, etc.)



The federal loan programs provide substantial savings and must continue to be the primary means of infrastructure funding for the vast majority of utilities in the state. Many utilities may have limited access to these sources of loan capital because they lack the infrastructure management, organizational management, and/or financial management practices to support debt. For many of these utilities, strengthening management will increase their access to these programs.

For some larger communities in the state, increased rates and access to the capital market, such as through municipal bonds, will continue to be a key strategy. However even these communities will likely need to continue to increase their management and financial capacity to meet their growing future needs.

For communities under extreme economic stress, facing water and sewer bills that are higher than most other water customers across the state, grants will be needed for the foreseeable future to ensure those systems can be competitive for growth opportunities. The Authority is directing grant funds to those critical situations and is providing the resources and tools for utilities to prevent such situations from developing or continuing.

**The state's role is to provide strategic project funding to support utilities as they:**

- **Transition to permanent local funding solutions**
- **Begin to access non-subsidized forms of capital**
- **End long-term reliance on grant funding**



“...a lot of people are looking for these top-level, silver bullet solutions from the top down – thinking the federal government is going to lead, and they’re going to prescribe these huge stimulus-style packages to solve the challenge” (2)

.....

In the world of infrastructure, **water stands out for the startlingly small role the federal government plays** in building and maintaining our crucial systems. In 2014, federal dollars accounted for 22% of mass-transit money, 28% of highway spending and 44% of aviation projects. **For water utilities, that number was just 4%. (3)**

## Moving Forward

In the near term, the Authority's next steps include:

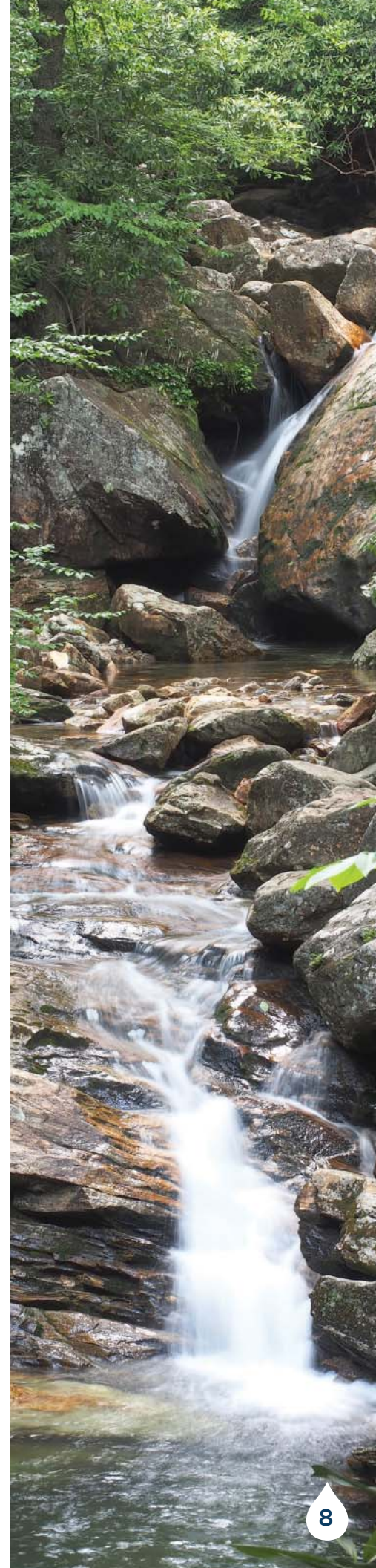
- **Monitoring and evaluating recent changes to the funding programs and levels**  
A great deal of change has taken place in the state's approach to funding assistance. A key activity will be managing these changes and evaluating their impacts to ensure that funding is linked to supporting a utility's viability. Future recommendations for modifications to the funding programs may be a result.
- **Strengthening resource partnerships**  
Multiple opportunities exist for strengthening resource partnerships among state and federal agencies, the university and community college systems, water and wastewater organizations, local governments and utility governing boards. These partnerships can be enhanced to leverage and expand on many existing resources and programs in planning, training and communications, leading to creative solutions for utility viability and the long-term success of the state's funding programs.
- **Developing a troubled system protocol**  
In partnership with the Local Government Commission and other agencies and organizations, the Authority will work to develop a troubled system protocol with the goal of seeking permanent solutions to water infrastructure issues. While applying an overarching protocol to any system would be ideal, the Authority recognizes that approaches may need to be tailored to an individual community's needs.

The Authority will continue to research and monitor a number of longer-term subjects for inclusion in future master planning efforts. These may include communications resources, regional coordination, managing reclaimed water and stormwater, partnership solutions, and improved procurement policies.

## Keeping North Carolina's Statewide Water and Wastewater Infrastructure Master Plan Relevant

Infrastructure master plans are kept fresh and relevant by continuing to address current key issues, envisioning the future and its possible challenges, and exploring options for meeting those challenges. **Just as any type of master plan is updated as conditions, information and priorities change over time, the Authority is committed to updating and refreshing this Statewide Infrastructure Master Plan.**

However, this first version of the Master Plan focuses on addressing critical water and sewer needs across the state. The plan identifies the range of needs in infrastructure, organizational and financial management, and the types of processes, knowledge and information needed to fill the gaps. The Authority is taking the first steps to address these issues in this Master Plan by providing resources and tools to help North Carolina become a state in which viable utilities are the model.





## **Section 1 – Introduction to the State Water Infrastructure Authority and the Statewide Water and Wastewater Infrastructure Master Plan**

In 2013, the North Carolina General Assembly created the State Water Infrastructure Authority (Authority) to assess and make recommendations about the state’s water and wastewater infrastructure needs, and the infrastructure funding programs available to the state’s local governments and utilities. By creating the Authority and consolidating funding programs, the legislature recognized the critical nature of North Carolina’s water infrastructure. The state’s rich water resources and the systems that provide these resources to its citizens are key competitive advantages over many other growing states that have limited water resources, such as Florida, Texas, and California.

### **1.1 The State Water Infrastructure Authority and Its Work**

The Authority’s nine members have extensive experience in town and county management, private sector consulting, the operation and management of public water and wastewater utilities, local government finance, economic development work and academic experience involving water infrastructure, federal and state funding, and regulatory compliance and permitting.

The General Assembly tasked the Authority with twelve activities (provided in Appendix A), one of which is to develop a master plan to meet the state’s water infrastructure needs. In addition to the master plan, the Authority is also responsible for:

- Distributing loan and grant funds from five federal and state funding programs, and establishing criteria and priorities for funding
- Making recommendations on the role of the state in the development and funding of water infrastructure
- Assessing emerging practices in utility planning and management
- Assessing the need for a “troubled system” protocol

The Authority identified several key infrastructure issues in its annual reports to the legislature (4,5):

- A significant gap exists between infrastructure needs and available funding via either grants or loans
- Incentives should be provided to encourage utilities to become more proactive in the management and financing of their systems
- State grant and loan funds may not be reaching the most economically distressed communities

To address these issues, the Authority initiated fundamental changes to the state's approach to assistance with water infrastructure funding through:

#### EXPANDING ACCESS TO CAPITAL

- **Simplified the application process** across all five funding programs administered by the Division of Water Infrastructure
- **Developed a strategic, comprehensive priority rating system** to evaluate the best use of limited state funds
- **Refined the criteria for project affordability** to increase access to low-cost or no-cost capital by economically distressed utilities that already have high water or sewer rates

#### INCENTIVIZING UTILITY MANAGEMENT

- **Created a new grant program to allow a utility to develop an inventory of its water and wastewater infrastructure**, assess the condition of the assets and prioritize capital needs to address the most critical issues (Asset Inventory and Assessment grant)
- **Created a new grant program to allow utilities to study the feasibility of merging or regionalizing** with other systems (Merger/Regionalization Feasibility grant)

#### FOCUSING ON ECONOMICALLY DISTRESSED UTILITIES

- **Identified the factors that struggling utilities may face**, such as small customer bases and potential organizational and/or financial management issues that may limit access to capital
- **Initiated work with the Local Government Commission** of the Department of State Treasurer to develop a "troubled system" protocol to seek permanent solutions to water infrastructure issues

The State Water Infrastructure Authority members' **combined experience includes:**

**49** *years of*  
**TOWN AND COUNTY**  
**MANAGEMENT**

**27** *years of*  
**MANAGING**  
**WATER SYSTEMS**

**47** *years of*  
**PROFESSIONAL CONSULTING**  
**ENGINEERING SERVICES**

**19** *years of*  
**LOCAL GOVERNMENT**  
**FINANCE WORK**

**32** *years of*  
**ACADEMIC EXPERIENCE**  
**AND ECONOMIC**  
**DEVELOPMENT WORK**  
LINKED TO WATER  
INFRASTRUCTURE NEEDS

**62** *years of*  
**WATER AND WASTEWATER**  
**INFRASTRUCTURE PROJECT**  
**FUNDING, PERMITTING AND**  
**REGULATORY COMPLIANCE**

## 1.2 Master Plan

The Authority recognizes that this Master Plan must address more than only the cost of water infrastructure needs across the state. While the state must define the needs and provide access to capital funds to the extent possible, it must also address utilities' organizational and financial management challenges that may contribute to their physical infrastructure limitations.

Addressing these challenges is key to assuring the effective use of the state's capital funds for water infrastructure. **Best practices in utility management are essential for viable utility systems that are robust in three key integrated focus areas:**



**Infrastructure Management** – Utilities take proactive approaches to enable the right investments to be made in the right projects at the right time, taking into consideration life-cycle costs and risk management



**Organizational Management** – Utility governing boards (elected officials, appointed officials and owners) understand the long-term nature of water/wastewater systems and prioritize the financing and completion of the most critical infrastructure projects



**Financial Management** – Utilities generate sufficient revenue to fund infrastructure construction, maintenance, operations and renewal/replacement without long-term reliance on grant funds.

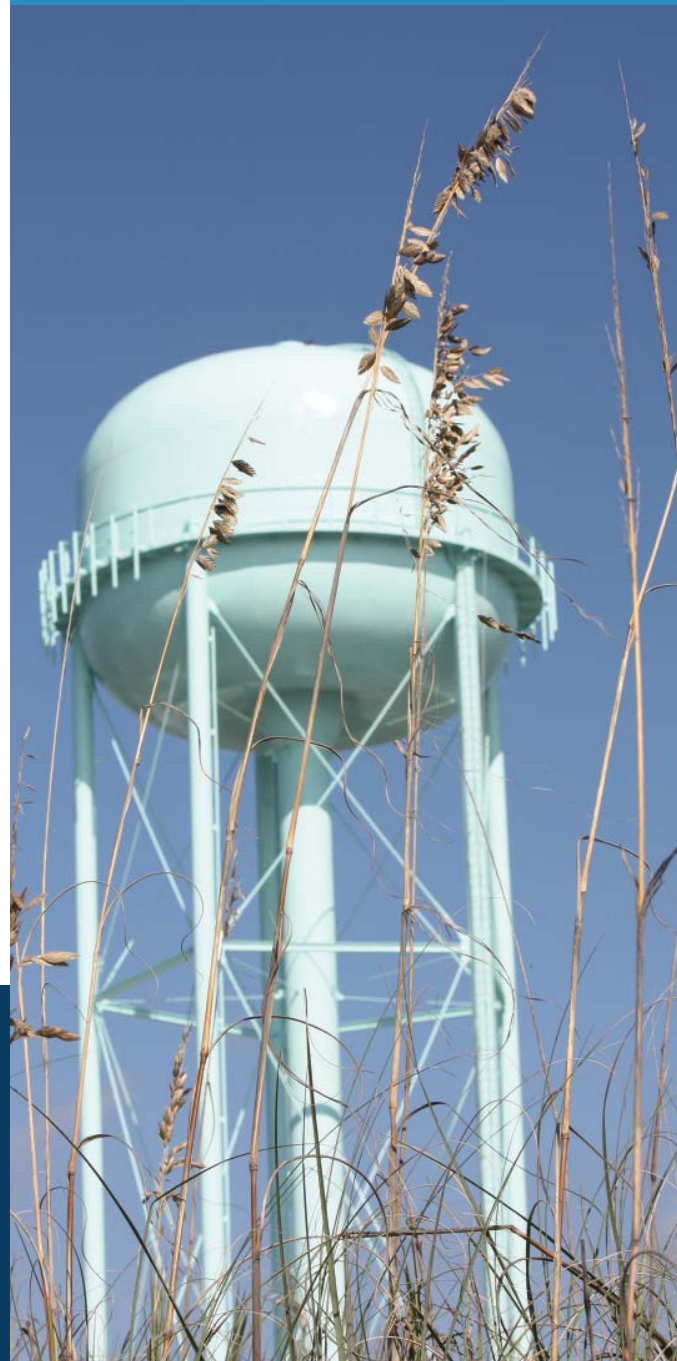
The Master Plan identifies the needs in each focus area and provides a path forward in achieving viability through:

- **Resource partnerships** among state and federal agencies, key organizations and utility providers for more cohesive support as they work to reach and maintain viability by leveraging existing resources and programs
- **Resources and tools** that support proactive utility management
- **Prioritized funding** that is linked to utility viability

Addressing utilities' organizational and financial management challenges are essential to assuring the effective use of the state's capital funds for water infrastructure

The Authority's work has resulted in initiatives that have greatly changed the state's approach to funding water infrastructure through:

- **Expanding access to capital**
- **Incentivizing utility management**
- **Focusing on economically distressed utilities**



## 1.3 Plan Organization

The Master Plan contains ten sections and six appendices, organized as follows:

### **Section 1**

#### **Introduction to the State Water Infrastructure Authority and the Statewide Water and Wastewater Infrastructure Master Plan**

*Introduces the State Water Infrastructure Authority, its responsibilities and initiatives, and the Master Plan*

### **Section 2**

#### **Master Plan Vision and Purpose**

*Presents the state's vision for water and wastewater utilities and the purpose of the Master Plan*

### **Section 3**

#### **Selected Federal and State Water Infrastructure Funding Programs**

*Provides a history and overview of selected federal and state funding programs*

### **Section 4**

#### **Statewide Needs**

*Identifies some of the many management challenges encountered by public water and wastewater utilities, grouped into three integrated focus areas: infrastructure, organizational and financial management; also presents information about the capital costs of the state's needed infrastructure and the sources of funding to meet some of those needs*

### **Section 5**

#### **Achieving the Vision: Infrastructure Management**

*Presents the path toward viability through infrastructure management, addressing the need for best practices in utility planning and management; describes the new grants available for asset inventory and assessment, and resources related to infrastructure management*

### **Section 6**

#### **Achieving the Vision: Organizational Management**

*Presents the path toward viability through organizational management, addressing the roles of utility governing boards, operations staff, and customers and stakeholders; describes new grants for merger/regionalization feasibility analyses and resources related to organizational management*

### **Section 7**

#### **Achieving the Vision: Financial Management**

*Presents the path toward viability through financial management, addressing revenue generation, and local government finance requirements; describes resources related to financial management*

### **Section 8**

#### **Assessing a Utility's Financial Capacity**

*Describes the Authority's new funding approach to increase access to low-cost or no-cost capital by the most economically distressed utilities in the state that already have high water and/or sewer rates; the approach stretches limited state loan and grant funding to benefit more utilities by combining loans and grants based on affordability*

### **Section 9**

#### **Troubled System Protocol**

*Describes the Authority's work with the Local Government Commission of the Department of State Treasurer toward development of strategies and practices to assist "troubled" systems*

## **Section 10**

### **Moving Forward**

*Describes the Authority's work plan for the near term as well as to address longer-term issues, both of which will be the focus of the first update of this Master Plan*

## **Appendix A**

### **State Water Infrastructure Authority Legislation and Member Information**

*Provides information about the Authority members and the North Carolina General Statutes that created the Authority in 2013*

## **Appendix B**

### **Resource Toolbox**

*Contains dozens of resources, publications, tools, and guidance available from many public and private agencies and organizations that are engaged in the support of water and wastewater utilities and may play a role in partnership solutions*

## **Appendix C**

### **Local Government Finance and Accounting Requirements**

*Presents information about North Carolina General Statutes Chapter 159 – Local Government Finance, and the Governmental Accounting Standards Board (GASB)*

## **Appendix D**

### **Attributes of Effectively Managed Water Sector Utilities**

*Presents information from "Effective Utility Management: A Primer for Water and Wastewater Utilities – The EUM Primer"*

## **Appendix E**

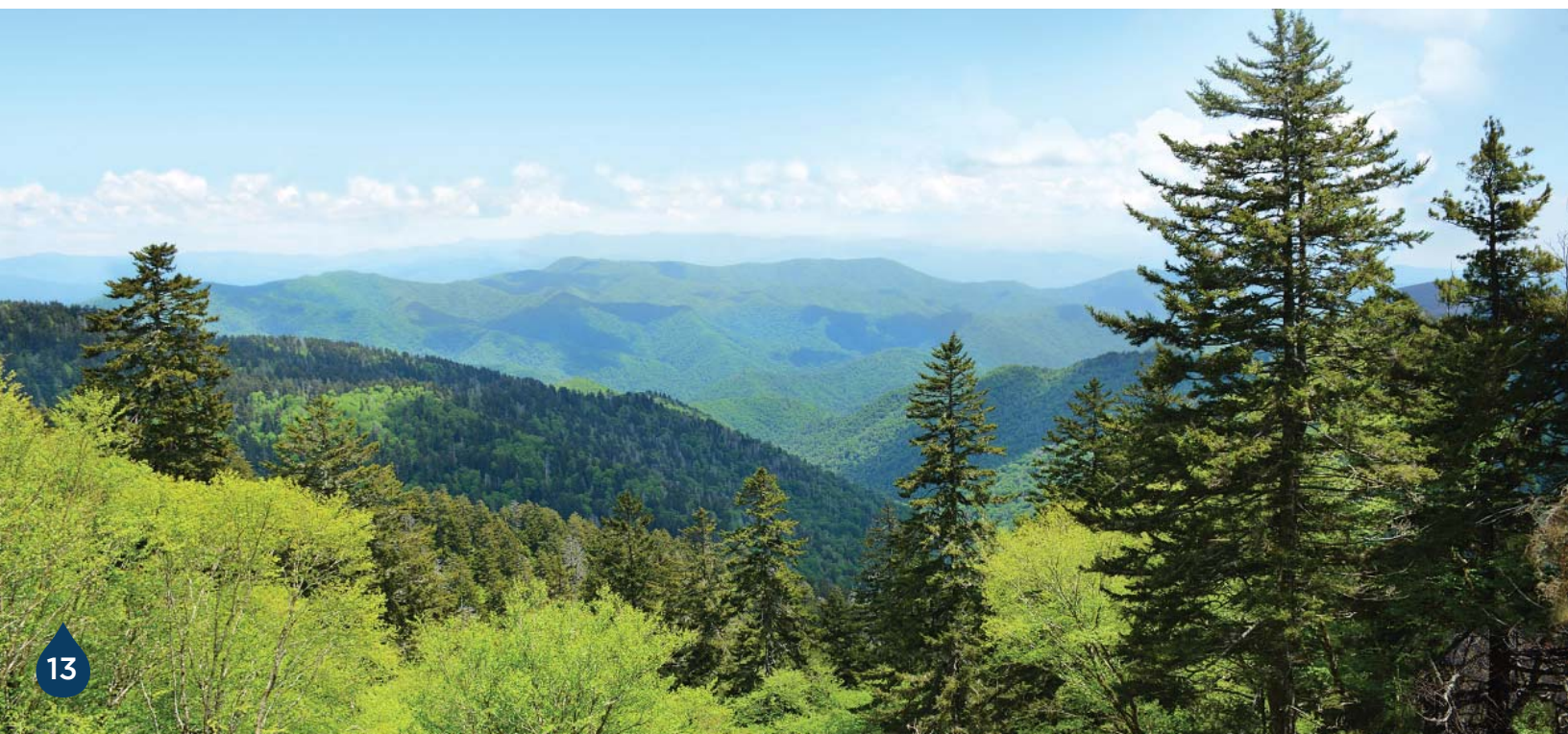
### **References**

*Contains references cited throughout the Master Plan*

## **Appendix F**

### **Acronyms**

*Acronyms used throughout the Master Plan*





## Section 2 – Master Plan Vision and Purpose

The primary public health advances of the last 200 years – the provision of clean drinking water and the collection and treatment of wastewater – could not have been achieved without operating infrastructure systems. These systems of water and wastewater infrastructure are essential to maintain healthy communities and vibrant economies. However, these advances could all be reversed without ongoing work to renew and replace infrastructure and to construct new infrastructure as needed to support public health and safety, environmental protection and economic development.

Many improvements are underway to modernize and upgrade the state’s water utilities through infrastructure technology, ranging from advancements in construction materials and methods to automated meter reading.

Conversely, as is the case nationwide, much of the state’s infrastructure is aging and deteriorating, and in some areas is nearly a century old. In the past decade, many utility systems have lost revenue from manufacturing bases that have closed, especially in the textile and furniture sectors. In some communities, the sale of water and wastewater services to an industry was once the primary source of a utility’s revenue. The combination of infrastructure condition, age, modernization needs and lack of sufficient utility revenues may threaten the viability of some utilities.

Recognizing these conditions, the North Carolina General Assembly tasked the Authority with developing a plan to meet the state’s water infrastructure needs while focusing on maximizing the effective use of its water infrastructure investments.

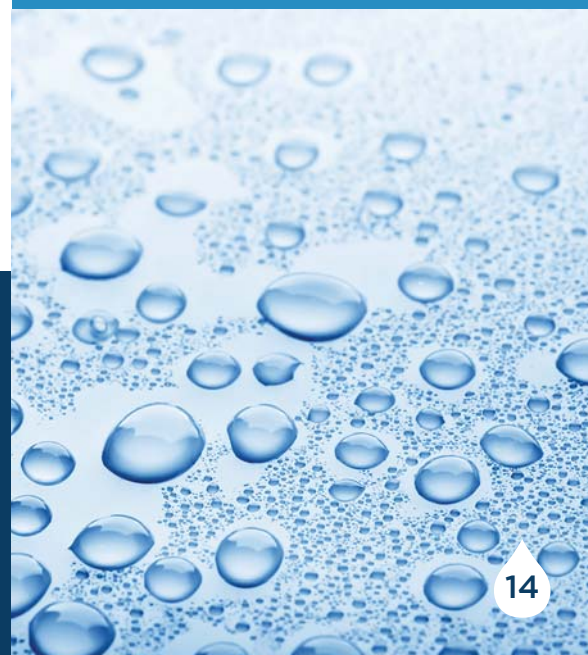
### Vision for Viable Utilities

The state will best be able to meet its water infrastructure needs by ensuring individual utilities are, or are on a path to be, viable systems

.....

A viable system is one that functions as a long-term, self-sufficient business enterprise, establishes organizational excellence, and provides appropriate levels of infrastructure maintenance, operation, and reinvestment that allow the utility to provide reliable water services now and in the future

**Water infrastructure is the system of pipes, pumps and treatment plants necessary to deliver clean drinking water to and convey/treat sewage from homes, businesses and industries**

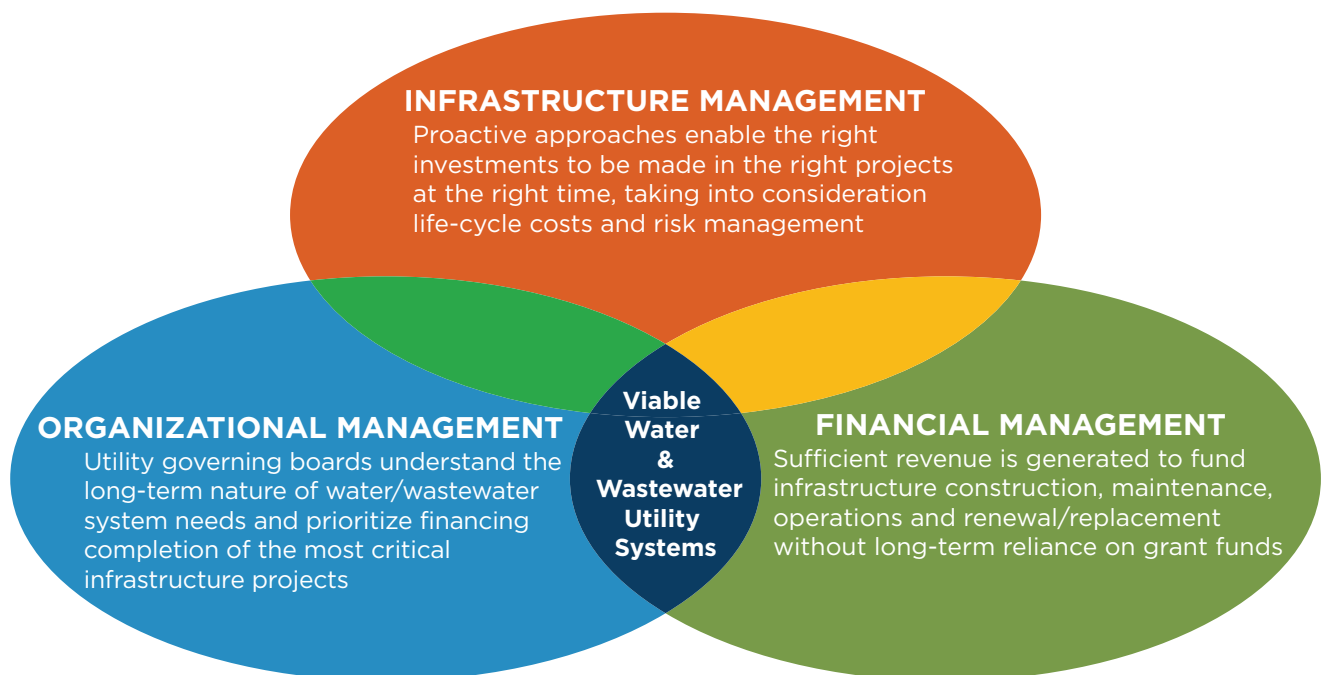


## 2.1 Vision for North Carolina's Water and Wastewater Systems

The State must foster the long-term viability of individual water and wastewater utilities in order to maintain and improve public health, public safety, environmental protection and economic growth. This Master Plan is intended to apply broadly to owners and operators of water and wastewater utilities and systems that serve the public. The Authority acknowledges that the state must provide access to capital funds and also to resources to help address organizational and financial management challenges that may be contributing to physical infrastructure limitations. Addressing these challenges is essential to assuring the effective use of capital funds.

### **Viable water and wastewater systems will be characterized by:**

- Utilities that comply with local, state and federal regulations, and accomplish their primary mission to protect public health and the environment
- Utilities with access to a range of different capital sources appropriate to their situation and capacity
- Governing boards that are fully engaged in making the critical decisions about their water and wastewater systems to ensure long-term viability
- Utilities actively and continuously reinvesting in critical infrastructure based on the system's physical condition, reliability of vital components and the risk of deferring renewal projects
- Governing boards and utility staff working together to prioritize needed infrastructure work to address the most critical needs
- Utilities with financial plans in place to generate enough revenue to pay for what is needed in the foreseeable future and without repeated reliance on grant funds
- Utilities proactively managing system assets, minimizing the need for reactive projects to solve infrastructure problems
- A high degree of partnership with other utilities, sharing technical, organizational, and financial management resources
- Units of local government that thrive by ensuring their citizens and businesses have access to clean drinking water and sanitary sewer systems, whether or not they own or operate a utility



The Authority recognizes that best practices in utility management are essential for viable utility systems. These practices are grouped into three integrated focus areas:



**Infrastructure Management** – Utilities take proactive approaches to enable the right investments to be made in the right projects at the right time, taking into consideration life-cycle costs and risk management



**Organizational Management** – Utility governing boards understand the long-term nature of water/wastewater systems and prioritize the financing and completion of the most critical infrastructure projects



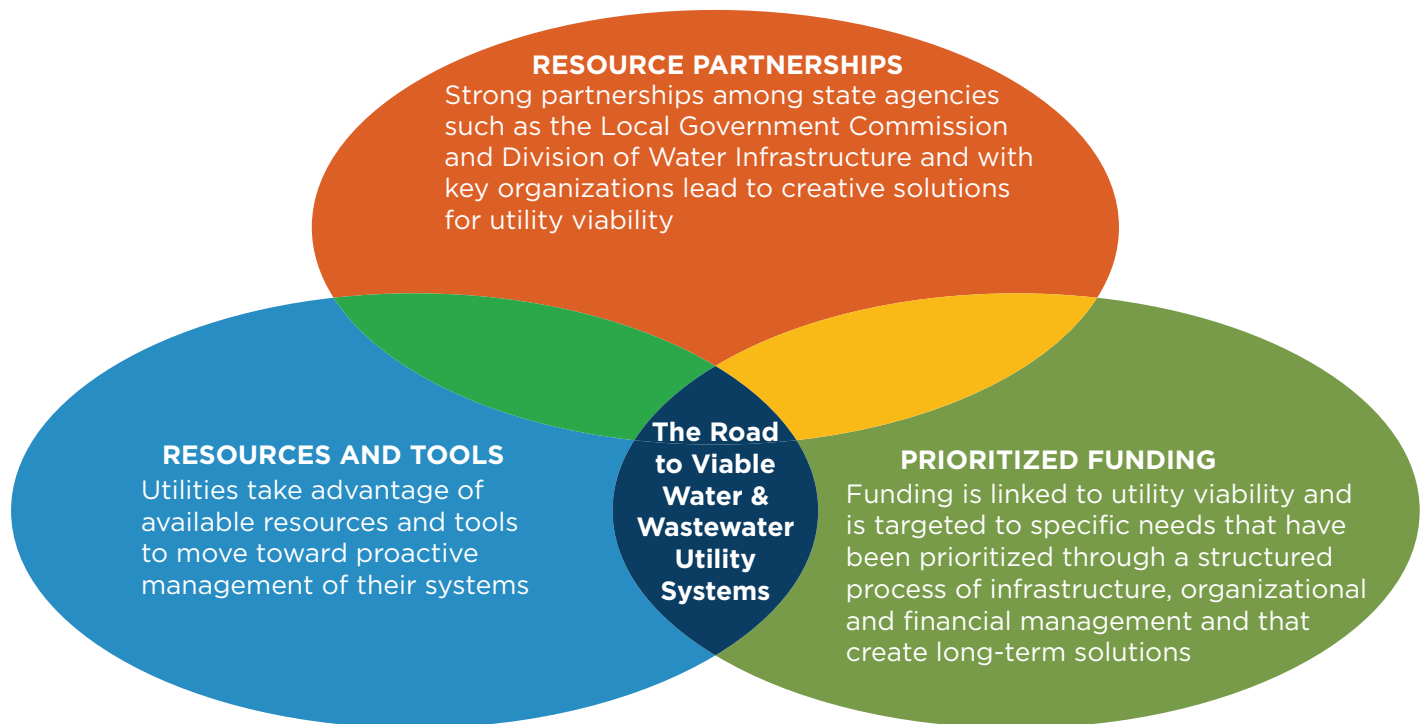
**Financial Management** – Utilities generate sufficient revenue to fund infrastructure construction, maintenance, operations and renewal/replacement without long-term reliance on grant funds

## 2.2 Purpose of the Master Plan

The purpose of this Master Plan is to provide the North Carolina General Assembly, utility governing boards, and the public with a roadmap for water and wastewater utility viability while maximizing the impact of the state's investments. The plan integrates the three focus areas to support the operation of a utility as a public health service provider, community service provider, and sustainable business.

**Together, the state, local governments and utility providers will move forward in achieving viability in the three focus areas through:**

- **Resource partnerships** to help leverage existing resources and programs
- **Resources and tools** that support proactive utility management
- **Prioritized funding** that is linked to viability



By supporting utilities as they implement the three management focus areas, the state can help assure that its limited capital resources are used most effectively and, in many cases, the improvements achieved will ultimately allow many utilities to access non-subsidized forms of capital

**The resources and tools provided in this plan are not exhaustive but they present a foundation for achieving utility viability.** Appendix B, “Resource Toolbox,” provides extensive information about the many organizations and agencies that are engaged in the support of water and wastewater utilities as they fulfill their primary mission to protect public health and the environment, and to comply with local, state and federal regulations. These organizations and agencies have produced a wealth of information that utilities can use as they address the wide range of challenges in carrying out this mission.

## 2.3 Keeping North Carolina’s Statewide Water and Wastewater Infrastructure Master Plan Relevant

Infrastructure master plans are kept fresh and relevant by continuing to address current key issues, envisioning the future and its possible challenges, and exploring options for meeting those challenges. Just as any type of master plan is updated as conditions, information and priorities change over time, the Authority is committed to updating and refreshing this Statewide Infrastructure Master Plan.

However, this first version of the Master Plan focuses on addressing critical water and sewer needs across the state.





## Section 3 – Selected Federal and State Water Infrastructure Funding Programs

In the United States, state and federal government funding support for infrastructure in general has traditionally been a significant component of overall infrastructure policy. While funds for water infrastructure are often less than funds for other types of infrastructure, many of these efforts reflect the importance of water infrastructure as a core government service as well as the need to upgrade facilities to modernize and to meet public health or environmental requirements. This section of the Master Plan presents a broad overview of major water infrastructure funding programs, their history, the intent of the funding, and the road ahead.

### 3.1 Federal Assistance for Water Infrastructure

#### Tax-Exempt Municipal Bonds

Municipal bonds have been tax-exempt since the inception of income tax (i.e., 1913). Whether or not the original intent was an infrastructure subsidy, this exemption provides substantial savings to municipalities for infrastructure costs, including water infrastructure.<sup>1</sup> Tax-exempt bonds reduce the issuer's borrowing costs because purchasers of such debt are willing to accept a lower rate of interest than that of taxable debt of comparable risk and maturity. (7)

While Congress has considered eliminating this exemption, it remains a substantial savings to municipalities on their investments in water infrastructure. For State Fiscal Year 2014-2015, about \$600 million in tax-exempt debt was issued in North Carolina for water and sewer activities. During the last year, it is estimated that the tax-exempt status of this debt led to bonds with an interest rate that is approximately 0.70% lower than bonds that are subject to federal tax. (8) To put this in perspective, this exempt status has the same impact as a \$600,000 one-time grant on a 20-year, \$10 million bond issue at a taxable rate.

<sup>1</sup> On April 20, 1988, the U.S. Supreme Court ruled that the federal government may tax the interest paid on state and local bonds. The 7-to-1 decision in *South Carolina v. Baker* overturned an 1895 precedent in the *Pollock v. Farmer's Loan & Trust Co.* case, which had been the foundation for the doctrine of intergovernmental tax immunity (6)

In 1972, the Clean Water Act established the first national standards for sewage treatment and significantly increased federal funding to help communities transition their treatment works to meet the new requirements

**“Essentially all communities had to construct or upgrade sewage treatment facilities to meet the requirements of the Clean Water Act” (9)**

### **Federal Grant Program for Wastewater Infrastructure**

The federal government has long provided grants for water infrastructure with a particular emphasis on wastewater infrastructure. For example, the Water Pollution Control Act of 1948 provided grants to assist preliminary work such as design for treatment facilities.

“In the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500, known as the Clean Water Act [CWA]), Congress established the first national standards for sewage treatment and significantly increased federal funding to help communities meet the law’s standards.” (10) With the establishment of minimum national discharge standards for publicly-owned treatment works, federal funding was significantly increased to local government units, reflecting the significant costs of treatment plant upgrades. It is clear, however, that the federal grant funding was intended to transition treatment works to the new standards.

Local government units in North Carolina began receiving federal grants in 1972. That year, the state received \$36 million (now worth over \$200 million when adjusted for construction cost increases), and assistance continued through 1989, with a peak grant of \$147 million in 1976 (now worth over \$600 million).

### **Conversion to Wastewater Loan Program**

Prior to 1987, wastewater treatment assistance was provided in the form of grants made directly to municipalities. “The federal share of project costs was generally 55%; state and local governments were responsible for the remaining 45%. The 1987 amendments to the Clean Water Act altered this arrangement by replacing the traditional grant program with one that provides federal grants to capitalize state clean water loan programs, or state revolving funds (SRFs).” (11) **The new loan program was intended to provide a long-term, self-supporting state funding program and meant that local governments were now responsible for 100% of projects costs.**

In North Carolina, the Clean Water State Revolving Fund (CWSRF) has received approximately \$900 million in investment from both the federal grants to the state and the required state match. Due to the revolving nature of the investments, the CWSRF program has provided over \$1.9 billion in assistance (i.e., low-interest loans) from its inception through state fiscal year 2015-16.

### **Federal Program for Drinking Water Infrastructure**

In 1996, Congress established a program similar to the CWSRF, under the Safe Drinking Water Act (SDWA), to help communities with the financing of drinking water infrastructure. From the beginning of the Drinking Water State Revolving Fund (DWSRF) program, Congress provided for principal forgiveness specifically for disadvantaged communities, with up to 30% of the grant to be used for additional subsidization for these communities. The DWSRF has received less capitalization for projects than the CWSRF. The result is less investment into the revolving portion of the DWSRF.

Policymakers have debated the tension between assisting municipal funding needs, which remain large, and the impact of aid programs such as the Clean Water Act’s on federal spending and budget deficits (12)

# FEDERAL AND STATE FUNDING PROGRAMS FOR WASTEWATER AND DRINKING WATER

## o o o o o Federal o o o o o

### 1972

#### Federal Water Pollution Control Act Amendments (the Clean Water Act)



Federal grants provided directly to utilities for infrastructure to meet new Clean Water Act requirements which set minimum wastewater treatment levels at secondary treatment

### 1971 & 1977

#### North Carolina Clean Water Bond Acts

Provided state grant funds for additional wastewater treatment facilities to meet new Clean Water Act requirements



### 1987

#### Clean Water Act Amendments



Replaced direct federal grants with a new state revolving loan program capitalized by federal grants; allowed states to establish their Clean Water State Revolving Fund (CWSRF) program

### 1987

#### North Carolina Clean Water Revolving Loan and Grant Act

Created a state revolving loan program for wastewater that mirrored the CWSRF program and a similar revolving loan program for drinking water – this pre-dated the federal DWSRF program by nearly nine years



### 1996

#### Safe Drinking Water Act Amendments



Created revolving loan funding program for Drinking Water (DWSRF) similar to the CWSRF program

### 1998

#### Clean Water and Natural Gas Critical Needs Bond Act

\$500 million for state grant funds  
\$300 million for state clean water and drinking water revolving loan programs



### 2015

#### Connect North Carolina Bond Act

\$100 million for state grant funds  
\$209.5 million for state clean water and drinking water revolving loan programs



## o o o o o State o o o o o

## Federal Programs for Low-to-Moderate Income Areas and Rural Communities

Two federal funding programs are designed to assist designated populations. More information about these programs is provided in Appendix B, "Resource Toolbox."

### *Federal Housing and Urban Development Community Development Block Grant Program*

The U.S. Department of Housing and Urban Development (HUD) is responsible for the federal Community Development Block Grant (CDBG) program, which works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses.

The North Carolina General Assembly determines the allocation of these CDBG funds to various programs within the state. A portion of the CDBG funds are allocated exclusively to construct public water and sewer infrastructure to mitigate public and environmental health problems in low-to-moderate income areas. These funds are administered by the Division of Water Infrastructure under the Community Development Block Grant-Infrastructure (CDBG-I) program.

### *U.S. Department of Agriculture Rural Development*

The U.S. Department of Agriculture Rural Development (USDA-RD) offers a Water and Wastewater Disposal Loan and Grant program which provides funding for clean and reliable drinking water systems and sanitary sewage disposal in rural communities and areas with populations of 10,000 or less. USDA-RD offers long-term, low-interest loans, and if funds are available, may offer grants to be combined with a loan, if necessary, to help keep user costs reasonable. Funds can be used for drinking water sourcing, treatment, storage and distribution; and sewer collection, transmission, treatment and disposal.

## 3.2 North Carolina Programs

In addition to the federal programs described above, North Carolina has also provided assistance to local government units in the state. The amount of state funding has varied due to budget constraints and major initiatives through various bond bills. Select aspects of state funding initiatives are presented below.

### **Early State Programs**

The first major grant funding provided in the modern era was through the North Carolina Clean Water Bond Act of 1971, which recognized, as Congress did in the CWA, the need for additional wastewater treatment facilities. "The problem of polluted and befouled lakes, streams and estuaries in the state of North Carolina, already serious and destined to grow worse unless immediate action is taken, is a matter of vital concern to the General Assembly. A major factor in



Committed to the future of rural communities.





Major funding for state grant programs has usually occurred through intermittently issuing general obligation bonds. Grants were intended to be for temporary assistance – not to be relied upon for long-term operation of water utilities

**“Although the funds...shall be used primarily to encourage and assist local government units to meet their responsibilities, it is not intended nor is it possible for the state to assume those responsibilities.” (13, 14)**

the pollution problem is the discharge of waste to the waters of this state by municipalities and other population concentrations from wastewater systems that are inadequate, antiquated and, in some instances, nonexistent.” (13) In contrast to the federal grants which only provided funds for wastewater facilities, the bond bill provided grant funds for both drinking water and wastewater needs.

With the passage of the North Carolina Clean Water Revolving Loan and Grant Act of 1987, the state created NCGS Chapter 159G for state funding programs. It included the first state revolving loan program that mirrored the federal CWSRF program created in the same year. In passing this legislation, the General Assembly found “that a critical need exists in this State to provide for a low-interest funding source for municipal water and wastewater capital facilities.” The state was foresighted in that it created a revolving fund for drinking water infrastructure that predated the federal DWSRF. **Similar to the bond bills passed in the previous decade, the Loan and Grant Act of 1987 gave clear indication that the responsibility for water infrastructure lay with the local governments** and the purpose of the funding was “to encourage and assist local government units to meet their responsibilities to their citizens to maintain a clean and healthful environment and an abundant supply of pure water and further to provide an adequate base for economic growth.” (15)

### 1998 State Grants Program

The Clean Water and Natural Gas Critical Needs Bond Act of 1998 included the largest package of funds provided by the state, even when adjusted for construction cost increases. However, not all of the funds were allocated for infrastructure construction; some of the funds were designated for use by the North Carolina Rural Economic Development Center for planning purposes, such as developing capital improvement plans.



In 1998 over \$500 million was provided for grants, with a special emphasis on “the willingness and ability of local government units to meet their responsibilities through sound fiscal policies, creative planning, and efficient operation and management” (16)

### 2015 Connect North Carolina Bond Act

In 2016, the citizens of the state approved the Connect North Carolina Bond Act of 2015 to provide \$100 million in grant funds plus \$209.5 million in low-interest loan funds for water and wastewater infrastructure. The General Assembly designated one-half of these bond funds to drinking water infrastructure and one-half of the funds to wastewater infrastructure.

Even though the General Assembly has indicated that the state will not assume the local government’s responsibility, its actions to provide grants may support a mindset that grants will always be available. Without any other measures in place, this may lead to entities depending on grant funds instead of generating the revenue needed to cover the full costs of providing water or wastewater services. In addition, **utilities that defer rehabilitation projects while waiting for grant funding are essentially accumulating debt.** As these needs become critical, it may become a more difficult problem to resolve. It is this ballooning of costs without capital planning that makes the work more difficult to address through financing alone.

### 3.3 Consolidation of State Water Infrastructure Programs in 2013

In 2013, the Clean Water and Drinking Water SRFs, the HUD CDBG funds for infrastructure, and the state water infrastructure funding programs were consolidated and administration was placed in a newly created Division of Water Infrastructure in the Department of Environmental Quality (then known as the Department of Environment and Natural Resources).

At the same time, the General Assembly created the State Water Infrastructure Authority. With this comprehensive framework for water infrastructure funding in place, local government units in North Carolina can work with one agency, the Division of Water Infrastructure, to obtain the most suitable funding package available. The state can then utilize these collective program funds in a more strategic manner.

### 3.4 Future Funding

The federal loan programs and tax exemption described above provide substantial savings and ultimately must continue to be the primary means of infrastructure funding for the vast majority of utilities in the state. Many utilities may have limited access to these sources of loan capital because they lack the infrastructure management, organizational management, and/or financial management practices to support debt. For many of these utilities, strengthening management will increase their access to these programs.

However, for communities under extreme economic stress, facing water and sewer bills that are higher than most other water customers across the state, grants will be needed for the foreseeable future to ensure those systems can be competitive for growth opportunities.

**The Authority is strategically directing grant funds to those critical situations and is providing the resources and tools for utilities to prevent such situations from developing or continuing.**

Many utilities may have limited access to loan sources because they lack the infrastructure management, organizational management, and/or financial management practices to support debt. For many of these utilities, strengthening management will increase their access to these programs.



## Section 4 – Statewide Needs

Statewide, a combination of poor water infrastructure condition, the need for modernization and the lack of sufficient revenues threaten the viability of some water utilities. The North Carolina Department of State Treasurer recognizes that financially troubled water and sewer systems are a significant contributing factor for a majority of North Carolina's troubled municipalities. (17)

Even if enough funds were available to address all of today's capital needs, funding by itself does not safeguard long-term viability. Comprehensive management of a water utility's infrastructure, organization, and finances is needed.

### 4.1 North Carolina's Water Infrastructure

Compared to most states, North Carolina has a large number of independent, local government water and wastewater systems, including incorporated municipalities, counties, sanitary districts, water and sewer authorities and others. Hundreds of separate water systems are owned by not-for-profit associations and for-profit water companies and by property managers such as homeowners' associations and mobile home park owners.

The large number of small water systems and wastewater treatment plants in North Carolina have unique challenges such as small customer bases and limited revenue

.....

**About one-third of the community water systems operating in the state have customer bases of 100 people or less**

# North Carolina DRINKING WATER SYSTEMS



Of the 2,000 community water systems operating in the state, one-third of these systems have customer bases of 100 people or less. The smallest 1,800 of these systems serve about 10% of the state's population. In contrast, the ten largest water systems serve 30% of the state's population. Statewide, approximately 8 million North Carolinians are served by public water systems, which is about 80% of the state's population. The remainder use household wells as their water supply. (18)

More than 1.4 billion gallons per day of wastewater from communities in the state are treated and then discharged into streams and rivers by nearly 300 publicly owned treatment works. About half of these plants treat less than 1 million gallons per day, and account for only 4% of the total wastewater treated. Wastewater is collected by more than 300 permitted public sewer systems and many more systems that are too small to require a permit. In addition, many homes and businesses use septic tanks to treat their wastewater.

Many of the water and wastewater treatment plants in the state were constructed either with the help of federal grant funds or with revenue from a large manufacturing customer base – both of which have diminished considerably. In growing communities, new users can help pay for new and upgraded infrastructure, but in places where growth has slowed, paying for aging infrastructure is more difficult and must fall on the existing customer base.

## 4.2 Recognizing the Management Challenges of Public Water and Wastewater Utilities

Utilities encounter a wide range of challenges while carrying out their primary mission of protecting public health and the environment, and complying with regulations. For local governments that operate utility systems, the challenges can be increasingly complex when combined with all of the other responsibilities of local governance such as police and fire protection. The challenges can encompass some or all of the following:

- Competing needs that are often more visible in the community
- Handling unexpected critical infrastructure repairs
- Changing regulations
- Prioritizing competing projects
- Knowing infrastructure condition
- Setting appropriate rates
- Increasing customer rates and fees
- Governing boards with relatively short terms
- Communicating complex utility management issues
- Building customer support
- Workforce succession planning
- Evaluating partnerships and regionalization
- Losing large industrial customers
- Declining population in rural areas



The state can help utilities address these challenges through targeted support in three integrated focus areas:

- **Infrastructure Management**
- **Organizational Management**
- **Financial Management**

## 4.3 Focus Area 1 – Infrastructure Management

North Carolina's communities and utilities have made enormous investments in water and wastewater infrastructure. Yet, in its most recent "North Carolina Report Card for Infrastructure", the American Society of Civil Engineers gave the state's drinking water systems a grade of C+ and wastewater systems a grade of C. While these grades are not satisfactory, they are higher than many competing states. However, it is critical that North Carolina maintain and enhance this advantage. The Report Card finds that:

- Water systems statewide lose about 100 million gallons per day of treated water through leaks and other means; this equals about 1,200 gallons every second
- During large rain events, wastewater flows exceed treatment capacity at nearly half of the state's wastewater treatment plants, resulting in systems that are under moratoria<sup>2</sup> or Special Orders by Consent<sup>3</sup>
- Many utilities establish rates that provide enough revenue to balance an annual budget but not enough to cover long-term capital and maintenance needs. Many do not cover operating expenses. Such practices make it difficult to rehabilitate infrastructure, save for operating emergencies, finance system improvements and expansion, and engage in proactive asset management (19)

Most utility needs surveys and planning documents focus on physical infrastructure – the size of treatment plants, miles of pipeline, and other components needed to operate water and wastewater systems. Some include the possibility that changing regulations may require upgrades in treatment, collection system and/or distribution system infrastructure. Most loan and grant applications are made to address these physical needs. However, managing infrastructure goes beyond knowing what is needed to solve today's problems only.

**Infrastructure management involves long-term master planning which includes:**

- **Knowing the risk<sup>4</sup> of failure of key water infrastructure components**

<sup>2</sup> Moratoria are temporary suspensions of activity required by an authority

<sup>3</sup> A Special Order by Consent is an agreement that a permit holder enters into with the NC Environmental Management Commission in order to achieve some stipulated actions designed to reduce, eliminate, or prevent water quality degradation

<sup>4</sup> Risk is the potential for an unwanted outcome resulting from an event; it is expressed as its likelihood and associated consequences



- Aviation
- Beaches & Inlets
- Bridges
- Dams
- Drinking Water
- Energy
- Rail
- Roads
- Public Schools
- Storm Water
- Wastewater



ASCE-NC's 2013 Report Card gave drinking water systems a grade of C+ and wastewater systems a grade of C.

The Report found that many utilities do not cover their operating expenses and do not have the funds to rehabilitate aging infrastructure, save for operating emergencies, finance system improvements and expansion, and engage in proactive asset management.

Without addressing these areas, the state risks reversing the improved public health and economic gains that have been realized.

- Taking proactive approaches and making informed decisions to construct, operate, maintain and renew/replace infrastructure that will minimize long-term costs
- Having funding in place so that the right investments are made at the right time

A wide variety of water and wastewater treatment technology is available, but operating expenses and staff skill levels – which are linked to the utility’s organization and financial resources – need to be taken into account when selecting the best solution. Similarly, there could be alternatives to expensive capital projects that involve collaborating with a neighboring utility, which might require much more work on organizational issues than on engineering design and construction.

## 4.4 Focus Area 2 – Organizational Management

A utility’s organization is comprised of its governing boards, operations staff, customers and stakeholders. Each plays an important role in achieving the critical mission of a utility – protecting public health and the environment, and complying with local, state and federal regulations.

**Organizational management involves all levels of the utility’s organization in understanding the long-term nature of water and wastewater infrastructure needs, implementing a plan to address and finance the needs in a prioritized manner, and building customer and stakeholder support.**

### Utility Governing Boards

Governing boards make the critical decisions about operation of the water and wastewater systems that are needed to protect public health and the environment, support economic growth and development, and keep their utility system viable.

**The long-term nature of infrastructure planning and management can be difficult to realize in the short 2- to 4-year terms of elected officials.** Competing short-term needs can present a challenge to implementing long-term plans for infrastructure projects which are usually based on a 30- to 50-year time frame. Funding is often delayed for long-term needs because water and sewer infrastructure is “out-of-sight-and-out-of-mind.” Without a long-term plan to meet those needs, the default approach is to “fix it when it breaks”, which results in less reliable infrastructure and/or higher public costs.

“ One of the most important things I have found is for our elected officials to actually see the drinking water and wastewater treatment plants. This gives them an instant grasp of the size and complexity of the equipment that we talk about – **finished drinking water pumps standing more than 16 feet tall, and emergency generators the size of a Greyhound bus.** Once they saw the equipment and its condition, they understood the need to keep it in good condition and that the costs I presented were not unreasonable. ”

— Joe Hudson  
 Director of Water Resources  
 City of Statesville, NC

When board members change, decisions previously made to implement long-term infrastructure plans can be questioned and sometimes reversed. The demand for other government services – usually more visible and easier to understand, such as police, fire, solid waste, and economic development, continue to grow. Often it is the water and sewer utility that is underfunded, regardless of the enterprise system concept.

A gap exists in implementing long-term infrastructure management plans, especially in terms of positioning a utility to reduce reliance on grant funding. Especially for small utilities, the gap may be related to having sufficient technical resources to conduct long-term as well as short-term planning and management. Other gaps may exist, such as the lack of tools needed to gain a better understanding of utility needs and operations, and the challenge of communicating this information to customers and stakeholders.

### Operations Staff and Succession Planning

Trained and motivated staff anticipate problems and proactively address issues well before they result in the breakdown of infrastructure, service disruption, public health concerns and potential regulatory violations. **As staff retire, a utility may lose a body of knowledge that was perhaps developed over decades. Such gaps in knowledge could significantly impact operations** because remaining staff may have a limited knowledge of the condition of existing infrastructure components which can hamper planning for repair and maintenance. Utilities need continuity plans to retain decades of system knowledge when staff retire or depart because there is a high cost to starting over to fill such gaps. In addition, lack of funds for salaries to support multiple full-time staff may result in only a few employees covering a wide range of duties, hindering the development of their expertise.

### Customers and Stakeholders

A utility's customers and stakeholders can greatly influence infrastructure management by paying (or not paying) their utility bills, and through supporting or opposing rate increases to pay for major projects. Potential disconnects can exist between water customers' expectations for clean water supplied in desired quantities at adequate pressure with capacity for fire-fighting, and the cost of the infrastructure, operations and maintenance that it takes to meet those expectations.

Utilities need continuity plans to retain decades of system knowledge when staff retire or depart – the cost to start over to fill such gaps is high



A critical gap may exist between the service expectations of customers, stakeholders and even utility leadership, and the cost of infrastructure, operations, and maintenance needed to meet those expectations





## 4.5 Focus Area 3 – Financial Management

Multiple challenges can lead to financial problems in a water or sewer fund because:

- Frequently, water distribution and wastewater collection pipelines were – and still are – originally installed by developers or businesses at no cost to the community. However, repair and replacement of those pipelines falls on the utility and may not have been planned for when installed years ago
- Local economic conditions and declining population can contribute to loss of customers and revenue
- It can be difficult to communicate to elected officials and customers why it costs so much to produce and distribute drinking water, and to collect and process wastewater
- The cost of providing water and sewer services will almost certainly continue to increase, requiring corresponding increases in customer rates and fees
- It can be difficult to obtain the expertise necessary to develop sound financial policies, rate models and capital improvement plans, particularly for small systems
- Rate or fee increases are rarely popular, especially when they are for preventive measures that will provide benefits in the future, or do not visibly improve customer service or expand capacity

- It can be challenging to develop and enforce sound financial policies such as discontinuing service to customers who have not paid their bills or charging sufficient deposits on new accounts to protect the utility from possible loss

**Financial management involves planning to generate the revenues needed to construct, operate, maintain, and repair/replace utility infrastructure – including reserves for unexpected events – without long-term reliance on grant funds.**

Building financial stability for the future requires equal focus on long-term planning (i.e., know what you have and what is needed), financing (i.e., plan for revenues to exceed expenses) and implementation (i.e., enact policy changes, increase rates/fees, and implement projects according to schedule). Overlooking or delaying any of these elements adds to the financial challenge to be faced in the years to come. Delaying infrastructure investments can result in utility service degradation, public health and environmental risks, increased service disruptions, increased expenditures for emergency repairs, and missed opportunities for economic development.

### Revenue Generation

It will be necessary for some communities to modify financial structures to “catch up” in order to generate funds for repair or replacement of infrastructure projects that in the past were paid for with grant funds. Utilities may need to generate additional funds from their customers, most likely through higher rates that will cover the full cost of the services provided. (1)

Increased rates and access to the capital market, such as through municipal bonds, will continue to be the primary strategy for some larger communities in the state.

It is recognized that some utilities already have rates much higher than many other utilities in the state and face pressure not to increase rates further. Also, many smaller utilities may have difficulty competing with larger systems for staff resources/expertise. These issues can lead to the financial instability of a utility. Some may benefit by developing regional partnerships in order to gain economies of scale. The gap that may exist is in implementing a financial management plan to generate, over time, the revenues needed to operate, maintain, and repair/replace aging utility infrastructure, and to set aside reserves for unexpected events, without long-term reliance on grant funds.

## 4.6 Infrastructure Capital Needs and Costs

The Environmental Finance Center at the University of North Carolina's School of Government recently studied water and wastewater infrastructure needs in the state. **Over the next 20 years, capital cost estimates for water system needs range from \$10 to \$15 billion, and wastewater system needs range from \$7 to \$11 billion – more likely at the higher end of these ranges.**

(20) It is important to note that these are only the capital costs – they do not include the costs of operations, maintenance and on-going renewal/replacement.

A number of other entities have also assessed and reported on water and wastewater needs in the state; they conclude that the needs are within a similar range when adjusted for construction cost increases. Sources include:

- US EPA 2012 Clean Watersheds Needs Survey (21)
- US EPA 2011 Drinking Water Infrastructure Needs Survey and Assessment (22)
- 2013 American Society of Civil Engineers Report Card for North Carolina's Infrastructure (19)
- North Carolina Rural Economic Development Center Water 2030 (23)

**In the past three years, the State Water Infrastructure Authority reviewed requests for over \$1 billion in loan funds and over \$650 million in grant funds. Funding was only available to fund \$600 million in loans (60% of requests) and \$97 million in grants (15% of requests).** The graph on the next page demonstrates the dollar amount of requests and awards through July 2016.

The amounts requested do not, alone, portray the total infrastructure needs of water and wastewater systems during this time, since applications for funding were received from only a small number of utilities, and do not include estimates for infrastructure needs that were financed from alternative sources (i.e. own revenues, other federal funding programs, bonds, and commercial loans).

The gap that may exist is in implementing a financial management plan to generate revenue needed to construct, operate, maintain, and repair/replace utility infrastructure – including reserves for unexpected events – without long-term reliance on grant funds



The capital cost of water and wastewater infrastructure needs in the state ranges from \$17 to \$26 billion over the next 20 years – more likely at the higher end of the range

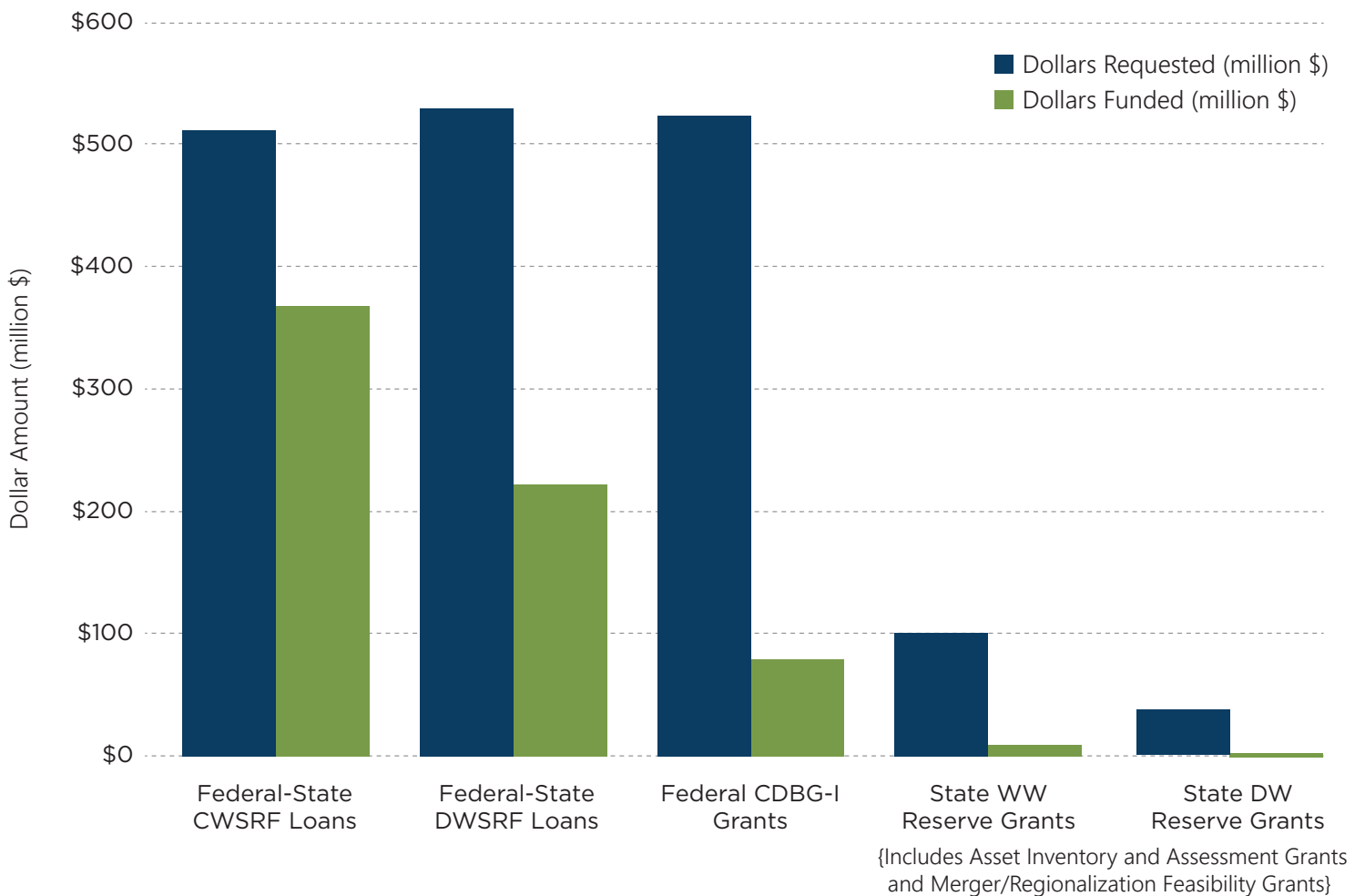
**WATER INFRASTRUCTURE NEEDS = \$10 TO \$15 BILLION**

**WASTEWATER INFRASTRUCTURE NEEDS = \$7 TO \$11 BILLION**

These are capital costs only – the costs of operations, maintenance and on-going renewal/replacement are not included

Total long-term water and wastewater debt among local governments in North Carolina was \$7.6 billion in 2012, with nearly 60% of this debt (\$4.6 billion) held by smaller local governments. (24) In contrast, the smaller units generate approximately \$300 million in water and sewer operating revenues each year. (17)

**Amount Requested in Applications and Funded  
January 2014 through July 2016  
Total requested: \$1.69 billion; total funded: \$697 million**



# Revolving loan programs represent a **substantial, permanent investment** by state and federal governments in water infrastructure

## Funding Sources

Both policymakers and experienced water and wastewater infrastructure professionals in North Carolina agree that the days of plentiful federal or state grant funds are a thing of the past. While grant funds were more readily available decades ago, the funds were provided to deal with initial investments needed to meet major regulatory changes, and were never intended to also pay for later renewal of the infrastructure.

Currently, through the federal and state loan and grant funding programs administered by the Division of Water Infrastructure, approximately \$330 million is available each year. Through the USDA-RD's Water and Wastewater Disposal Loan and Grant program, approximately \$63 million is available each year. It is clear that these two significant sources of funding, both federal and state, can only meet a fraction of the total capital needs. In addition, only a small portion of these funds are available in the form of grants.

The North Carolina General Assembly, recognizing the state's water infrastructure needs, increased the recurring funds for the state grant programs for fiscal years 2015-2016 and 2016-2017 to \$10 million per year, and provided \$7.4 million in new nonrecurring grant funds, bringing the state grant funding to a total of \$27.4 million for these two fiscal years. The citizens of the state approved the Connect North Carolina Bond Act of 2015 to provide an additional \$100 million in grant funds plus \$209.5 million in low interest loan funds over the next two fiscal years.

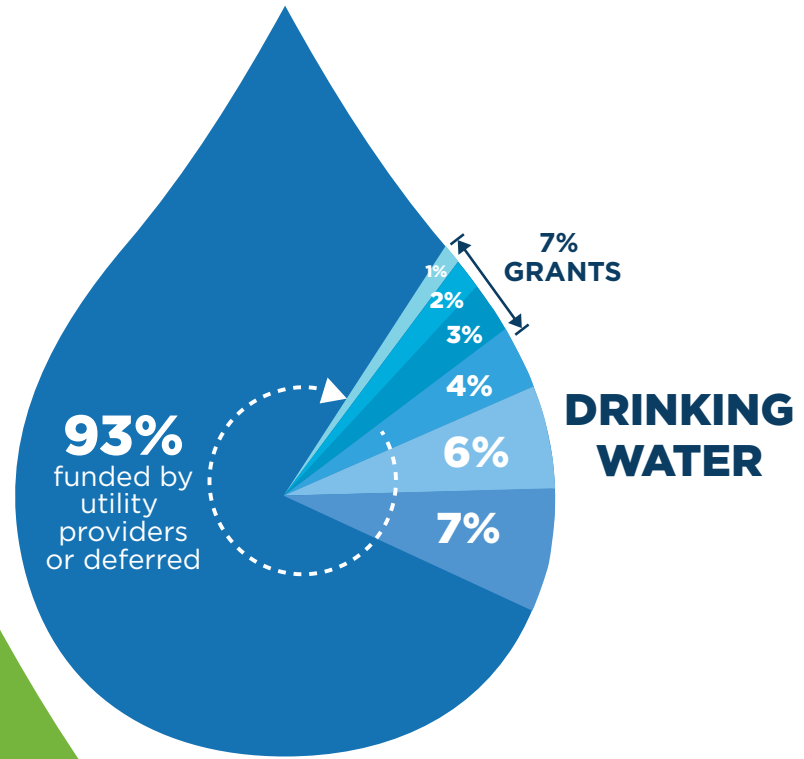
During the next two fiscal years, just 7% of drinking water infrastructure needs and 8% of wastewater infrastructure needs can be met by grants. The remaining needs – 92% for wastewater and 93% for drinking water – must be funded by the utility providers. However, if debt is necessary, much of this need can be met by subsidized loans via the SRF program or subsidized municipal bonds if the utility is willing and able to take on the debt. If not funded, these add to the backlog of infrastructure investments that are deferred year after year.



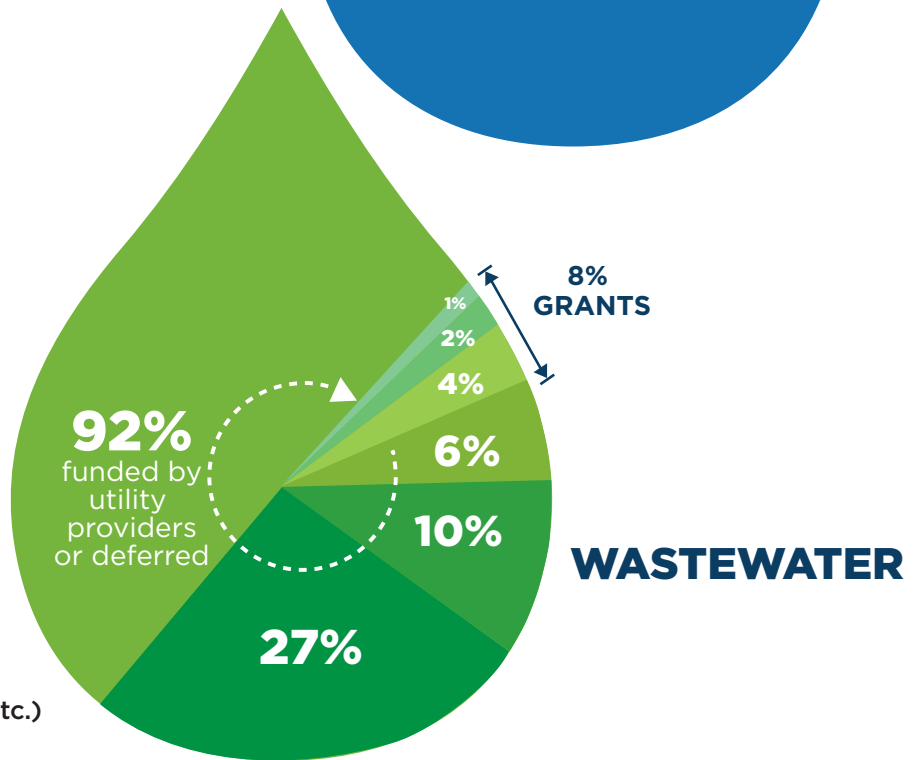
# Estimated Drinking Water and Wastewater INFRASTRUCTURE NEEDS and FUNDING SOURCES for FY2017 and FY2018



- State Drinking Water Reserve Grants (1%)
- Community Development Block Grant - Infrastructure (2%)
- Drinking Water Connect NC bond grants (3%)
- USDA - Rural Development (4%)  
(3% loans + 1% grants)
- Drinking Water State Revolving Funds (6%)
- Drinking Water Connect NC bond loans (7%)
- Drinking water needs deferred or funded by other means (bonds, etc.)



- State Wastewater Reserve grants (1%)
- Community Development Block Grant - Infrastructure (2%)
- Wastewater Connect NC bond grants (4%)
- USDA - Rural Development (6%)  
(5% loans + 1% grants)
- Wastewater Connect NC bond loans (10%)
- Clean Water State Revolving Funds (27%)
- Wastewater needs deferred or funded by other means (bonds, etc.)





## Section 5 – Achieving the Vision: Infrastructure Management

Managing infrastructure goes beyond knowing what is needed to solve only today's problems. Long-term infrastructure master planning is needed to minimize long-term costs and ensure that appropriate investments are made at the right time. Infrastructure management also encompasses best and emerging practices in utility planning and management.

Infrastructure management involves long-term master planning which includes:

- Knowing the risk<sup>5</sup> of failure of key water infrastructure components
- Taking proactive approaches and making informed decisions to construct, operate, maintain and renew/replace infrastructure that will minimize long-term costs
- Having funding in place so that the right investments are made at the right time

---

<sup>5</sup> Risk is the potential for an unwanted outcome resulting from an event; it is expressed as its likelihood and associated consequences

### Vision for Infrastructure Management

Utilities take proactive approaches to infrastructure master planning and asset management planning, ensuring that the plans are in place and implemented, which enables the right investments to be made in the right projects at the right time

**Infrastructure management supports viability by enabling the utility to provide reliable water services now and in the future**

Infrastructure management is best accomplished when the utilities and local decision-makers know all their assets, and have a plan for when to upgrade, replace or rehabilitate the assets to ensure that service levels are being met now and into the future. This concept is often referred to as “Asset Management Planning” in the water infrastructure sector.

## 5.1 Asset Management

Asset management is an integrated set of processes designed to minimize the life-cycle costs of infrastructure assets, at an acceptable level of risk, while continuously delivering established levels of service.

(25) Typical steps in asset management include:

- Understand the condition of and costs associated with critical infrastructure assets
- Plan infrastructure investments to support system reliability, community priorities, and economic development
- Build in flexibility for improvements in technology and materials
- Maintain and improve the condition of all assets over the long-term considering life-cycle cost and acceptable levels of risk
- Develop capital improvement plans that establish the timing of capital needs
- Implement the capital improvement plans

Current trends in asset management include the consideration of risk and consequences of infrastructure investment decisions. The concepts of reliability, redundancy, and resiliency are emerging topics.

## Utilities that apply asset management principles report that the greatest benefits are:

- Better ability to explain and defend infrastructure investment needs to governing bodies
- Better focus on priorities
- Better understanding of risk and consequences of investment decisions
- Increased ability to balance between capital and operating expenditures (26)



“The Town of Spindale used the “Ten Attributes of Effectively Managed Water Sector Utilities” while developing our wastewater system Asset Management Plan, especially those related to financial health. We found that a major rate increase was needed to fund the operation and maintenance of the system as well as improve system assets. A four-year rate increase structure was put in place even though it was initially difficult to undertake.

**Since the Plan was adopted, the town has implemented all rate increases and replaced thousands of feet of old sewer lines. The treatment plant will soon be rehabilitated, making it possible to bring on a new bulk customer, significantly increasing the town’s revenue stream. The Asset Management Plan greatly facilitated changing our course from financial difficulty to financial stability.** ”

—— Mickey Bland  
Mayor  
Town of Spindale

Many utilities are surprised at the amount of money they do not collect and the significant impact it has on their finances. “The more money/water we find, the less we may need to borrow for capital projects.” (27)

It is recognized that some utilities may not be able to immediately engage staff in inventorying system components, assessing their condition, and then preparing cost estimates and a schedule for the needed work. An entity may want to consider contracting services, either in the short-or long-term, for any of these tasks while internal staff receive needed education and training.

## 5.2 Emerging Best Practices

Infrastructure management also encompasses best practices related to technology that can provide potential gains in system efficiency by capturing “lost” resources, reducing energy usage, and increasing revenue.

### Accounting for Water Loss

All water distribution systems, regardless of piping material, experience leaks. Typically, older, more brittle materials will experience more leaks due to wearing at fittings, potential damage from years of service tapping and construction-related issues. Some small systems lose as much as 20% of their total treated water. Systems in North Carolina lose an average of 11% of treated water annually. (19)

In addition to leaks, utilities sometimes treat and deliver water to customers but do not charge for the water for various reasons. The combination of these real and apparent water losses are termed “non-revenue water”, indicating the amount of water that is treated and delivered but generates no revenue. The American Water Works Association’s Water Loss Control Committee has been helping utilities manage non-revenue water for many years. Water loss control programs can be helpful to utilities, regardless of whether they are water-rich or water-challenged. (28)

### Smart Technology

Depending on the number of customers, some utilities may benefit from the use of smart water meter technology which:

- Allows utilities to better detect leaks, respond more quickly, and reduce the amount of non-revenue water
- Reduces customer service calls related to meter readings and high bills
- Accurately records consumption and increases billable revenues
- Provides useful information for forecasting, facilities planning and rate setting

Using smart water meter technologies, utilities can provide real-time data to assist customers in tailoring their daily water consumption, **creating the potential to reduce their water utility bill and contribute to water resource conservation**





## Utilities of the Future

While public health and environmental protection will always be the central concern, industry leaders realize that the challenges and opportunities faced by wastewater agencies are unprecedented and that some paradigms that have been in place for decades are changing to meet these challenges. The most progressive of today's clean water agencies are defining the Utilities of the Future (UOTF) and advancing a new business approach.

The UOTF recognize that they manage valuable resources, deliver public health and environment benefits and are partners in local economic development and the watershed community. The Water Environment Federation (WEF), along with partner organizations, recently created the Utility of the Future Today Recognition Program. This program supports the progress and performance of forward-looking wastewater utilities as well as the widespread adoption of an innovative business model. (29)

WEF's "Water Resources Utility of the Future: A Blueprint for Action" ties together diverse resource recovery activities, many of which likely could never have been foreseen 40 years ago when the Clean Water Act was enacted. Such practices include:

- Extracting and finding uses for nutrients and other constituents
- Capturing waste heat and energy in biosolids and liquid streams
- Generating renewable energy using its land and other assets

The Blueprint highlights the type of collaboration needed to ensure a sustainable future that minimizes waste, maximizes resources, protects the ratepayer, improves the community, and embraces innovation in a unique and unprecedented manner. (30)

## 5.3 The Role of the State in Achieving the Vision for Infrastructure Management

**The Authority recognizes that North Carolina should provide incentives to encourage utilities to become more proactive in the management of its systems, and that some utilities may require assistance to implement or improve infrastructure management.** The state currently supports utilities as they move toward viability through infrastructure management by:

**UTILITIES OF THE FUTURE (UOTF)** implement innovative approaches and non-traditional partnerships to improve environmental performance, lower costs, increase revenue and boost the local economy

**The triple-bottom-line approach is at the heart of UOTF**



- **Providing grants from the State Reserve Program for Asset Inventory and Assessment (AIA)**

The purpose of these grants is to assist a utility with the first steps towards an asset management plan. Funds are provided for a utility to:

- Identify the water and wastewater infrastructure components that comprise its water and wastewater systems
- Create an asset inventory
- Determine the condition of these assets
- Prioritize the most critical infrastructure needs
- Develop a capital improvement plan (CIP) to fund the projects

AIA grants support a utility as it examines the purpose and value of its infrastructure, and the processes it uses to determine when and how to spend infrastructure dollars. Outcomes include identifying the most critical projects and the ability to demonstrate and explain why they are critical, which will help gain support from governing bodies, customers and stakeholders to make the needed investments.

- **Providing grant funds from the State Reserve Program for Merger/Regionalization Feasibility analyses**

The purpose of these grants is to investigate voluntary partnerships that can result in improvements to physical infrastructure.

- **Providing subsidized loan and grant funds**

The Division of Water Infrastructure administers five funding programs. The Authority determines the projects to be funded. Limited grant funds are used for projects that will move a utility toward permanent infrastructure management solutions. Priority rating systems recognize a utility's efforts toward infrastructure management. Loan funds can be used for water meter technology and for projects that provide for energy recovery and water reuse.

- **Providing a wide range of resources in Appendix B – “Resource Toolbox” that are almost all related to infrastructure management**





## Section 6 – Achieving the Vision: Organizational Management

The long-term viability of any critical infrastructure system, no matter how resilient and sustainable it is, will ultimately rely on the human and organizational stewardship the infrastructure system receives. (31)

A utility's organizational management directly affects the quality of its physical infrastructure. Decisions about rates and fees impact the amount of infrastructure funds available. The decisions made about staff training and development impact the operation of its infrastructure components and system as a whole. Its decisions about communicating with customers and stakeholders affect utility service expectations and support for its rates and fees.

**Organizational management involves all levels of the utility's organization in understanding the long-term nature of water and wastewater infrastructure needs, implementing a plan to address and finance the needs in a prioritized manner, and building customer and stakeholder support.**

### 6.1 Utility Governing Boards

Governing boards (elected officials, appointed officials and owners) need a solid understanding of the long-term nature of the water and wastewater infrastructure for which they are responsible, in order to support their staff in implementing strategic plans for the future. **They can then make proactive decisions that move the system toward or maintain viability, avoiding short-term actions that may not be best for the long-term health of their customers or the environment.**

Governing boards make key decisions that impact their customers and stakeholders, their staff and the level of funding directed to the utility system. **Boards may first need to assess their internal level of infrastructure understanding by considering these questions:**

- What are the basics of infrastructure: what is it, what does it do and how does it directly impact public health, public safety, the environment, economic development, and other aspects of quality of life?
- What level of attention, operation, and maintenance does infrastructure need to function effectively and in compliance with regulations?
- What is the finite life of infrastructure components and, even with the best maintenance, when will they eventually need to be renewed, replaced or upgraded?
- What is the real possibility of infrastructure failure and how would it impact public health, safety and the environment?
- What is the current physical condition of the system's assets and what is needed to maintain or improve the assets?
- What plans are in place to solve the most critical problems first?
- What long-term financial plans are in place to cover the future costs of infrastructure renewal or replacement?
- Is our system large enough to operate efficiently or do we need to look for opportunities to share resources or regionalize to maximize efficiency?
- What are the general duties of our utility staff and are we supporting them in their work?
- Do we have or can we obtain the level of expertise needed to effectively manage our utility system?

To answer these questions, a board should seek information and training about water and wastewater utility management. Next steps should include deciding what viability means specifically for their utility, and enabling and supporting their staff to implement infrastructure management activities to achieve the goals.

## 6.2 Operations Staff

**To achieve viability, a utility's staff must be adequately trained to accomplish all of their duties, or be able to partner with organizations that can provide those services when necessary.** Ideally, staff are engaged and adaptive – anticipating problems and proactively addressing issues well before they result in infrastructure failure, public health concerns or regulatory violations.

## Vision for Organizational Management

A utility's organization, from its governing board to its operations staff, is aligned to accomplish the critical mission of the utility, including the protection of public health, public safety and the environment, and compliance with regulations

.....

**Organizational management supports viability by creating a culture that places value on long-term planning and addressing its challenges in a comprehensive and realistic way**



## Vision for Utility Governing Boards

- Understand the long-term nature of infrastructure planning and management and the long-term needs of its system
- Set standards and expectations for system operations
- Make proactive decisions to address system needs in a prioritized manner
- Put in place financial plans to fund operation and maintenance, renewal/replacement and capital improvement plans according to schedule
- Understand local, state, and federal funding sources and availability

An environment that supports continual learning, improvement, and innovation and that emphasizes opportunities for professional and leadership development is needed. Particularly important is continuity planning to ensure that employee institutional knowledge is retained, transferred, and improved upon over time.

Actions could include:

- Having programs in place to retain and improve institutional knowledge
- Ensuring that staff members are cross-trained and can assist each other or fill-in by performing each other's duties
- Scheduling required staff training events that are short, focused and part of the regular work day
- Establishing and clearly communicating staff performance requirements
- Creating incentive programs to retain staff, encourage training, or encourage staff to take on a wider variety of skills
- Creating networks with neighboring utilities to collaboratively provide and receive assistance

## Vision for Operations Staff

- Have adequate knowledge and resources to operate and maintain the systems according to regulatory and governing board standards and expectations including asset management planning
- Build strong relationships and constant communication with customers, governing boards, regulators and funders
- Pursue professional/skill development and career enhancement
- Assist staff from neighboring utilities

An option for any utility might be to share management, staff and/or contracted resources with neighboring utilities, thereby providing several utilities with access to resources that perhaps none could support alone. Some utilities may need to consider contracting services, either in the short-or long-term, for overall system operations, as internal staff receives education and training.

## 6.3 Customers and Stakeholders

Customers and stakeholders drive the service needs of the utility. When customers and stakeholders understand water and wastewater infrastructure enough to have realistic expectations for both water and sewer service levels, and the associated cost of those services, they more readily support utility plans, policies, rates and fees.

**To achieve viability, a utility must provide accurate and transparent information to its customers, stakeholders and regulatory agencies, and actively seek support and feedback.** Governing boards and staff must stay informed about what their customers expect in terms of service, water quality, rates and other concerns they may have. The utility works with its customers to build support for “what needs to be done” along with “how much we need to spend” to provide the expected level of service. (32) Ultimately, customers should be satisfied with the services that the system provides and understand and support the associated costs of that service.

Actions could include:

- Holding outreach and education events at the treatment facility to explain the basics of utility operations
- Using these events as opportunities to gain an understanding of community and customer needs and interests related to utility operations
- Communicating information about rate requirements and system needs so that there is a better understanding within the community of why rate decisions and changes are made, by:
  - Using space in bills to promote the value of clean and safe water, and provide other important information to customers
  - Engaging customers through multiple channels to make information more accessible. Utility websites are prime locations to provide more details through fact sheets, videos, and FAQs.
- Sharing information with local media sources since they can be a key asset in reaching customers through digital media and editorial opportunities

Some governing boards may lack the tools needed to explain utility needs and operations to customers and stakeholders, and some may not have the resources to start or maintain the type of communication needed. Utilities that have these capabilities may be able to share staff, designed materials, and communications strategies with those that do not have these resources.

## Vision for Customers and Stakeholders

- Have general understanding of water infrastructure and role of the utility provider
- Have realistic expectations for service and the cost of providing that service
- Pay utility bills on time
- Support the utility’s efforts to generate the revenue needed to fund operation and maintenance, reinvestment and reserves



## 6.4 The Role of the State in Achieving the Vision for Organizational Management

The Authority recognizes that North Carolina should provide an incentive to encourage utilities to become more proactive in the management of its systems, and some utilities may require assistance to implement or improve organizational management. Governing boards need to gain a better understanding of the ability of their utilities to operate as self-sufficient business enterprises for the long-term. Some boards may need information and training about water and wastewater utility management or may require assistance in organizational management.

The state currently supports utilities as they move toward viability through organizational management by:

- **Providing grant funds from the State Reserve Program for Merger/Regionalization Feasibility analyses**

Some governing boards may recognize that the efforts or costs needed to achieve or maintain self-sufficiency is beyond what they can accomplish alone, and that an alternative path to viability might provide a solution. The state's grant program for merger/regionalization feasibility (MRF) analyses enables entities to investigate the feasibility of voluntary merger/regionalization options. The purpose of an MRF grant is to provide funds for utilities to define and evaluate potential options for partnering with one or more utilities. While a range of options exist, in general:

- A merger involves the combination of two or more water and/or sewer systems into one system with common ownership, management, and operation, and
- Regionalization involves the physical interconnection with another system for the purposes of regional wastewater treatment or regional water supply.

Identifying and evaluating the details of various options can be a major project for some utilities. Frequently, smaller utilities that may benefit the most from merger or regionalization may not have funds for a comprehensive feasibility study, and a neighboring larger utility may see no benefit to its customers of such a study. The new grants provide a means to bridge this gap.

**The Authority recognizes that while utility partnerships and regionalization can sometimes save money, utility coordination will take more time and may be difficult if there have been problems between local governments on other issues.** In addition, some barriers to merger or regionalization may exist, including large upfront costs, physical geography, the perception that there may be loss of local control, and the

Some of the potential barriers associated with mergers/ regionalization are addressed in publications by the Rural Community Assistance Partnership (33) and the UNC-EFC (34)

condition and/or size of the possible partner systems. These grants will enable utilities to examine such issues objectively and in depth, determining whether merger or regionalization can increase the viability of one or more partners without any negative impact to the other potential partners.

- **Providing extensive resources for utility and organizational management in Appendix B – “Resource Toolbox”**

The Resource Toolbox provides information gathered from dozens of resources, many of which include case studies and step-by-step actions that can serve as guides to help governing boards assess their utility’s situation and circumstances. The Toolbox also provides information about and links to the many agencies and organizations that operate in North Carolina and important information that they have produced in support of utilities.







## Section 7 – Achieving the Vision: Financial Management

Financial management practices and capabilities are the key to assuring that utilities can fund, with decreasing reliance on grants, the infrastructure needed to protect public health and the environment, comply with regulations, and deliver the expected level of service to their customers.

To function well over the long-term, utilities must establish and maintain an environment in which its rates and fees are adequate to pay bills, put funds away for future capital expenditures and unanticipated needs, and maintain, repair, and replace infrastructure before it reaches the end of its useful life. These revenues are essential to delivering safe and reliable drinking water and wastewater services that protect public health and the environment.

**Financial management involves planning to generate the revenues needed to construct, operate, maintain, and repair/replace utility infrastructure, including reserves for unexpected events, without long-term reliance on grant funds.**

**In evaluating their utility's financial environment and structure, governing boards may want to consider:**

- Conducting a study on rate and fee requirements using an independent party, to support discussions about revenue requirements and to establish predictable rates and fees
- Reviewing budgets at least twice every year and discussing upcoming prioritized projects to plan for the allocation of funds
- Developing a CIP looking at needs for at least the next 10 years and updating the CIP annually
- Ensuring financial accounting policies and procedures follow generally accepted accounting principles
- Making sure there is appropriate separation of duties between staff that are responsible for billing, invoicing, receipts, and other accounting areas
- Improving practices for reducing the number of outstanding bills

**A potential option for smaller utilities, especially to ensure the separation of financial-related duties, could include sharing management and staff resources with nearby towns.**

## 7.1 Revenue Generation

Historically, many water and wastewater utilities were able to expect steady growth with relatively stable costs and revenues. (35) As population shifts away from rural areas and businesses close or use less water, the basic assumptions of the traditional approach to financial management are no longer valid.

This comes at a time when capital needs are determined as much by renewal and replacement projects as by new infrastructure to serve growth and expansion. Independent of these changes, utilities must protect public health and the environment, and comply with regulations. As a result, many utilities have seen costs rise at the same time that its rates and fees have resulted in smaller amounts of money for the entity's utility fund.

To address this shortfall, the American Water Works Association (AWWA) suggests that additional revenue funds need to come from local utility customers, most likely through higher rates. Utilities must ask their customers to invest more and be able to explain how the investment will provide actual benefits to the community. (1) Investments should be prioritized through implementing best practices that include asset management, risk analysis, prioritization of projects, and the development and implementation of CIPs.

Some utilities may find that they cannot increase their rates and/or fees enough to become financially viable in the long-term. This is just one potential reason they may benefit by developing regional partnerships to gain economies of scale.

## 7.2 Local Government Finance Requirements

In North Carolina, the State and Local Finance Division and the Local Government Commission (LGC) of the Department of State Treasurer State must approve almost all water and wastewater debt. Consequently, the LGC has oversight of local government units' overall financial status, including municipal water and sewer utility operations.



### Vision for Financial Management

Utilities have in place financial management plans that generate the revenues needed to operate, maintain, and repair/replace utility infrastructure – including reserves for unexpected events – without long-term reliance on grant funds

.....

**Financial management supports viability by enabling the utility to operate as a long-term, self-sufficient business enterprise**

The LGC monitors and analyzes the fiscal and accounting practices of local governments, with the goal of helping communities remain financially strong. Often, issues within a community's water and sewer utility fund can contribute to overall financial difficulties of a community. The LGC can assist local governments in determining the effectiveness of their financial management, and in determining the feasibility of a project, the size of the financing, and potential forms of financing.

Compliance with Governmental Accounting Standards Board (GASB) (36) standards is required by Chapter 159 of the North Carolina General Statutes – Local Government Finance. **These statutes are designed to ensure transparency in local government finance. For enterprise systems, it requires that:**

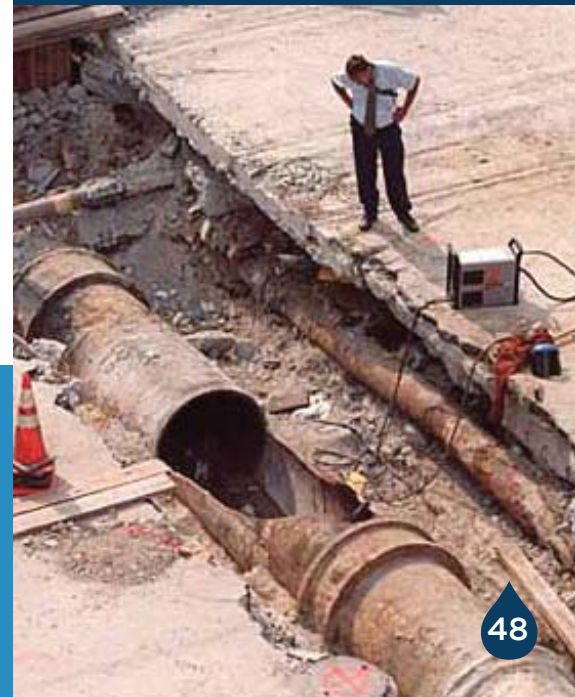
- **A water and sewer utility fund is kept separate from the general fund**
- **The utility fund has sufficient resources to meet all of its operating expenses, capital outlay, and debt service obligations**
- **The utility report annually to the LGC**

GASB Statement No. 34, "Basic Financial Statements – and Management's Discussion and Analysis – for State and Local Governments" established new financial reporting requirements for state and local governments throughout the U.S. These financial statements are designed to help users:

- Assess the finances of the government in its entirety, including the year's operating results
- Determine whether the government's overall financial position improved or deteriorated
- Evaluate whether the government's current-year revenues were sufficient to pay for current-year services
- See the cost of providing services to its citizenry
- See how the government finances its programs – through user fees and other program revenues versus general tax revenues
- Understand the extent to which the government has invested in capital assets, including water and wastewater infrastructure assets

More information about GASB and North Carolina's General Statutes related to Local Government Finance is presented in Appendix C.

**"I think a lot of people are looking for these top-level, silver bullet solutions from the top down – thinking the federal government is going to lead, and they're going to prescribe these huge stimulus-style packages to solve the challenge. I think if anything has become evident over the past few years...[it] is that a lot of states and localities realize they're on their own. **The cavalry, so to speak, isn't coming to save the day.**" (2)**



**The LGC's oversight has resulted in widespread recognition that North Carolina's local government debt capacity and reliability are among the best in the country**

## 7.3 The Role of the State in Achieving the Vision for Financial Management

The Authority recognizes that North Carolina should support governing boards in active financial planning that is essential for a utility to operate as a self-sufficient business enterprise for the long-term. Some boards may need information and training about water and wastewater utility management or may require assistance in financial management.

The state currently supports utilities as they move toward viability through financial management by:

- **Services of the State and Local Finance Division and the Local Government Commission of the Department of State Treasurer**

The Pew Charitable Trusts recognize the LGC as a “local government lifeline” (37, 38). The LGC monitors the fiscal health of local governments, including a community’s water and sewer utility fund. The LGC can assist local governments in determining the effectiveness of their financial management and offers broad assistance in financial administration to local governments.

The LGC, the Authority, and the Division of Water Infrastructure recognize that a community’s issues in funding its water and wastewater utility can be related to its overall financial management issues. Since the concerns of these state agencies are so closely linked, the LGC and the Division are working together to find ways to jointly support local governments as they work to resolve financial management problems that impact the viability of their water and wastewater utility.

As an example, a unit of local government that the LGC has assisted had a history of water and sewer finance issues as well as system operational issues. The LGC consulted with the town and determined that it needed a regional solution and also needed to secure outside accounting help. Through its local Council of Government (COG), the town accessed a water and sewer system consultant to assist in implementing a capital project that moves it to a regional approach by closing its wastewater treatment plant and sending its wastewater to a larger plant. While partially funded with grants, the town will require USDA loan funds to complete the project. LGC staff reviewed the town’s financial situation and then addressed its board to make it aware of operational changes necessary for debt approval. The town needed a rate structure change that included a rate increase; it was approved by the town board. The town has also secured outside accounting assistance to put its books in order and to replace its old hardware and software systems.

The influence and oversight of the Local Government Commission is a major reason why North Carolina local government issuers have been able to weather this recession...North Carolina’s oversight model is one of the strongest of any state

**Other states have formal and informal tools to assist local governments, but none has the same reach as North Carolina’s Commission, which imposes budget controls and advises troubled communities (37, 38)**

- **Services of the University of North Carolina's School of Government**

The University of North Carolina's School of Government provides North Carolina's local and state government officials with nonpartisan legal, public administration, management, and financial expertise. It is the largest university-based local government training, advisory, and research organization in the United States.

**Each year, the school offers hundreds of courses, webinars, and specialized conferences for over 12,000 North Carolina public officials. Attendees include city and county managers, county commissioners, city council members, finance officers, and planning officials, among many others.**

The School's faculty members respond to thousands of phone calls and e-mail messages each year about routine and urgent matters and also engage in long-term advising projects for local governing boards, legislative committees, and statewide commissions. In addition, faculty members annually publish numerous books, manuals, reports, articles, bulletins, and other print and online content related to state and local government.

The School created a blog – Coates' Canons: NC Local Government Law – to disseminate information about a broad range of legal issues affecting local governments and other public agencies in North Carolina. Although the focus of the blog is on legal issues, it serves as a valuable source of information for a variety of public officials including elected officials, managers, department heads, and attorneys as well as for individuals who interact with local governments and other public agencies. The blog is a joint effort of local government law faculty members at the School of Government.

- **Services of the Environmental Finance Center at the University of North Carolina's School of Government**

The state of North Carolina is fortunate to have the Environmental Finance Center at the University of North Carolina's School of Government (UNC-EFC) as a resource. The UNC-EFC is dedicated to building the capacity of governments and other organizations to provide environmental protection and public services, including water and wastewater services, in financially sustainable ways. Its vision is to assist communities in creating healthy environments that are supported by long-term sustainable financing.

One of the core services that the UNC-EFC has provided to utilities over the last 10 years is access to a comprehensive financial benchmarking and dashboard resource. This resource compiles information from a wide variety of sources and presents it in an accessible manner to utility managers. It allows managers and its governing boards to quickly gauge their financial health and to assess the impact of rate adjustments.



In addition to their benchmarking services, the **UNC-EFC** has developed a wide variety of **capital planning and rate setting tools designed to help utilities assess and implement improved financial practices**. Tools include spreadsheet-based capital planning models and rate-setting tools, as well as affordability assessment tools.

- **Providing extensive resources for utility financial management in Appendix B – “Resource Toolbox”**

The Resource Toolbox provides information about and links to many agencies and organizations that are directly involved in water and wastewater utility financial management. Resources that focus on smaller and rural systems include the Southeast Rural Community Assistance Program (SERCAP) and the North Carolina Rural Water Association (NCRWA).



## Section 8 – Assessing a Utility’s Financial Capacity

The Authority is charged with determining ways to better facilitate the dissemination of loan and grant funds and to meet the project needs of rural, economically distressed local governments. To meet these goals, the Authority recommended statutory changes to the General Assembly to allow the use of new affordability criteria.

Using affordability criteria is one of the fundamental changes made to the state’s approach to increase access to low-cost or no-cost capital by economically distressed utilities. The criteria recognize not only the economic situation of a utility but also its efforts towards managing its water utility as a financially viable business.

### 8.1 Background

Between 2013 and 2015, state grant funds could be awarded to a local government unit only if the entity was located in a Tier 1 or Tier 2 county<sup>6</sup> and if the entity met the high unit cost (HUC) threshold<sup>7</sup> rather than the county tier and HUC threshold. Despite these criteria, the Authority recognized that funds from state grant programs might not be reaching the most economically distressed communities. (4, 5)

**In 2015, the General Assembly modified NCGS 159G to include the new affordability criteria. Using the new criteria will help target the limited state loan and grant funds to some of the most distressed communities in the state – those that demonstrate the most need and can least afford a critical project.**

However, the goal of providing funding remains unchanged – that the scarce funds available are used most effectively to transition utilities to permanent local funding solutions and eventually the ability to access non-subsidized forms of capital.

<sup>6</sup> The N.C. Department of Commerce annually ranks the state’s 100 counties based on economic well-being and assigns each a tier designation. Counties designated as Tier 1 and 2 are the most distressed.

<sup>7</sup> A high unit cost project was defined as one resulting in an estimated average household user fee for water and sewer service in excess of the high unit cost (HUC) threshold, where the HUC threshold was defined as 1.5% of the median household income in an area that receives both water and sewer service.



### Definition of Affordability

NCGS 159G-20.(1)

Affordability – The relative affordability of a project for a community compared to other communities in North Carolina based on factors that shall include, at a minimum, water and sewer service rates, median household income, poverty rates, employment, the population of the served community, and past expenditures by the community on water infrastructure compared to that community’s capacity for financing water infrastructure improvements.

## 8.2 Affordability Criteria

The affordability criteria recognize not only the economic situation of a community, but also the community's efforts towards managing its water utility as a financially viable business.

In general, the criteria prioritize those utility providers and local governments that:

- Have smaller populations as determined by the number of residential connections
- Are comparatively worse than the state benchmarks for the five key economic indicators shown in the table at right:
  - Population change
  - Poverty rate
  - Median household income (MHI)
  - Unemployment
  - Property valuation per capita
- Have higher current monthly utility rates
- Have higher debt service per connection

**The financial capacity of a utility to fund a project without grant funds is also essential in determining the need for a grant.** The combination of monthly bills and debt service per connection reflects a utility's capacity for financing a proposed project along with past expenditures. For example, if a utility already has high rates, there may be limited ability to raise more revenue with future rate increases.

## 8.3 Outcomes

Using affordability criteria will better distinguish between entities that can least afford a critical project and those that can afford to incur some amount of debt or obligate some amount of funding toward a project.

More grant funding, as a percentage of the project cost, will be provided for utilities that are worse than the key state benchmarks, have the least affordable monthly bills and the most debt per connection.

Entities that are comparatively better than the state benchmarks, have relatively lower monthly bills and/or lower debt service per connection will be eligible for grant funds for a smaller percentage of the project cost.

Project costs that cannot be funded with grants are eligible for state loans and federal loans.

This restructured approach stretches the limited state loan and grant funding resources to benefit more utilities by combining loans and grants based on affordability while acknowledging that, in some cases, full grant funding of projects is still the most appropriate approach.

The affordability criteria will better distinguish between entities that can least afford a critical project and those that can afford to incur some amount of debt or obligate some amount of funding toward a project

5 Key Economic Indicators	2016 State Benchmark
Population Change	5.17%
Poverty Rate	17.6%
Median Household Income (MHI)	\$46,693
Unemployment	6.4%
Property Valuation per Capita	\$104,432

*Affordability criteria prioritize LGUs/utility providers that are comparatively worse than the state benchmarks for these economic indicators*

The goal of all grant and loan funding remains unchanged – that limited state loan and grant funds are used most effectively to transition utilities to permanent local funding solutions and eventually the ability to access non-subsidized forms of capital





## Section 9 – Troubled System Protocol

One of the Authority’s specific tasks is to assess the need for a “troubled system” protocol. However, it is recognized that most utilities throughout the state are probably somewhere within a range between “viable” and “troubled.”

The resources and tools in this Master Plan are designed to support utilities as they move toward the “viable” end of the range. As utilities do so, they may be better able to minimize or prevent situations that may move them toward the “troubled” end of the range. The grants available for voluntary merger/regionalization feasibility analyses might be an appropriate first step to investigate potential solutions for troubled units.

The LGC staff uses multiple benchmarks to evaluate the financial condition of a utility. The data for comparison to the established benchmarks is reported in the audited financial statements of each unit of local government that operates a water and/or wastewater system. In its reviews of the audited financial statements, staff also looks for indications of poor operational and internal controls over the utility system and often the entire governmental entity. Any combination of poor performance against set financial standards and poor controls can qualify a system as “troubled”.

The LGC and the Division of Water Infrastructure recognize that a community’s issues in funding its water and wastewater utility can be related to its overall financial management issues. The agencies have found that a system more on the “troubled” end of the range may lack sufficient organizational and/or financial management tools as evidenced by:

- Internal control issues, lack of timely audited financials, accounting and reporting issues, and low cash balances
- Issues related to water and wastewater system billing/revenue generation policies, utility rates, condition assessments, lack of enforcement of collection and cut-off policies, and affordability considerations

Some of the general characteristics of potentially “troubled” systems include:

- Populations of 2,000 people or less
- Four months or less of cash on hand in the utility and/or general fund
- Aging and/or inadequately maintained infrastructure

While an overarching protocol that could be applied to any system would be ideal, the Authority recognizes that the potential to be “troubled” may result from a number of different circumstances that may be unique to each community and require approaches tailored to an individual community’s needs. The Authority and the Local Government Commission are working together to develop a range of scalable practices and strategies to assist systems that are on the more “troubled” end of the range.

The Authority and the Local Government Commission are working to develop scalable strategies and practices to assist systems that may be on the more “troubled” end of the range – with the goal of seeking permanent solutions to water infrastructure issues



## Section 10 – Moving Forward

As with any master planning process, the master plan will be updated and refreshed as conditions, information, and priorities change over time. The updated plan will address current key issues, how the future might look, the challenges that it might hold, and options to meet those challenges.

The Authority will continue to monitor and research a number of longer-term subjects for inclusion in future master planning efforts. These may include communications resources, regional coordination, managing reclaimed water and stormwater, partnership solutions, and improved procurement policies.

### 10.1 Near Term Activities

In the near term, the Authority's next steps include:

- Monitoring and evaluating recent changes in funding programs
- Strengthening resource partnerships in planning, training and communications
- Developing a troubled system protocol

#### Monitoring and Evaluating Recent Funding Program Changes

Beginning with the 2013 creation of the Authority, and including the 2016 Connect North Carolina bond funding, there has already been a great deal of change in the state's approach to assistance with water and wastewater infrastructure funding. **A key activity in the near term will be managing these changes and evaluating their impacts to ensure that funding is linked to supporting a utility's viability.** Future recommendations for modifications to the funding programs may be a result.

The Authority recognizes that the new approach of evaluating affordability criteria and making combination grant/loan awards based on these criteria will need to be closely monitored and evaluated, with the help of stakeholders and those receiving the awards. As with any major program changes, this will likely require some modification as experience is gained with the new approach. The Authority will continue its work to maximize the effective use of the state's water infrastructure investments and ensure that the state realizes the most benefit over the long-term through the best use of both state and federal funds.

## Strengthening Resource Partnerships

This master plan identifies multiple opportunities for strengthening resource partnerships among state agencies such as the LGC and the Division of Water Infrastructure. Partnerships with organizations such as the North Carolina League of Municipalities (NCLM), the North Carolina Association of County Commissioners (NCACC), and North Carolina Councils of Government (COGs) can be enhanced to leverage and expand on many existing resources and programs.

The Division, NCLM and NCACC already work collaboratively, and also work separately as partners with the LGC. These state and local government agencies will begin to work closely together to provide more cohesive support for local government utility providers.

**Partnerships such as these will lead to creative solutions for utility viability and will enhance the long-term success of the state's funding programs.**

The Division also works closely with the Division of Water Resources Public Water Supply Section on many issues related to community water systems.

Division staff will continue to promote discussions on planning, training and communications programs with these and other partners that may include:

- University of North Carolina School of Government and the School's Environmental Finance Center
- North Carolina Rural Water Association
- Southeast Rural Community Assistance Project
- North Carolina Waterworks Association and Water Environment Association
- North Carolina Waterworks Operators Association
- North Carolina Councils of Government
- University of North Carolina System
- North Carolina Community College System
- North Carolina Department of Commerce



The mission of the nonpartisan North Carolina League of Municipalities is to enhance the quality of life in municipalities through excellent municipal governance

The North Carolina Association of County Commissioners empowers 100 counties to work together for the betterment of one state



Topics and issues that may be addressed with these partners include:

- Affordability
- Water and sewer rates
- Infrastructure management training
- Asset management training
- Financial management training
- Technical issues training
- Building customer and stakeholder support
- Building the capacity of utility governing boards
- Communicating complex utility management issues to governing boards, customers and stakeholders

## Developing a troubled system protocol

In partnership with the Local Government Commission and other agencies and organizations, the Authority will work to develop a troubled system protocol. The goal of a troubled system protocol is to seek permanent solutions to water infrastructure issues. While applying an overarching protocol to any system would be ideal, the Authority recognizes that the potential to be “troubled” may result from a number of different circumstances that may be unique to each community and require approaches tailored to an individual community’s needs.

## 10.2 Longer-Term Issues

The longer-term issues that the Authority and Division staff will continue to discuss, research and monitor for future master planning efforts may include:

- Resources available for communication to help engage and increase understanding of and support for infrastructure funding by utility governing boards, utility staff, customers, and stakeholders
- Regional coordination:
  - The potential role of metropolitan and rural planning organizations
  - Interstate water sharing
  - Basinwide water resources management issues such as interbasin transfers and water quality
- Management of reclaimed water, gray water, stormwater, and other types of water
- A range of partnership solutions that might include shared management opportunities, contract operations, public-private partnerships, privatization, inter-local agreements, and other activities or arrangements
- Improvement of procurement policies including laws, regulatory frameworks, communications, and universal practices
- Development of project plans, specifications and construction monitoring practices to ensure that the finished project meets its specific objectives, such as reducing inflow/infiltration, reducing water loss, and providing levels of treatment required to meet permit limits



# Appendices



The State Water Infrastructure Authority was created within the North Carolina Department of Environmental Quality (then the Department of Environment and Natural Resources) by Session Law 2013-360.

## A.1. Current State Water Infrastructure Authority Positions and Members

The table below provides the statutory requirements for each position on the Authority as well as current member information.

Cite § 159G-70.(b)	Statutory Position Requirements	Name	Title	Appointing Authority
(1)	Director of Division of Water Infrastructure* / Serves as Authority Chair	Kim Colson – Chair	Director, Division of Water Infrastructure	Ex-Officio
(2)	Secretary of Commerce* / Familiar with Water or Other Infrastructure Improvements for the Purpose of Promoting Economic Development	Melody Adams	Director, Rural Grants/ Programs; Rural Development Division; Dept. of Commerce	Ex-Officio
(3)	Director of Local Government Commission* (Dept. of State Treasurer)	Greg Gaskins	Deputy Treasurer, State and Local Finance Division; Director of the Local Government Commission	Ex-Officio
(4)	Professional Engineer in Private Sector Familiar with Wastewater Systems	JD Solomon	Vice President, CH2MHILL	Governor
(5)	Knowledgeable about Federal Funding for Wastewater and Water Systems	Johnnie Carswell	Burke County Commissioner	Governor
(6)	Knowledgeable about Urban Wastewater or Water Systems	Leila Goodwin	Water Resources Engineer	Senate Pro Tempore
(7)	Knowledgeable about Rural Wastewater or Water Systems	Charles Vines	Mitchell County Manager	Senate Pro Tempore
(8)	County Commissioner or Resident of a Rural County Knowledgeable about Public Health Services	Cal Stiles	Cherokee County Commissioner	Speaker of the House
(9)	Familiar with Wastewater, Drinking Water and Stormwater Issues and State Funding Sources	Maria Hunnicutt	Manager, Broad River Water Authority	Speaker of the House

\* Or designee

## A.2 North Carolina General Statutes 159G-70 through 72

### North Carolina General Statute Chapter 159G. Water Infrastructure.

#### Article 5.

#### State Water Infrastructure Authority.

#### § 159G-70. State Water Infrastructure Authority created.

(a) Authority Established. - The State Water Infrastructure Authority is created within the Department of Environment and Natural Resources.

(b) Membership. - The Authority consists of nine members as follows:

- (1) The Director of the Division of Water Infrastructure of the Department or the Director's designee who is familiar with the water infrastructure financing, regulatory, and technical assistance programs of the Department.
- (2) The Secretary of Commerce or the Secretary's designee who is familiar with the State programs that fund water or other infrastructure improvements for the purpose of promoting economic development.
- (3) The Director of the Local Government Commission or the Director's designee who is familiar with the functions of the Commission.
- (4) One member who is a professional engineer in the private sector and is familiar with the development of infrastructure necessary for wastewater systems, to be appointed by the Governor to a term that expires on July 1 of even-numbered years.
- (5) One member who is knowledgeable about, and has experience related to, direct federal funding programs for wastewater and public water systems, to be appointed by the Governor to a term that expires on July 1 of odd-numbered years.
- (6) One member who is knowledgeable about, and has experience related to, urban local government wastewater systems or public water systems, to be appointed by the General Assembly upon the recommendation of the President Pro Tempore of the Senate to a term that expires on July 1 of even-numbered years.
- (7) One member who is knowledgeable about, and has experience related to, rural local government wastewater systems or public water systems, to be appointed by the General Assembly upon the recommendation of the President Pro Tempore of the Senate to a term that expires on July 1 of odd-numbered years.
- (8) One member who either (i) is a county commissioner of a rural county or (ii) resides in a rural county and is knowledgeable about, and has experience related to, public health services, to be appointed by the General Assembly upon the recommendation of the Speaker of the House of Representatives to a term that expires on July 1 of even-numbered years.
- (9) One member who is familiar with wastewater, drinking water, and stormwater issues and related State funding sources, to be appointed by the General Assembly upon the recommendation of the Speaker of the House of Representatives to a term that expires on July 1 of odd-numbered years.

(c) Terms. - The members appointed by the Governor, the President Pro Tempore of the Senate, and the Speaker of the House of Representatives shall serve two-year terms. The other members, who are ex officio members or designees of those members, shall serve until they are no longer in office or are replaced with another designee.



(d) Chair. - The Director of the Division of Water Infrastructure, or the Director's designee, shall serve as Chair of the Authority. The Chair must call the first meeting. The Chair shall serve as a nonvoting member, provided, however, that the Chair shall vote to break a tie.

(e) Meetings. - The Authority shall meet at least four times a year and may meet as often as needed. A majority of the members of the Authority constitutes a quorum for the transaction of business. The affirmative vote of a majority of the members present at a meeting of the Authority is required for action to be taken by the Authority.

(f) Vacancies. - A vacancy in the Authority or as Chair of the Authority resulting from the resignation of a member or otherwise is filled in the same manner in which the original appointment was made. The term of an appointment to fill a vacancy is for the balance of the unexpired term.

(g) Compensation. - Each member of the Authority shall receive no salary as a result of serving on the Authority but shall receive per diem, subsistence, and travel expenses in accordance with the provisions of G.S. 120-3.1, 138-5, and 138-6, as applicable. (2013-360, s. 14.21(b); 2013-363, s. 5.12.)

### **§ 159G-71. State Water Infrastructure Authority; powers and duties.**

The Authority has the following additional duties:

- (1) After reviewing the recommendations for grants and loans submitted to it by the Division, to determine the rank of applications and to select the applications that are eligible to receive grants and loans, consistent with federal law.
- (2) To establish priorities for making loans and grants under this Chapter, consistent with federal law.
- (3) To review the criteria for making loans and grants under G.S. 159G-23 and make recommendations, if any, to the Department for additional criteria or changes to the criteria, consistent with federal law.
- (4) To develop guidelines for making loans and grants under this Chapter, consistent with federal law.
- (5) To develop a master plan to meet the State's water infrastructure needs.
- (6) To assess and make recommendations on the role of the State in the development and funding of wastewater, drinking water, and stormwater infrastructure in the State.
- (7) To analyze the adequacy of projected funding to meet projected needs over the next five years.
- (8) To make recommendations on ways to maximize the use of current funding resources, whether federal, State, or local, and to ensure that funds are used in a coordinated manner.
- (9) To review the application of management practices in wastewater, drinking water, and stormwater utilities and to determine the best practices.
- (10) To assess the role of public-private partnerships in the future provision of utility service.
- (11) To assess the application of the river basin approach to utility planning and management.
- (12) To assess the need for a "troubled system" protocol. (2013-360, s. 14.21(b).)

### **§ 159G-72. State Water Infrastructure Authority; reports.**

No later than November 1 of each year, the Authority shall submit a report of its activity and findings, including any recommendations or legislative proposals, to the Senate Appropriations Committee on Natural and Economic Resources, the House of Representatives Appropriations Subcommittee on Natural and Economic Resources, and the Fiscal Research Division of the Legislative Services Commission. (2013-360, s. 14.21(b).)

The Resource Toolbox provides extensive, but not exhaustive, information about many organizations and agencies that are engaged in the support of water and wastewater utilities, as well as publications and tools that have been produced by many of the organizations. **The goal in providing this information is to introduce users of this Master Plan to some of the resources, tools, and guidance that are available for use by utilities.** Inclusion in this Toolbox does not imply a recommendation or endorsement by the State Water Infrastructure Authority or the State of North Carolina.

Resources are organized into the following categories and are alphabetical within each category:

- B.1 Organizations and Agencies
- B.2 Publications
- B.3 Tools and Webinars
- B.4 Partnerships and Education
- B.5 Funding Resources
- B.6 Design-Build and Public-Private Partnerships

Note that throughout this Appendix, information that is especially applicable to small, rural communities and systems is highlighted in blue.

## B.1 Organizations and Agencies

Resources are available from many state, national and international organizations, associations, and agencies, as well as the University of North Carolina system. They provide support in the areas of technical assistance, asset management, organizational management, financial management and other key issues described in this Master Plan.

The table below lists and briefly describes many organizations. A more detailed description of each organization with link(s) to their resources and websites is provided following the table.

Organization / Agency	Primary Purpose	Description	Section
American Society of Civil Engineers North Carolina (ASCE-NC)	Technical Assistance	NC Section of the ASCE; developed the 2013 NC Report Card for Infrastructure	B.1.1
American Water Works Association (AWWA)	Technical Assistance	The largest nonprofit, scientific and educational association dedicated to the management and treatment of water	B.1.2
Buried Asset Management Institute – International (BAMI-I)	Asset Management	Education and assistance in applying best practices in underground water infrastructure asset management	B.1.3
Environmental Finance Center Network (EFCN)	Financial Management	University-based network creating solutions to the “how-to-pay” issues of environmental protection	B.1.4
EPA Water Infrastructure and Resiliency Finance Center	Technical Assistance	Resource for entities seeking to address water infrastructure needs with limited budgets	B.1.5

## APPENDIX B – Resource Toolbox

Organization / Agency	Primary Purpose	Description	Section
Institute of Asset Management (IAM)	Asset Management	Support focused on acquisition, operation and care of critical infrastructure physical assets	B.1.6
National Council for Public-Private Partnerships	Funding	Non-profit that facilitates forming public-private partnerships, where appropriate, and raises awareness of governments and businesses of the cooperative means by which the public can be provided with cost-effective quality goods, services and facilities	B.1.7
NC American Water Works Association / NC Water Environment Association (NC AWWA-WEA) and Academy for Water Professional Development	Technical Assistance	NC chapter of the AWWA and WEF dedicated to providing water and wastewater education, training, and service to protect public health and the environment	B.1.8
NC Association of County Commissioners (NCACC)	Advocacy	Serves as the counties' advocate before the executive, legislative and judicial branches of state government	B.1.9
NC Councils of Government (COGs) / Association of Regional Councils	Administrative and Financial Support	16 regional COGs provide services such as administrative and financial, interim executive management, financial administration, human services program delivery and economic development; COGs often partner with small local government units to provide financial and administrative support	B.1.10
NC Department of Commerce Rural Economic Development Division	Funding	Works to improve the economic well-being and quality of life of North Carolinians with particular emphasis on rural communities	B.1.11
NC Division of Water Resources Public Water Supply (PWS) Section	Technical Oversight and Technical Assistance	The PWS Section administers the NC Capacity Development Program which offers tools and training to help water systems understand state and federal requirements	B.1.12
NC League of Municipalities (NCLM)	Advocacy	Nonpartisan association of municipalities in North Carolina	B.1.13
NC Local Government Commission (LGC)	Financial and Organizational Management	Staffed by the Department of State Treasurer; assists local government units with fiscal management and approves issuance of debt	B.1.14

Organization / Agency	Primary Purpose	Description	Section
NC Rural Water Association (NCRWA)	Technical, Organizational and Financial Management Assistance	NCRWA is the leading provider of water and wastewater training and on-site managerial, financial, and technical assistance in the state	B.1.15
NC Waterworks Operators Association (NCWOA)	Technical Assistance	NCWOA has been the premier trainer of waterworks professionals for the state since 1939, providing certification schools and continuing education opportunities	B.1.16
Rural Community Assistance Partnership (RCAP)	Technical Assistance and Funding	Works in small, rural communities across the nation, territories, and tribal areas. Most communities are low-income and have a population under 2,500	B.1.17
Southeast Rural Community Assistance Project (SERCAP)	Technical Assistance, Funding and Organizational Management	Regional office of RCAP assisting NC's small rural communities with training, technical assistance and funding	B.1.18
U.S. Economic Development Administration (EDA)	Economic Development	Fosters regional economic development in economically distressed communities	B.1.19
University of North Carolina Environmental Finance Center (UNC-EFC)	Financial Management	Located within the School of Government; builds capacity of local government units to provide environmental programs and services in fair, effective, and financially sustainable ways	B.1.20
University of North Carolina School of Government (UNC-SOG)	Financial and Organizational Management	Provides NC's local and state government officials with nonpartisan legal, public administration, management, and financial expertise	B.1.21
Water Environment Federation (WEF)	Technical Assistance	Mission is to connect water professionals, enrich the expertise of water professionals, increase the awareness of the impact and value of water, and provide a platform for water sector innovation	B.1.22

### B.1.1 American Society of Civil Engineers North Carolina

The North Carolina Section of the American Society of Civil Engineers (ASCE-NC) works to advance the state of the practice, educate the public and engineers, and advocate for the civil engineering profession. The Society's website is: <http://www.ascenc.org>

### B.1.2 American Water Works Association

The American Water Works Association (AWWA) is a national organization established in 1881. It is the largest nonprofit, scientific and educational association dedicated to managing and treating water, and providing solutions to improve public health, protect the environment, strengthen the economy and enhance quality of life. The Association provides many resources and tools that are free and available at: <http://www.awwa.org/resources-tools.aspx>. A section about Water and Wastewater Utility Management is also helpful: <http://www.awwa.org/resources-tools/water-and-wastewater-utility-management.aspx>.

### B.1.3 Buried Asset Management Institute – International

The Buried Asset Management Institute – International (BAMI-I) is a non-profit corporation whose main purpose is to educate and assist those who have an interest in applying best buried asset management practices to extend the life and efficiency of their assets. Although BAMI-I has been mainly focused on water and wastewater systems, the principles of asset management apply to all different types of buried assets. The purpose of BAMI-I is to provide a center of excellence for owners of underground water infrastructure to join with industry and researchers, using sound science, to evaluate and/or develop buried asset management protocols for application worldwide. The BAMI-I website is: <http://138.47.28.11/bami/index.php>

### B.1.4 Environmental Finance Center Network

The Environmental Finance Center Network (EFCN) is a university-based organization creating innovative solutions to the difficult how-to-pay issues of environmental protection and improvement. The EFCN works with the public and private sectors to promote sustainable environmental solutions while bolstering efforts to manage costs. The EFCN offers free help on financial and managerial topics to systems serving 10,000 or fewer people. Examples of assistance the EFCN can provide include:

- Creating an Asset Management Plan
- Near-term financial planning and rate setting
- Analyzing revenues and expenses
- Offering ideas on how to effectively budget
- Long-term capital planning
- Assessing options for lowering energy use and/or water loss
- Identifying sources of outside funding
- Collaborating with other water systems
- Resiliency planning

The UNC-EFC is a member of the network and is leading a project, Smart Water Management for Small Water Systems. The project is a collaborative effort between the members of the EFCN and AWWA, and is made possible through a cooperative agreement with the U.S. EPA. The project seeks to address major issues facing the nation's smallest drinking water systems (those serving 10,000 or fewer people). The project's team of experts works with water systems across the country to address these issues, which range from asset management and rate setting to water loss detection and conservation, through training and technical assistance. Information is available here: <http://efcnetwork.org/small-systems-project/>

### B.1.5 EPA Water Infrastructure and Resiliency Finance Center

The Water Infrastructure and Resiliency Finance Center serves as a resource for communities, municipal utilities, and private entities seeking to address water infrastructure needs with limited budgets. It provides objective financial advice to help communities make informed decisions on financing drinking water, wastewater, and stormwater infrastructure. The Center works actively with the UNC-EFC on several programs to provide assistance to communities addressing water infrastructure challenges. Information is available here: <https://www.epa.gov/waterfinancecenter/about-water-infrastructure-and-resiliency-finance-center>

### B.1.6 Institute of Asset Management

The Institute of Asset Management (IAM) is a non-profit professional body for those involved in the acquisition, operation and care of physical assets, especially critical infrastructure. The Institute researches, gathers and presents knowledge and good practices, and provides products, especially The IAM Toolkit to assist organizations with putting this knowledge into effect. The IAM website is: <https://theiam.org/>

### B.1.7 National Council for Public-Private Partnerships

The National Council for Public-Private Partnerships defines a public-private partnership as a contractual arrangement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility. The Partnership's website is: <http://www.ncppp.org/ppp-basics/7-keys/>

### B.1.8 North Carolina AWWA-WEA and Academy for Water Professional Development

In North Carolina, the affiliates of the AWWA and the WEF operate jointly under one board of trustees and function as both a Section of the AWWA and as a Member Association of the WEF. Formed in 1928, it is dedicated to providing water and wastewater education, training, and service to protect public health and the environment. There are over 3,000 members in North Carolina representing municipal and private utilities, consulting engineering firms, government agencies, companies who provide equipment and supplies to the industry, and representatives of academia who teach and conduct research in water and wastewater-related areas. The website is: <http://www.ncsafewater.org/>

The Academy for Water Professional Development is a NC AWWA-WEA initiative to fill an industry training gap and advance the careers of participants. The program includes multi-year technical and soft-skill training courses, which have been developed based on input from industry leaders across North Carolina. The NC AWWA-WEA consulted with industry experts and North Carolina utility managers to develop The Academy for Water Professional Development (The Academy). The Academy provides a structured and specialized training and certification program for water professionals to demonstrate competency at defined levels through completion of courses and passing of comprehensive exams. The Academy delivers a demonstrated return on investment as employees move through a certification track, and will increase the pool of qualified candidates available for supervisory-level positions. Completion of the Academy levels and ladders (or industry specialization areas) is a quantifiable method to compare employee's skills and development. The website is: <http://www.ncsafewater.org/?page=Academy>

### **B.1.9 North Carolina Association of County Commissioners**

Founded in 1908, the North Carolina Association of County Commissioners (NCACC) is one of the most successful and active statewide local government associations in the nation. The NCACC was established for the betterment of county government in North Carolina. North Carolina's 100 counties are vibrant and essential partners with state government in providing services to the state's more than 9 million citizens. As the form of government closest to the people, counties offer a unique perspective that makes them critical players in decisions affecting their citizens. The NCACC serves as the counties' advocate before the executive, legislative and judicial branches of state government. The Association's website is: <http://www.ncacc.org>

### **B.1.10 North Carolina Councils of Government (COGs) / Association of Regional Councils**

There are 16 regional Councils of Government (COGs) in North Carolina. The mission of the COGs is to provide creative regional solutions to relevant and emerging issues in North Carolina while providing a standard of excellence in the delivery of federal, state and regional services. The regional councils provide a broad range of programs and services; the nature and extent of the programs vary depending on local needs and the priorities of the board that governs each council. Through contact with state and federal agencies, regional councils advise their members on program changes and the availability of funding or programs that are important to their local governments. The Association's website is: <http://www.ncregions.org/>.

Some of the services are traditional, such as the delivery of federal and state programs in aging, transportation planning, workforce development, community planning, GIS mapping services and convening of regional leaders for problem solving. A more robust range of services has emerged through member demand for administrative and financial services, interim executive management, financial administration, human services program delivery and economic development.

Many small governments contract with their regional councils to provide financial and administrative support. The economies of scale created through these regional solutions can provide significant savings for small communities.

### **B.1.11 North Carolina Department of Commerce Rural Economic Development Division**

The North Carolina Department of Commerce Rural Economic Development Division was created in 2013 to improve the economic well-being and quality of life of North Carolinians with particular emphasis on rural communities. The Division has a number of grant programs and planning services to assist rural counties and census tracts. Information can be found here: <http://www.nccommerce.com/rd>

#### **Community Development Block Grant Program**

The U.S. Department of Housing and Urban Development (HUD) is responsible for the federal Community Development Block Grant (CDBG) program, which works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses. These grants primarily serve persons of low-to-moderate incomes. Since states are in the best position to know, and to respond to, the needs of local governments, Congress has given each state the ability to administer the CDBG funds for non-entitlement areas – these are generally cities and towns with populations of less than 50,000 and

counties with populations of less than 200,000. The NC Department of Commerce administers these federal funds through the Rural Economic Development Division. The Division offers the Community Development Block Grants for Economic Development (CDBG-ED). CDBG-ED grant funds are specifically provided to assist with infrastructure projects that will lead to the creation of new, full-time jobs.

### **Appalachian Regional Commission**

The Appalachian Regional Commission (ARC) is a unique federal-state partnership providing social and economic support for a 13-state region stretching along the Appalachian Mountains from southern New York to northern Mississippi. The ARC was established by the U.S. Congress in 1965 and has worked to bring Appalachia's 22 million people into America's economic mainstream. In North Carolina, the program is administered through the Rural Economic Development Division to support economic development activities in 29 western counties: Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Davie, Forsyth, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yadkin, and Yancey counties.

### **B.1.12 North Carolina Division of Water Resources Public Water Supply Section**

The mission of the Public Water Supply (PWS) Section is to promote public health by ensuring that safe, potable water is available in adequate quantities to the residents and visitors of North Carolina served by public water systems by assuring that such systems are properly located, constructed, operated, and maintained. The PWS Section regulates public water systems within North Carolina. Public water systems are those which provide piped drinking water to at least 15 connections or 25 or more people 60 or more days per year. All PWS Section staff provide technical assistance, and PWS Section regional offices are a first point of contact for questions from public water systems. The PWS Section's website is: <http://deq.nc.gov/about/divisions/water-resources/drinking-water>

In addition, the PWS Section has a Capacity Development Program that was developed to promote technical, managerial and financial capacity of all community and non-transient non-community water systems. See Appendix B.2.12 for information about the Section's guidance document.

### **B.1.13 North Carolina League of Municipalities**

The North Carolina League of Municipalities (NCLM) is a nonpartisan association of municipalities in North Carolina. For more than 100 years, NCLM has promoted good government by: providing member services that strengthen and support excellence in municipal government; engaging members, staff and stakeholders in representing municipal issues and interests; and, developing municipal leaders who can address the needs and interests of their citizens. The mission of the League is to enhance the quality of life in municipalities through excellent municipal governance. The NCLM has developed "Vision 2030" to establish a vision of how cities and towns will operate in 2030. The NCLM website is: <http://www.nclm.org/>

### **B.1.14 North Carolina Local Government Commission**

In 1931 the North Carolina General Assembly established the Local Government Commission (LGC) to help address the problems in local government finance caused by the Great Depression. Currently, North Carolina has a larger percentage of units rated "AAA" by national bond rating agencies when compared to other states, and the debt of its local governments in general finds a significantly better reception on the national bond



markets than the national average. Many attribute this favored credit status, in part, to the work of the Local Government Commission.

The LGC, established by NCGS 159-3, is unique in the nation. It provides assistance to local governments and public authorities in North Carolina. It is staffed by the Department of State Treasurer. It assists units of local government with fiscal management and approves the issuance of debt for all units of local government.

The primary mission of the LGC is focused in three areas of responsibility and authority. First, a unit of government must seek LGC approval before it can borrow money. In reviewing each proposed borrowing, the LGC examines whether the amount being borrowed is adequate and reasonable for the projects and is an amount the unit can reasonably afford to repay. Second, once a borrowing is approved, the LGC is responsible for selling the debt (or bonds) on the unit's behalf; it is the combination of the power of approval with the power of sale that makes the LGC unique. Third, the LGC staff regulates annual financial reporting by oversight of the annual independent auditing of local governments, by monitoring the fiscal health of local governments and by offering broad assistance in financial administration to local governments. The LGC website is: <https://www.nctreasurer.com/slq/Pages/Local-Government-Commission.aspx>

### **B.1.15 North Carolina Rural Water Association**

The North Carolina Rural Water Association (NCRWA) is the leading provider of water and wastewater training and on-site managerial, financial, and technical assistance in the state. The NCRWA is a non-profit organization dedicated to helping its members attain the highest standard in drinking water and wastewater service. Members represent both community and non-community water and wastewater systems and are directly involved with the day to day operation of rural water and wastewater systems. The Association focuses on the needs of these systems and has developed a network of information and technical services available statewide. Although the list is too extensive to include every service, NCRWA has developed a reputation for assisting with just about any need a system has. The NCRWA website is: <http://www.ncrwa.com/>

### **B.1.16 North Carolina Waterworks Operators Association**

The North Carolina Waterworks Operators Association (NCWOA) has been the premier trainer of waterworks professionals for NC since 1939, comprised of industry leaders who volunteer to provide certification schools and continuing education opportunities. Annually, NCWOA conducts two regional well and surface water schools and offers a variety of seminars across the state to keep water industry professionals informed about new technology and advances in the water industry. The Association's website is: <http://ncwoa.com/>

### **B.1.17 Rural Community Assistance Partnership**

The Rural Community Assistance Partnership (RCAP) works in small, rural communities across the United States, its territories, and in tribal areas. Most of the communities where RCAP works are low-income and have a population under 2,500. RCAP's assistance enables communities to provide reliable, safe and clean supplies of drinking water and sanitary wastewater disposal systems. RCAP has six regional offices in the U.S. The RCAP website is: <http://rcap.org/>.

### **B.1.18 Southeast Rural Community Assistance Project**

The Southeast Rural Community Assistance Project (SERCAP) is the regional office of the RCAP (mentioned above) that serves North Carolina and six other states in the eastern U.S. It helps small rural towns and communities needing aid in upgrading their water and wastewater systems; provides training and technical assistance to rural residents for managerial issues, systems operation, and maintenance; and supports capacity building and economic development. To date, SERCAP has brought clean water and wastewater facilities to more than 450,000 residents in its seven state network. SERCAP also provides limited funding to communities for certain types of water and wastewater projects. The SERCAP website can be accessed here: <http://sercap.org/>.

### **B.1.19 U.S. Economic Development Administration**

The U.S. Economic Development Administration (EDA), a bureau of the U.S. Department of Commerce, is the only federal government agency focused exclusively on economic development. Its role is to foster regional economic development efforts in communities across the nation. Through strategic investments that foster job creation and attract private investment, EDA supports development in economically distressed areas. Guided by the basic principle that communities must be empowered to develop and implement their own economic development and revitalization strategies, EDA works directly with local economic development officials. In North Carolina, EDA works primarily with the N.C. Department of Commerce Rural Development Division. The EDA's website is: <https://www.eda.gov/>

### **B.1.20 University of North Carolina Environmental Finance Center**

The U.S. EPA supports a network of eight environmental finance centers (EFCs) located across the country. EFCs are university-based organizations that provide innovative solutions to communities to help manage the costs of environmental protection programs and activities. EPA provides partial funding for the EFCs. The state of North Carolina is fortunate to have the University of North Carolina Environmental Finance Center (UNC-EFC), which is dedicated to building the capacity of governments and other organizations to provide environmental programs and services in fair, effective, and financially sustainable ways through applied research, teaching, program design and partnerships. Its vision is to create communities with healthy environments maintained and improved by sustainable financing.

One of its major roles is to increase the capacity of other organizations to address the financial aspects of environmental protection and service delivery. For this reason, the Center provides most of its community training in a collaborative manner – partnering with established organizations that have environmental but not necessarily financial expertise. In addition to direct community outreach, the UNC-EFC works with decision-makers to assess the effectiveness of environmental finance policies at a regional or state level, and to improve those policies as a way of supporting local efforts. The UNC-EFC website is available here: <http://www.efc.sog.unc.edu/>

### **B.1.21 University of North Carolina School of Government**

The University of North Carolina's School of Government provides North Carolina's local and state government officials with nonpartisan legal, public administration, management, and financial expertise. It is the largest university-based local government training, advisory, and research organization in the United States. The mission of the School of Government is to improve the lives of North Carolinians by engaging

in practical scholarship that helps public officials and citizens understand and improve state and local government. It is the largest university-based local government training, advisory, and research organization in the United States. The website is: <https://www.sog.unc.edu/>

Each year, the school offers hundreds of courses, webinars, and specialized conferences for over 12,000 North Carolina public officials. Attendees include city and county managers, county commissioners, city council members, finance officers, planning officials, among many others.

The School’s faculty members respond to thousands of phone calls and e-mail messages each year about routine and urgent matters and also engage in long-term advising projects for local governing boards, legislative committees, and statewide commissions. In addition, faculty members annually publish numerous books, manuals, reports, articles, bulletins, and other print and online content related to state and local government.

One of the School’s blogs – Coates’ Canons: NC Local Government Law – provides information about a broad range of legal issues affecting local governments and other public agencies in North Carolina. The blog serves as a valuable source of information for elected officials, managers, department heads, and attorneys and for individuals and other public agencies. The blog is a joint effort of local government law faculty members at the School of Government and is available here: <http://canons.sog.unc.edu/>

**B.1.22 Water Environment Federation**

The Water Environment Federation (WEF) is a not-for-profit technical and educational organization founded in 1928 to protect public health and the environment. WEF’s mission is to connect water professionals, enrich the expertise of water professionals, increase the awareness of the impact and value of water, and provide a platform for water sector innovation. WEF’s diverse membership includes scientists, engineers, regulators, academics, utility managers, plant operators, and other professionals. WEF provides many resources that are available at <http://www.wef.org/about/>. The website contains links to information about utilities of the future (UTOF), energy and resource recovery, and many other timely topics.

**B.2 – Publications**

Many of the organizations and agencies listed above, as well as others, have produced and published manuals, guides, articles, and papers that address many of the key issues described in this Master Plan. The table below lists and briefly describes many publications. A more detailed description of each publication with link(s) to the resources is provided following the table.

Publication Title	Author(s)	Description	Section
Affordability and Capability Issues of Small Water and Wastewater Systems: A Case for Regionalization of Small Systems	RCAP	Addresses many of the potential barriers associated with mergers/ regionalization	B.2.1
Building Better Water Rates for an Uncertain World: Balancing Revenue Management, Resource Efficiency, and Fiscal Sustainability	Alliance for Water Efficiency	Provides practical guidance to help water managers understand, design, and implement rate structures that contribute to revenue stability, support long-term financial health, and incentivize efficiency	B.2.2

Publication Title	Author(s)	Description	Section
Controlling Water Loss More Critical Than Ever	AWWA	Addresses adopting water loss control programs	B.2.3
Effective Utility Management: A Primer for Water and Wastewater Utilities	USEPA, et. al.	Known as “The EUM Primer”; describes the Ten Attributes of Effectively Managed Utilities and Five Keys to Management Success	B.2.4
Enhancing Performance of Small Water Systems through Shared Management	UNC-EFC	Examines a non-physical form of consolidation – the consolidation of water management and operations – but not ownership, with systems being served by regional teams of highly trained personnel	B.2.5
Implementing Asset Management: A Practical Guide	WEF et. al.	Step-by-step guide for utilities to improve infrastructure asset management	B.2.6
Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance	AWWA et al.	Known as “The Asset Management Handbook”	B.2.7
Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Own Water Utility Roadmap	USEPA	Assists utility leaders with implementing proven and effective practices to proactively address challenges, improve operations and move toward sustainability	B.2.8
Opportunities for Infrastructure Reform: Improving America's Procurement System	Brookings Institution	Reviews collaboration between the public and private sector	B.2.9
Performance Benchmarking for Effectively Managed Water Utilities	Water Research Foundation	Provides metrics and strategies to achieve performance excellence	B.2.10
Planning for Sustainability: A Handbook for Water and Wastewater Utilities	USEPA	Steps utilities can take to develop processes to ensure infrastructure investments are cost-effective	B.2.11
Public Water System Capacity Development Guidance	Division of Water Resources Public Water Supply Section	Provides background information about the purpose and objectives of NC’s Capacity Development Program and the criteria used by the Department to evaluate technical, managerial, and financial capacity	B.2.12

Publication Title	Author(s)	Description	Section
Rural and Small Systems Guidebook to Sustainable Utility Management	USEPA and USDA	Uses strategies from “The EUM Primer” to help managers of rural and small water/wastewater systems develop an operations management work plan	B.2.13
Taking the Next Step: Findings of the Effective Utility Management Review Steering Group	USEPA, et. al.	Contains changes and updates to “The EUM Primer” to better reflect the changing operating context of utilities	B.2.14
Water Infrastructure Asset Management: Adopting Best Practices to Enable Better Investments	McGraw-Hill Construction	Explores trends in asset management to determine practices that utilities are implementing	B.2.15
Water Resources Utility of the Future: A Blueprint for Action	WEF	Links diverse resource recovery activities and innovative approaches to water resource management	B.2.16

**B.2.1 Affordability and Capability Issues of Small Water and Wastewaters Systems: A Case for Regionalization of Small Systems**

Many of the potential barriers associated with mergers/regionalization are addressed in this publication by the Rural Community Assistance Partnership, available here:

<http://rcap.org/resource/affordability-and-capacity-issues-of-small-water-and-wastewater-systems-a-case-for-regionalization-of-small-systems/>

**B.2.2 Building Better Water Rates for an Uncertain World: Balancing Revenue Management, Resource Efficiency, and Fiscal Sustainability**

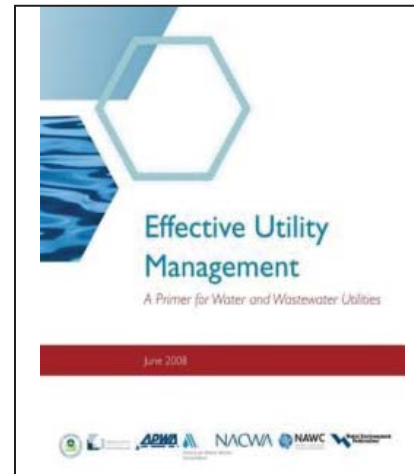
In 2014, the Alliance for Water Efficiency published this handbook to provide practical guidance to help water managers understand, design, and implement rate structures that contribute to revenue stability, support long-term financial health, and incentivize efficiency. It provides tools for designing better rate structures and for quantifying and evaluating the impact of those rates to promote better decision-making. It also contains communication guidance for different internal and external audiences, including management within the utility, the general public, and boards. It is available here: <http://www.financingsustainablewater.org/>

**B.2.3 Controlling Water Loss More Critical Than Ever**

The AWWA Water Loss Control Committee’s article explains why adopting water loss control programs can be of help to utilities. It is available here: <http://www.awwa.org/publications/connections/connections-story/articleid/3672/controlling-water-loss-more-critical-than-ever.aspx>

### B.2.4 Effective Utility Management: A Primer for Water and Wastewater Utilities

The U.S. Environmental Protection Agency (EPA) and organizations representing North American water and wastewater utilities have long recognized the challenges water sector utilities face and have identified effective utility management practices to address them. In 2006, EPA and six organizations including the American Water Works Association (AWWA), Water Environment Federation (WEF), and the National Association of Clean Water Agencies (NACWA) formed the Effective Utility Management Collaborating Organizations to “formalize a collaborative effort among the organizations in order to promote effective utility management”. The group developed a framework for effectively managed water utilities and published “**Effective Utility Management: A Primer for Water and Wastewater Utilities (the EUM Primer)**” in 2008. This document identified Ten Attributes of Effectively Managed Water Utilities as well as Five Keys to Management Success and is available here: <http://www.watereum.org/resources/>. The same link also contains a Resource Toolbox that provides a compilation of resources from the organizations collaborating on the Effective Utility Management effort and is organized according to the ten attributes of effectively managed utilities and the five keys to management success. The homepage for EUM is: <http://www.watereum.org/>



### B.2.5 Enhancing Performance of Small Water Systems through Shared Management

This white paper prepared by the UNC-EFC identifies opportunities to enhance management capacity for small systems through shared management, a non-structural form of regionalization, and would not require owners to give up ownership of their systems. It provides background on aspects of small systems, performance, and regionalization in the state. It then explores the opportunities for cost savings through capturing economies of scale in this unique alternative by recognizing the tasks and duties of running a water system that would be affected by consolidation of management and operations. The paper is available here: <http://www.efc.sog.unc.edu/sites/www.efc.sog.unc.edu/files/2015/SmallWaterSystemsSharedManagement.pdf>

### B.2.6 Implementing Asset Management: A Practical Guide

The Water Environment Federation (WEF), the Association of Metropolitan Water Agencies (AMWA), and the National Association of Clean Water Agencies (NACWA) collaborated on this step-by-step guide for utilities to assist in improving the management of their infrastructure assets. The concepts and processes presented are applicable to utilities of all sizes. Utilities can address their infrastructure assets at a broad, system-wide level or can drill-down to individual assets components and elements. The guide is available, for a fee, here: <https://www.e-wef.org/Store/ProductDetails.aspx?productId=4130>

### B.2.7 Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance

The Water Environment Federation (WEF), the Association of Metropolitan Water Agencies (AMWA), the National Association of Clean Water Agencies (NACWA) and the American Water Works Association (AWWA) collaborated on this publication which is often referred to as the "Asset Management Handbook". It is available here: <https://www.e-wef.org/Store/ProductDetails.aspx?productId=4131>

### B.2.8 Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Own Water Utility Roadmap

In 2014, the U.S. EPA published a report designed to assist water sector utilities of various sizes in becoming more sustainable. The purpose of this document is to assist utility leaders with implementing proven and effective practices over time to improve their operations and move toward sustainability at a pace consistent with their needs and the needs of their communities. It provides utility leaders with a cohesive structure to help them address various challenges proactively and with confidence. It is available here:

[https://www.epa.gov/sites/production/files/2015-04/documents/sustainable\\_practices\\_utilities\\_roadmap\\_crwu.pdf](https://www.epa.gov/sites/production/files/2015-04/documents/sustainable_practices_utilities_roadmap_crwu.pdf)

### B.2.9 Opportunities for Infrastructure Reform: Improving America's Procurement System

This Brookings Institution's report suggests that collaboration between the public and private sector can deliver better projects. Public-private partnerships can provide opportunities for efficient risk transfer and allow the partners to focus their work on creating a better infrastructure project. Visionary leadership, a talented pool of private and public sector professionals, and increased collaboration can make public-private partnerships more effective. The report is available here:

<http://www.brookings.edu/research/reports/2015/09/30-infrastructure-reform-procurement-puentes-sabol>

### B.2.10 Performance Benchmarking for Effectively Managed Water Utilities

Despite the number of effective utility management related documents available, the Water Research Foundation (WRF) found that there were no specific or discrete recommendations on how utilities would develop and implement the Ten Attributes of Effectively Managed Water Utilities. In 2014, the WRF developed a structured benchmarking exercise to help utilities identify performance metrics that can be scored to guide the development of strategies to achieve performance excellence, and is aligned with the EUM Primer. The document identifies practice areas used by water and wastewater utilities to support each attribute, designed to help utilities conduct a self-assessment of any or all of the ten attributes. Performance measures are defined so that utilities can track their progress in achieving goals. It is available here: <http://www.waterrf.org/Pages/Projects.aspx?PID=4313>

### B.2.11 Planning for Sustainability: A Handbook for Water and Wastewater Utilities

The U.S. EPA published this Handbook which builds upon the EUM Primer Ten Attributes of Effectively Managed Water Utilities. It describes steps utilities can undertake to enhance their planning processes to ensure that water infrastructure investments are cost-effective over their life-cycle, resource efficient, and support community goals. Developed after extensive consultation and input from utilities, states, and other stakeholders, the Handbook is organized around a series of Core Elements, including:

- Setting utility sustainability goals and objectives that also support relevant community goals;
- Analyzing a range of alternatives, including green infrastructure and other innovative approaches, based on full life-cycle costs; and
- Implementing a financial strategy, including adequate rate structures, to ensure the alternatives selected are sufficiently funded, operated, maintained, and replaced over time.

The Handbook is available here: [https://www.epa.gov/sites/production/files/2015-04/documents/planning\\_for\\_sustainability\\_handbook\\_crwu.pdf](https://www.epa.gov/sites/production/files/2015-04/documents/planning_for_sustainability_handbook_crwu.pdf)

### B.2.12 Public Water System Capacity Development Guidance

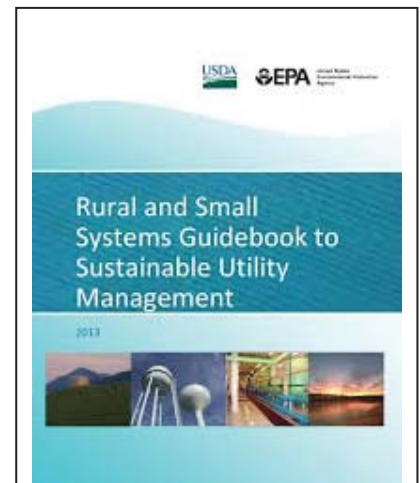
The NC Division of Water Resources Public Water Supply (PWS) Section developed a guidance document to provide background information about the purpose and objectives of NC's Capacity Development Program. Capacity development is defined as the process of a water system becoming self-sustaining in a changing environment by acquiring and maintaining adequate technical, managerial, financial, and operational capabilities to enable it to consistently provide safe drinking water meeting all state and national drinking water regulations reliably on a long-term basis. A system has developed capacity when it has acquired, and can maintain, adequate technical, managerial, financial, and operational capabilities to be self-sustaining for an indefinite period of time. The Guidance is available here: <https://ncdenr.s3.amazonaws.com/s3fs-public/Water%20Quality/capacitydevguide.pdf>

As described in the guidance document, water systems submitting plans and specifications for review perform a self-assessment of managerial capacity known as a water system management plan and certify that the system has an operation and maintenance plan in place. Water systems regulated by the Local Government Commission and Utilities Commission provide financial certification from those agencies. The remaining community and non-transient non-community water systems are typically quite small and work with the PWS Section to provide streamlined financial information which help predict operating costs and depreciation.

### B.2.13 Rural and Small Systems Guidebook to Sustainable Utility Management

In 2013, the U.S. EPA and U.S. Department of Agriculture (USDA) adapted many of the ideas from The EUM Primer, including the Ten Attributes of Effectively Managed Water Utilities, to help managers of rural and small water and wastewater systems develop a work plan to effectively manage their operations. The publication contains a step by step approach to create a framework for organizational management that includes financial viability, infrastructure stability, and stakeholder understanding and support. In addition, the guidebook itself contains dozens of references and links to additional information and guidance specifically for small systems. It available here:

[http://search.usa.gov/search?query=guidebook+to+sustainable+utility+management&op=Search&affiliate=usda-rd&\\_ga=1.142067186.1788800348.1470168004](http://search.usa.gov/search?query=guidebook+to+sustainable+utility+management&op=Search&affiliate=usda-rd&_ga=1.142067186.1788800348.1470168004)



### B.2.14 Taking the Next Step: Findings of the Effective Utility Management Review Steering Group

In 2015, the same organizations that developed The EUM Primer asked a Steering Group of utility and state leaders to review the Effective Utility Management framework. The group discussed the ways in which the operating context of utilities had changed since 2008 and recommended changes to the original EUM materials. The group also held two national webinars with over 200 participants each, including utility managers, operators, consultants, and assistance providers. The publication was made available in February 2016 at this location:

[http://www.awwa.org/Portals/0/files/legreg/documents/201602\\_EUM\\_Review\\_Report.pdf](http://www.awwa.org/Portals/0/files/legreg/documents/201602_EUM_Review_Report.pdf)



### B.2.15 Water Infrastructure Asset Management: Adopting Best Practices to Enable Better Investments

In 2012, McGraw-Hill Construction conducted a Water Utility Asset Management Study to explore trends in U.S. and Canadian asset management and to help determine what utilities were implementing in the field. The report is available here:

<http://www.newea.org/wp-content/uploads/2014/11/Water-Infrastructure-Asset-Management-SMR-2013.pdf>

### B.2.16 Water Resources Utility of the Future: A Blueprint for Action

The Water Environment Federation (WEF) defines and ties together diverse resource recovery activities and innovative approaches, many of which were never contemplated, and likely could never have been foreseen, 40 years ago when the Clean Water Act was enacted in this publication. It is available here:

[http://www.nacwa.org/index.php?option=com\\_content&view=article&id=1604&Itemid=250](http://www.nacwa.org/index.php?option=com_content&view=article&id=1604&Itemid=250)

## B.3 – Tools and Webinars

Many of the organizations and agencies listed above, as well as others, have produced tools, webinars and videos that address many of the key issues described in this Master Plan. The table below lists and briefly describes several resources, and a more detailed description with link(s) to the resources is provided following the table.

Name of Tool / Resource	Type of Resource	Author(s)	Description	Section
AWWA Water Loss Control Committee Free Water Audit Software	Spreadsheet-based Tool	AWWA	Water audit tool to help quantify and track water losses	B.3.1
The Basics of Financial Management for Small-Community Utilities	Webinar	RCAP	An overview of financial management for small drinking water and wastewater utilities	B.3.2
Financial Health Checkup for Water Utilities	Calculator	UNC-EFC	Tool to assess the financial performance of water and/or wastewater utility fund; free assistance is offered for small water systems	B.3.3
Performance Benchmarking for Effectively Managed Water Utilities Web-based Tool and Webcast	Web-based Tool and Webcast	Water Research Foundation	Tool and webcast to be used for performance benchmarking	B.3.4

Name of Tool / Resource	Type of Resource	Author(s)	Description	Section
Rate Approval Process Communication Strategy and Toolkit	Communication Tools	UNC-EFC	Communication strategies and specific messages that utilities can use to gain support during a rate approval process	B.3.5
Tool for Risk Management of Water Utility Assets	Spreadsheet-based Tool	Global Water Research Coalition, et. al.	Simple water industry risk management tool	B.3.6
Water and Wastewater Rates Dashboard	Interactive Dashboard	UNC-EFC	Interactive dashboard designed to assist utility managers and local officials with analyzing residential water and wastewater rates	B.3.7
Water and Wastewater Utility Operation and Management for Small Communities	Video-based Training Program	USEPA	Modules covering asset management, rate structure development and more, including case studies	B.3.8
WaterClips	Video	UNC-EFC et. al.	Videos highlighting important financial considerations	B.3.9
Workshop in a Box: Sustainable Management of Rural and Small Systems Workshops	Tool	USEPA and USDA	Steps to create a framework for financial viability, infrastructure stability, and stakeholder understanding and support	B.3.10

**B.3.1 AWWA Water Loss Control Committee Free Water Audit Software**

The AWWA makes available at no cost this spreadsheet-based water audit tool designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. While very useful, it does not take the place of a full-scale, comprehensive water audit. It is available at: <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>

**B.3.2 The Basics of Financial Management for Small-Community Utilities: A Webcast on Financial Management**

The Rural Community Assistance Partnership developed this two-part webinar to provide an overview of financial management for small-community drinking water or wastewater utilities, from developing and balancing an expense budget to estimating and collecting revenue. This primer is ideal for a board member

of a utility who needs to understand the financial aspects of a utility's operations. The guide explains in simple, easy-to-understand terms how to read and interpret common financial statements so more informed decisions can be made using that information. The webcasts are available here:

<http://rcap.org/resource/the-basics-of-financial-management-for-small-community-utilities-a-webcast-on-financial-management-part-1/>

### **B.3.3 Financial Health Checkup for Water Utilities**

This tool is designed to assess the financial performance of a water and/or wastewater utility fund. Financial data readily available in annual financial statements are copied into this tool, which computes key financial indicators that measure a variety of important metrics, such as the ability to pay debt service, availability of cash to pay for operations and maintenance, the sufficiency of revenues generated, etc. Each indicator is explained and targets can be set for each metric in order to compare a fund's actual performance against the goals set by the utility's governing body. The tool demonstrates the financial strengths and weaknesses of a utility fund in the past 5 years. The tool is free to download and use. It is designed to be used by utility professionals, governing body members, government staff, and technical assistance providers working with small water systems.

In addition, the UNC-EFC offers free assistance to small water systems in using this tool and interpreting the results. Water systems serving up to 10,000 people are invited to contact the UNC-EFC to schedule a time for the EFC to assist in using this tool to assess the water system's fund performance in recent years. The EFC will help populate the tool, go over how to use the tool, review the results and have a discussion about what the water system can or should do going forward to strengthen the financial performance of the water fund. This could lead to further discussions and direct assistance for small water systems, free of charge to the systems, thanks to funding from the U.S. EPA.

The Financial Health Checkup tool is available here:

<http://www.efc.sog.unc.edu/reslib/item/financial-health-checkup-water-utilities>

### **B.3.4 Performance Benchmarking for Effectively Managed Water Utilities Web-based Tool and Webcast**

As a companion to the benchmarking document, the Water Research Foundation published a web-based tool aligned with the EUM Primer. The tool identifies practice areas used by water and wastewater utilities to support each of the Ten Attributes of Effectively Managed Water Utilities. It is designed to help utilities conduct a self-assessment of any or all of the ten attributes. Performance measures are defined so that utilities can track their progress in achieving goals. The tool is accompanied by a User's Guide (PowerPoint presentation) that will help in conducting internal performance benchmarking. The web-based tool (in Excel) is available here:

<http://www.waterrf.org/resources/pages/PublicWebTools-detail.aspx?ItemID=26>

A webcast presented on March 6, 2014 can be located here:

<http://www.waterrf.org/resources/webcasts/pages/PublicWebcasts-Detail.aspx?ItemID=23>

### B.3.5 Rate Approval Process Communication Strategy and Toolkit

Water utility managers address numerous issues which can create fiscal and public communication challenges and must also address rate increases with governing boards while keeping the focus on environmental stewardship, public health and good resource management. These strategies and tools assist in preparing for and presenting rate increase requests. The communication strategies and messages are complemented with a set of scalable and ready-to-use products (tools) to support utilities and governing boards throughout this process. The toolkit is available here:

<http://www.efc.sog.unc.edu/project/rate-approval-process-communication-strategy-and-toolkit>

### B.3.6 Tool for Risk Management of Water Utility Assets

The Global Water Research Coalition, the AWWA Research Foundation, the Water Environment Research Foundation, and the Water Services Association of Australia developed a simple risk management tool. The participants reviewed current practices in the water and other industries and developed an approach to risk management that was suitable for use in the water industry. It is available here:

<http://simple.werf.org/simple/media/documents/RiskMgt/Volume%201%20-%20Tool%20for%20Risk%20Management%20of%20Utility%20Assets.pdf>

### B.3.7 Water and Wastewater Rates Dashboard

This interactive rates and financial benchmarking dashboard is designed to assist utility managers and local officials with analyzing residential water and wastewater rates against multiple characteristics, including utility finances, system characteristics, customer base socioeconomic conditions, and geography. Financial indicators are added in a separate tab. This dashboard was funded through a cooperative agreement with the U.S. Environmental Protection Agency, and funded in part through North Carolina's Drinking Water State Revolving Fund program. The dashboard can be accessed here: <http://www.efc.sog.unc.edu/reslib/item/north-carolina-water-and-wastewater-rates-dashboard>

### B.3.8 Water and Wastewater Utility Operation and Management for Small Communities

The U.S. EPA developed a video-module training program covering topics such as asset management and rate structure development; it includes case studies and is available here:

<https://www.epa.gov/small-and-rural-wastewater-systems/tools-training-and-technical-assistance-small-and-rural#training>

### B.3.9 WaterClips

The UNC-EFC collaborated with the WRF to produce a series of short videos, called WaterClips, designed with water utility governing boards in mind. The series describes the many challenges water utilities face through clear explanations and visual representations. The videos highlight important financial considerations for the water industry including financial benchmarking, new business models, and credit rating agency considerations. The videos were recently used by the Albuquerque-Bernalillo County Water Utility Authority (New Mexico) in a large scale customer engagement campaign. The videos are available here: <http://www.waterrf.org/Pages/Projects.aspx?PID=4366> or through the following links:

- [Whiteboard Video: Financial Benchmarking for the Water Industry](#)
- [Whiteboard Video: New Business Models for the Water Industry](#)
- [Whiteboard Video: Credit Rating Agency Considerations for the Water Industry](#)

### B.3.10 Workshop in a Box: Sustainable Management of Rural and Small Systems Workshops

As a companion to the Rural and Small Systems Guidebook to Sustainable Utility Management, the U.S. EPA and USDA also developed these materials to help systems and technical assistance providers work with systems using the Guidebook; it is available here:

[http://search.usa.gov/search?query=guidebook+to+sustainable+utility+management&op=Search&affiliate=usda-rd&\\_ga=1.142067186.1788800348.1470168004](http://search.usa.gov/search?query=guidebook+to+sustainable+utility+management&op=Search&affiliate=usda-rd&_ga=1.142067186.1788800348.1470168004)

## B.4 – Partnerships and Education

Utility governing boards and local governments can benefit from partnering with other public agencies on issues such as economic development, regional/shared solutions for organizational and financial management, and from educational opportunities for public officials and staff. The table below lists and briefly describes some of these resources, and a more detailed description with link(s) to the resources is provided following the table.

Organization / Agency Name	Type of Support	Description	Section Reference
Economic Development Partnership of North Carolina	Partnership	Oversees NC’s efforts in business and job recruitment/retention; utility providers are key partners since the availability of water supplies, wastewater treatment capacity and overall utility infrastructure capacity are crucial to keeping, attracting and expanding businesses	B.4.1
North Carolina Community College System	Education	Some campuses offer a public administration track that prepares individuals for entry into state and local government management positions	B.4.2
University of North Carolina System – Commerce Fellows / Building Community through Capacity and Knowledge program	Education	A collaborative effort enabling local governments to engage in high-quality professional development and training especially for improving opportunities for low- to moderate-income individuals	B.4.3

### B.4.1 Economic Development Partnership of North Carolina

A strong relationship exists between comprehensive infrastructure planning and economic development. The North Carolina Department of Commerce advances its mission to improve the economic well-being and quality of life for all North Carolinians with the collaborative assistance of a wide variety of partners and allies. Seven Regional Partnership Organizations across the state are dedicated to working to advance economic development; the website is <http://www.nccommerce.com/about-our-department/partners-allies>.

The Economic Development Partnership of North Carolina is a 501(c)(3) nonprofit corporation that oversees the state’s efforts in business and job recruitment and retention, international trade, and tourism, film and sports development. Emphasizing customer service, the Partnership fosters collaboration between businesses

and government, local and regional economic development organizations, other businesses, community leadership and the state's universities and community colleges. The partnership also provides access to research, innovative technology and research and a robust analysis of facilities and sites available for relocation.

Utility providers play an important role with these organizations because the availability of water supplies, wastewater treatment capacity and overall utility infrastructure capacity and its condition are keys to keeping, attracting or expanding businesses.

### **B.4.2 North Carolina Community College System**

Several campuses of the North Carolina Community College System offer a public administration track or concentration within their Business Administration programs. The Public Administration track prepares students for entry into management positions in state and local governments and not-for-profit organizations and provides education for current government employees. Course work includes the study and practical application to decision-making, ethics, organizational theories, public finance, budgeting and other governmental issues. The website is <http://www.nccommunitycolleges.edu/>.

### **B.4.3 University of North Carolina System – Commerce Fellows / Building Community through Capacity and Knowledge**

This program is a collaboration among the NC Department of Commerce Rural Economic Development Division CDBG program, Appalachian State University, East Carolina University, and UNC-Chapel Hill School of Government. The Department of Commerce offers grants to enable local governments to engage in high-quality professional development and training with an eye toward improving opportunities for low-to-moderate income individuals. These grants are designed to facilitate capacity-building and will enable local administrators to participate in professional development courses/seminars at one of these three universities. More information can be found here: <https://www.nccommerce.com/rd>

## **B.5 – Funding Resources**

Funding resources are available from several state and federal funding programs. Each program has unique eligibility requirements, application processes and deadlines, match requirements and other characteristics.

**The UNC-EFC provides a table that lists the primary public funding sources for drinking water, wastewater and stormwater projects in North Carolina.** The table is updated frequently, since contact information and details for the programs change. The table can be accessed here: <http://www.efc.sog.unc.edu/reslib/item/north-carolina-water-wastewater-and-stormwater-funding-sources>.

The table below lists and briefly describes the primary public funding sources for drinking water, wastewater and stormwater projects in North Carolina many organizations. A more detailed description of each organization with link(s) to websites is provided following the table.

Resource Name	Description	Section Reference
Golden LEAF Foundation	Funds projects with the most potential for bolstering NC's long-term economy, especially in tobacco-dependent, economically distressed, and/or rural communities	B.5.1
NC Department of Commerce Rural Economic Development Division	Created in 2013 to improve the economic well-being and quality of life of North Carolinians with particular emphasis on rural communities	B.5.2
NC Department of Environmental Quality Division of Water Infrastructure	Administers five funding programs that include both loans and grants: <ul style="list-style-type: none"> <li>• Federal-state funded Clean Water State Revolving Fund (CWSRF)</li> <li>• Federal-state funded Drinking Water State Revolving Fund (DWSRF)</li> <li>• Federal funded Community Development Block Grant-Infrastructure (CDBG-I)</li> <li>• State funded State Wastewater Reserve</li> <li>• State funded State Drinking Water Reserve</li> </ul>	B.5.3
Southeast Rural Community Assistance Project (SERCAP)	Low-interest loans to low-income rural communities for predevelopment costs, system upgrades or construction of new water and wastewater facilities	B.5.4
U.S. Department of Agriculture Rural Development (USDA-RD)	The only federal program focused exclusively on rural water and waste infrastructure needs of rural communities with populations of 10,000 or less; provides funding for construction of water and waste facilities in rural communities	B.5.5

### B.5.1 Golden LEAF Foundation

In 1999, the North Carolina legislature created the Golden LEAF Foundation to administer one-half of North Carolina's share of the Master Settlement Agreement with cigarette manufacturers in accordance with the court consent decree between North Carolina and the manufacturers. From its inception, Golden LEAF has been committed to using the funds entrusted to it for projects with the most potential to bolster North Carolina's long-term economy, especially in tobacco-dependent, economically distressed, and/or rural communities. Water and sewer and other public infrastructure projects are funded through the Open Grants Program and the Economic Catalyst Program and through special initiatives such as the Community-Based Grantsmaking Initiative.

Infrastructure projects typically have job creation as a primary projected outcome and the companies that will create the jobs are usually known. Information about the requirements for the grant programs and how to apply is available at the Foundation’s web site (<http://www.goldenleaf.org/>). Please contact Mr. Ted Lord, Vice President of Programs/Staff Attorney, at [tlord@goldenleaf.org](mailto:tlord@goldenleaf.org), with any questions.

### **B.5.2 North Carolina Department of Commerce, Rural Economic Development Division**

The Department’s Rural Economic Development Division was created in 2013 to improve the economic well-being and quality of life of North Carolinians with particular emphasis on rural communities. The Division has a number of grant programs and planning services to assist rural counties and rural census tracts. In particular, the Economic Infrastructure Program administered by the Rural Grants/Programs Section of the Division provides grants to local governments to assist with infrastructure projects that will lead to the creation of new, full-time jobs (<http://www.nccommerce.com/rd>). For more information, contact Ms. Melody Adams at [melody.adams@nccommerce.com](mailto:melody.adams@nccommerce.com).

### **B.5.3 North Carolina Department of Environmental Quality Division of Water Infrastructure**

At the same time that the State Water Infrastructure Authority was created by the North Carolina General Assembly, the Division of Water Infrastructure was created within the North Carolina Department of Environmental Quality. The goal of this action was to consolidate the major water- and wastewater-related infrastructure funding programs within one division and one department. The Division website is: <http://portal.ncdenr.org/web/wi/home>

The five funding programs are:

Federal-state funded Clean Water State Revolving Fund (CWSRF)

- Federal-state funded Drinking Water State Revolving Fund (DWSRF)
- Federal funded Community Development Block Grant-Infrastructure (CDBG-I)
- State funded State Wastewater Reserve
- State funded State Drinking Water Reserve

For more information, contact:

- Mr. Seth Robertson regarding the State Revolving Fund and State Reserve programs at [seth.robertson@ncdenr.gov](mailto:seth.robertson@ncdenr.gov).
- Ms. Julie Cubeta regarding the Community Development Block Grant-Infrastructure Program at [julie.cubeta@ncdenr.gov](mailto:julie.cubeta@ncdenr.gov).

### **B.5.4 Southeast Rural Community Assistance Project**

The Southeast Rural Community Assistance Project (SERCAP) provides a very limited amount of funding for certain types of projects. Its Loan Fund program provides low-interest loans to low-income rural communities for predevelopment costs, system upgrades and new construction of water and wastewater services and facilities. Loan amounts range from \$1,000 to \$150,000, and interest rates range from 4% to 7%. A household well water system loan program is available to assist low-to-moderate income individuals needing loans to construct, refurbish and service their individual household well systems. The SERCAP website is: <http://sercap.org/>. For more information, contact Mr. John Crowder at [jcrowder@sercap.org](mailto:jcrowder@sercap.org).



### B.5.5 U.S. Department of Agriculture Rural Development

USDA Rural Development (USDA-RD) provides funding for the construction of water and waste facilities in rural communities and is the only federal program exclusively focused on rural water and waste infrastructure needs of rural communities with populations of 10,000 or less. The Water & Waste Disposal Loan & Grant program provides funding for clean and reliable drinking water systems and sanitary sewage disposal in eligible rural areas. The website of the North Carolina office of the USDA-RE is: <http://www.rd.usda.gov/nc>. More information can be obtained by contacting Mr. Dennis Delong at [dennis.delong@nc.usda.gov](mailto:dennis.delong@nc.usda.gov).

## B.6 – Design-Build and Public-Private Partnerships

In August 2013, North Carolina enacted legislation that opened the doors of public contracting to the Design-Build Method of procuring services, and to a new financing mechanism known as the Public-Private Partnership. The legislation is Session Law 2013-401 (House Bill 857), “An Act Authorizing Public Contracts to Utilize the Design-Build Method or Public-Private Partnership Construction Contracts” and can be located here: <http://www.ncga.state.nc.us/Sessions/2013/Bills/House/PDF/H857v7.pdf>

### B.6.1 Design-Build Method

The legislation acknowledges that, in some instances, more efficient delivery of quality design and construction can be realized when a governmental entity is authorized to utilize an integrated approach for the design and construction of a project under one contract with a single point of responsibility. In addition, the design-build integrated approach to project delivery, based upon qualifications and experience, in some instances, can yield improved collaboration among design professionals, builders, and owners throughout the entire process and deliver a quality and cost-efficient project.

### B.6.2 Public-Private Partnerships

Regarding public-private partnerships (P3s), the legislation acknowledges that some governmental entities within the state lack the financial resources required to undertake capital construction projects that are necessary to satisfy critical public needs. In addition, partnerships with private developers may offer an effective financial mechanism for governmental entities to secure public projects to satisfy critical public needs that cannot otherwise be met.

The legislation defines a public-private project as a capital improvement project undertaken for the benefit of a governmental entity and a private developer pursuant to a development contract that includes construction of a public facility or other improvements, including paving, grading, utilities, infrastructure, reconstruction, or repair, and may include both public and private facilities.

Local government units may be interested in P3s for several reasons such as those described throughout this Master Plan:

- Traditional funding sources such as grants and loans are limited
- Financing through bonds may not be feasible
- There are competing budget pressures such as for police, fire, economic development, etc.
- There may be an urgent need for water infrastructure projects, possibly due to past deferred investments

### C.1 North Carolina General Statutes Chapter 159 – Local Government Finance

In order to assist local governments in carrying out their financial management responsibilities for water and sewer utilities, the North Carolina General Assembly has enacted statutes that govern local government finance – Chapter 159 of the North Carolina General Statutes. Together, these statutes are designed to ensure that a local government has a water and sewer utility fund that is kept separate from the general fund; that the utility fund has sufficient resources to meet all of its operating expenses, capital outlay, and debt service obligations; and that it reports annually to the LGC.

Selected North Carolina General Statutes	Area of Coverage
NCGS 159-26	Governs accounting systems and provides that each utility owned or operated by a unit of local government must establish and maintain a separate fund that is specific to that utility
NCGS 159-13(b)(14)	Governs budget ordinances and requires that money in a utility fund cannot be appropriated to another fund unless it is demonstrated through the budget process that the utility fund will meet all of its operating expenses, capital outlay, and debt service obligations
NCGS 159-25	Addresses the duties of finance officers and the requirements for the accounting system and internal control procedures
NCGS 159-34	Requires local government units to have an audit prepared at the end of each fiscal year and to submit the audits to the LGC; the financial statements must be prepared in accordance with generally accepted accounting principles (GAAP)

### C.2 Governmental Accounting Standards Board

The Governmental Accounting Standards Board (GASB) is an independent organization that establishes and improves standards of accounting and financial reporting for U.S. state and local governments. It was established in 1984 by agreement of the Financial Accounting Foundation and ten national associations of state and local government officials. GASB is not a government entity but it is recognized by governments, the accounting industry, and the capital markets as the official source of generally accepted accounting principles (GAAP) for state and local governments. <http://www.gasb.org/home>

Accounting and financial reporting standards designed for the government are essential because governments are fundamentally different from for-profit businesses. The GASB standards are not federal laws or regulations and the organization does not have enforcement authority. However, compliance with GASB’s standards is required directly by NCGS 159-25(a)(1) and through the audit process as required by NCGS 159-34 because auditors must render opinions on the fairness of financial statement presentations in conformity with GAAP.

GASB Statement No. 34 is entitled “Basic Financial Statements – and Management’s Discussion and Analysis – for State and Local Governments” and was issued in June 1999. The Statement established new financial reporting requirements for state and local governments throughout the U.S. It requires the government’s financial manager to discuss and analyze the government’s financial performance for the year and provide readers with an objective and easily readable analysis to help them assess whether the government’s financial position has improved or deteriorated as a result of the year’s operations.

## Appendix D – Attributes of Effectively Managed Water Sector Utilities

A comprehensive description of a viable utility is found in the 2016 publication “Taking the Next Step: Findings of the Effective Utility Management Review Steering Group” and includes the Ten Attributes of Effectively Managed Water Sector Utilities. For utility managers seeking to improve organization-wide performance, the Attributes encompass operations, infrastructure, customer satisfaction, community welfare, natural resource stewardship, and financial performance that are applicable to all water and wastewater utilities.

[http://www.awwa.org/Portals/0/files/legreg/documents/201602\\_EUM\\_Review\\_Report.pdf](http://www.awwa.org/Portals/0/files/legreg/documents/201602_EUM_Review_Report.pdf)

The ten attributes align with the three focus areas of this master plan:



### Infrastructure Management



**Organizational Management** – it is important to note that five of the ten attributes relate to organizational management and, of the five, four deal directly with communication



### Financial Management

The ten attributes are:

1. **Product Quality:** Produces “fit for purpose” water that meets or exceeds full compliance with regulatory and reliability requirements and consistent with customer, public health, ecological, and economic needs. Products include treated drinking water, treated wastewater effluent, recycled water, stormwater discharge, and recovered resources.
2. **Customer Satisfaction:** Provides reliable, responsive, and affordable services in line with explicit, customer-derived service levels. Utilizes a mix of evolving communication technologies to understand and respond to customer needs and expectations, including receiving timely customer feedback and communicating during emergencies. Provides tailored customer service and outreach to traditional residential, commercial, and industrial customers, and understands and exercises as appropriate the opportunities presented by emergent customer groups (e.g., high strength waste producers, power companies).
3. **Employee and Leadership Development:** Recruits and retains a workforce that is competent, motivated, adaptive, and safety-focused. Establishes a participatory, collaborative organization dedicated to continual learning, improvement, and innovation. Ensures employee institutional knowledge is retained, transferred, and improved upon over time. Provides a focus on and emphasizes opportunities for professional and leadership development, taking into account the differing needs and expectations of a multi-generational workforce and for resource recovery facilities. Establishes an integrated and well-coordinated senior leadership team.
4. **Operational Optimization:** Ensures ongoing, timely, cost-effective, reliable, and sustainable performance improvements in all facets of its operations in service to public health and environmental protection. Makes effective use of data from automated and smart systems, and learns from performance monitoring. Minimizes resource use, loss, and impacts from day-to-day operations, and reduces all forms of waste. Maintains awareness of information and operational technology developments to anticipate and support timely adoption of improvements.

5. **Financial Viability:** Understands the full life-cycle cost of utility operations and value of water resources. Establishes and maintains an effective balance between long-term debt, asset values, operations and maintenance expenditures, and operating revenues. Establishes predictable rates – consistent with community expectations and acceptability – adequate to recover costs, provide for reserves, maintain support from bond rating agencies, plan and invest for future needs, and taking into account the needs of disadvantaged households. Implements sound strategies for collecting customer payments. Understands the opportunities available to diversify revenues and raise capital through adoption of new business models.

6. **Infrastructure Strategy and Performance:** Understands the condition of and costs associated with critical infrastructure assets. Plans infrastructure investments consistent with anticipated growth, system reliability goals, and relevant community priorities, building in flexibility for evolution in technology and materials, and uncertainty in the overall future operating context (e.g., climate impacts, customer base). Maintains and enhances the condition of all assets over the long-term at the lowest possible life-cycle cost and acceptable risk consistent with customer, community, and regulator-supported service levels. Assures asset repair, rehabilitation, and replacement efforts are coordinated within the community to minimize disruptions and other negative consequences.

7. **Enterprise Resiliency:** Ensures utility leadership and staff work together internally, and with external partners, to anticipate, respond to, and avoid problems. Proactively identifies, assesses, establishes tolerance levels for, and effectively manages a full range of business risks (including interdependencies with other services and utilities, legal, regulatory, financial, environmental, safety, physical and cyber security, knowledge loss, and natural disaster-related) in a proactive way consistent with industry trends and system reliability goals.

8. **Community Sustainability:** Takes an active leadership role in promoting and organizing community sustainability improvements through collaboration with local partners (e.g., transportation departments, electrical utilities, planning departments, economic development organizations, watershed and source water protection groups). Manages operations, infrastructure, and investments to support the economic, environmental, and social health of its community. Integrates water resource management with other critical community infrastructure, social, and economic development planning to support community-wide resilience, sustainability, and livability to enhance overall water resource sustainability.

9. **Water Resource Sustainability:** Ensures the availability and sustainable management of water for its community and watershed, including water resource recovery. Understands its role in the complete water cycle, understands fit for purpose water reuse options, and integrates utility objectives and activities with other watershed managers and partners. Understands and plans for the potential for water resource variability (e.g., extreme events, such as drought and flooding), and utilizes as appropriate a full range of watershed investment and engagement strategies (e.g., Integrated Planning). Engages in long-term integrated water resource management, and ensures that current and future customer, community, and ecological water-related needs are met.

10. **Stakeholder Understanding and Support:** Engenders understanding and support from stakeholders (anyone who can affect or be affected by the utility), including customers, oversight bodies, community and watershed interests, and regulatory bodies for service levels, rate structures, operating budgets, capital improvement plans, and risk management decisions. Actively promotes an appreciation of the true value of water and water services, and water’s role in the social, economic, public, and environmental health of the community. Involves stakeholders in the decisions that will affect them, understands what it takes to operate as a “good neighbor,” and positions the utility as a critical asset to the community.

Ten Attributes of Effectively Managed Water Sector Utilities			
Attribute	Master Plan Focus Areas		
	 Infrastructure Management	 Organizational Management	 Financial Management
1. Product Quality	X		
2. Customer Satisfaction		X (*)	
3. Employee & Leadership Development		X (*)	
4. Operational Optimization	X		
5. Financial Viability			X
6. Infrastructure Strategy and Performance	X		
7. Enterprise Resiliency		X	
8. Community Sustainability		X (*)	
9. Water Resource Sustainability	X		
10. Stakeholder Understanding & Support		X (*)	

**(\*) Attributes deal directly with communications**

In addition to the Ten Attributes, the Five Keys to Management Success are also a critical component of effective utility management:

1. **Leadership:** Leadership responds to both internal organizational and broader external community imperatives. It is critical to effective utility management, particularly in the context of driving and inspiring
2. **Strategic Business Planning:** Strategic business planning provides a framework for decision making and helps to achieve balance and cohesion across the Ten Attributes.
3. **Measurement:** Measurement is the backbone of successful continual improvement management and strategic business planning. A measurement system serves to focus attention on key issues, clarify expectations, facilitate decision making, support learning and improving, establish and maintain accountability, and, most importantly, communicate effectively internally and externally.
4. **Continual Improvement Management:** Continual improvement management is usually implemented through a complete, start-to-finish management system, also referred to as a “Plan-Do-Check-Act” framework.
5. **Knowledge Management:** Knowledge management is critical to ensuring reliable utility operations. It includes standard operating procedures, human resource management, and business systems and operating systems data integration to support dependable operations and continual improvement.

### Five Keys to Management Success

1. Leadership
2. Strategic Business Planning
3. Measurement
4. Continual Improvement Management
5. Knowledge Management

1. American Water Works Association, Buried No Longer: Confronting America's Infrastructure Challenge, 2012.  
<http://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf>
2. American City & County, Dark Water Rising, November 2, 2015.  
[http://americacityandcounty.com/operations-management/dark-water-rising?NL=AMC-02&Issue=AMC-02\\_20151221\\_AMC-02\\_1000&sfvc4enews=42&cl=article\\_3\\_b&utm\\_rid=CPEQW000001080893&utm\\_campaign=6367&utm\\_medium=email&elq2=e45479b2bf06481d81ffa72d1b2765a9](http://americacityandcounty.com/operations-management/dark-water-rising?NL=AMC-02&Issue=AMC-02_20151221_AMC-02_1000&sfvc4enews=42&cl=article_3_b&utm_rid=CPEQW000001080893&utm_campaign=6367&utm_medium=email&elq2=e45479b2bf06481d81ffa72d1b2765a9)
3. Is Washington Creating More Flints?; Politico.com, May 2016  
<http://www.politico.com/agenda/story/2016/05/water-funding-washington-flint-000128>
4. North Carolina State Water Infrastructure Authority November 1, 2014 Annual Report.  
[http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=bb2daa60-5be4-4b16-9f69-1c07302a1fff&groupId=14655572](http://portal.ncdenr.org/c/document_library/get_file?uuid=bb2daa60-5be4-4b16-9f69-1c07302a1fff&groupId=14655572)
5. North Carolina State Water Infrastructure Authority November 1, 2015 Annual Report.  
[http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=e1c01f17-3436-4b50-a166-f8936f9a6d07&groupId=14655572](http://portal.ncdenr.org/c/document_library/get_file?uuid=e1c01f17-3436-4b50-a166-f8936f9a6d07&groupId=14655572)
6. Public Finance Network: Tax-Exempt Financing: A Primer.  
[http://gfoa.org/sites/default/files/Tax-ExemptFinancing\\_APrimer.pdf](http://gfoa.org/sites/default/files/Tax-ExemptFinancing_APrimer.pdf)
7. Subsidizing Infrastructure Investment with Tax-Preferred Bonds; A Joint Congressional Budget Office/Joint Committee on Taxation Study; October 2009.  
<http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/106xx/doc10667/10-26-taxpreferredbonds.pdf>
8. Protecting Bonds to Save Infrastructure and Jobs; The National Association of Counties, The National League of Cities, and The United States Conference of Mayors; 2013.  
<http://www.munibondsforamerica.org/cms/wp-content/uploads/2013/03/bonds-report.pdf>
9. Water Infrastructure Financing: History of EPA Appropriations; Congressional Research Service Report 96-647 ENR; April 2012.  
<http://fas.org/sgp/crs/misc/96-647.pdf>
10. Funding for EPA Water Infrastructure: A Fact Sheet; Congressional Research Service Report R43871; 2015.  
<http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R43871.pdf>
11. Water Infrastructure Financing: History of EPA Appropriations; Congressional Research Service Report 96-647 ENR; December 2001.  
[http://digital.library.unt.edu/ark:/67531/metacrs1409/m1/1/high\\_res\\_d/96-647enr\\_2001Dec03.pdf](http://digital.library.unt.edu/ark:/67531/metacrs1409/m1/1/high_res_d/96-647enr_2001Dec03.pdf)
12. Clean Water Act: A Summary of the Law; Congressional Research Service Report RL30030; 2014.  
<http://fas.org/sgp/crs/misc/RL30030.pdf>

13. An Act to Authorize the Issuance of One Hundred Fifty Million Dollars in Bonds of the State to Provide Funds for Environmental Improvement through Grants to Units of Government for Construction and Improvement of Wastewater Treatment Works, Wastewater Collection Systems and Water Supply Systems. Session Law 1971-909 Sec. 2.  
<http://www.ncga.state.nc.us/EnactedLegislation/SessionLaws/PDF/1971-1972/SL1971-909.pdf>
  
14. An Act to Authorize the Issuance of Two Hundred Thirty Million Dollars in Bonds of the State to Provide Funds for Environmental Improvement through Grants to Units of Government for Construction and Improvement of Wastewater Treatment Works, Wastewater Collection Systems and Water Supply Systems. Session Law 1977-677 Sec. 2.  
<http://www.ncga.state.nc.us/EnactedLegislation/SessionLaws/PDF/1977-1978/SL1977-677.pdf>
  
15. An Act to Create the North Carolina Clean Water Loan and Grant Program. Session Law 1987-796 Sec. 2.  
<http://www.ncga.state.nc.us/EnactedLegislation/SessionLaws/PDF/1987-1988/SL1987-796.pdf>
  
16. An Act to Authorize the Issuance of General Obligation Bonds of the State, Subject to a Vote of the Qualified Voters of the State, to Address Statewide Critical Infrastructure Needs by Providing Funds (1) For Grants and Loans to Local Government Units for Water Supply Systems, Wastewater Collection Systems, Wastewater Treatment Works, and Water Conservation and Water Reuse Projects and (2) For Grants, Loans, or Other Financing to Public or Private Entities for Construction of Natural Gas Facilities. Session Law 1998-132 Sec 5.1(a)(2).  
<http://www.ncleg.net/EnactedLegislation/SessionLaws/PDF/1997-1998/SL1998-132.pdf>
  
17. North Carolina Department of State Treasurer, State and Local Government Division and the Local Government Commission; Statistical Information on Water and Sewer Operations, June 10, 2016.  
<https://www.nctreasurer.com/slg/Memos/2016-19.pdf>
  
18. US EPA: Annual Drinking Water Quality Reports for North Carolina, accessed March 2016.  
[https://ofmpub.epa.gov/apex/safewater/f?p=136:103:0::NO:RP,103:P103\\_STATE:NC](https://ofmpub.epa.gov/apex/safewater/f?p=136:103:0::NO:RP,103:P103_STATE:NC)
  
19. 2013 North Carolina Report Card for Infrastructure, American Society of Civil Engineers – North Carolina Section, 2013.  
[http://www.infrastructurereportcard.org/north\\_carolina/north-carolina-overview/](http://www.infrastructurereportcard.org/north_carolina/north-carolina-overview/)
  
20. Extrapolating Drinking Water and Centralized Wastewater Capital Infrastructure Needs for the NC Division of Water Infrastructure; University of North Carolina Environmental Finance Center; 2016.
  
21. US EPA 2012 Clean Watersheds Needs Survey  
<https://www.epa.gov/cwns/clean-watersheds-needs-survey-cwns-2012-report-and-data>
  
22. US EPA 2011 Drinking Water Infrastructure Needs Survey and Assessment  
<https://www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf>
  
23. North Carolina Rural Economic Development Center Water 2030  
<http://www.ncruralcenter.org/about-us/43-rural-policy/rural-policy/247-water-2030-overview>



24. Borrowing for the Big Stuff: Overview of Local Government Water and Wastewater Debt in North Carolina; Environmental Finance Center, University of North Carolina School of Government, February, 2014.  
<http://www.efc.sog.unc.edu/reslib/item/borrowing-big-stuff-overview-local-government-water-and-wastewater-debt-north-carolina>
25. Implementing Asset Management: A Practical Guide; Water Environment Federation, Association of Metropolitan Water Agencies, and National Association of Clean Water Agencies, 2007.  
<https://www.e-wef.org/Store/ProductDetails.aspx?productId=4130>
26. Water Utility Asset Management: Adopting Best Practices to Enable Better Investments; McGraw-Hill Construction, 2013.  
<http://www.newea.org/wp-content/uploads/2014/11/Water-Infrastructure-Asset-Management-SMR-2013.pdf>
27. State of the States: Water Loss Management in the U.S., Cavanaugh Solutions, Inc., presentation to the State Water Infrastructure Authority, September 17, 2015.
28. Controlling Water Loss More Critical Than Ever; AWWA connections, March 2015.  
<http://www.awwa.org/publications/connections/connections-story/articleid/3672/controlling-water-loss-more-critical-than-ever.aspx>
29. The Utility of the Future Today Recognition Program, Water Environment Federation, 2016.  
<http://www.wef.org/utility-of-the-future-today-recognition-program/>
30. The Water Resources Utilities of the Future: A Blueprint for Action; National Association of Clean Water Agencies, Water Environment Research Foundation, and Water Environment Federation, 2013.  
[http://www.nacwa.org/index.php?option=com\\_content&view=article&id=1604&Itemid=250](http://www.nacwa.org/index.php?option=com_content&view=article&id=1604&Itemid=250)
31. American Society of Civil Engineers, Guiding Principles for the Nation’s Critical Infrastructure, 2009.  
<http://content.asce.org/files/pdf/GuidingPrinciplesFinalReport.pdf>
32. Infrastructure Solutions for North Carolina, North Carolina Section of the American Society of Civil Engineers; 2012.
33. Rural Community Assistance Partnership, Affordability and Capability Issues of Small Water and Wastewater Systems: A Case for Regionalization of Small Systems, 2014.  
<http://rcap.org/resource/affordability-and-capacity-issues-of-small-water-and-wastewater-systems-a-case-for-regionalization-of-small-systems/>
34. Enhancing Performance of Small Water Systems through Shared Management; Environmental Finance Center, University of North Carolina School of Government, April, 2009. <http://www.efc.sog.unc.edu/sites/www.efc.sog.unc.edu/files/2015/SmallWaterSystemsSharedManagement.pdf>

35. Alliance for Water Efficiency, Building Better Water Rates for an Uncertain World: Balancing Revenue Management, Resource Efficiency, and Fiscal Sustainability, 2014.

<http://www.financingsustainablewater.org/tools/building-better-water-rates-uncertain-world>

36. Governmental Accounting Standards Board.

<http://www.gasb.org/home>

37. North Carolina Agency is Local Government Lifeline; The Pew Charitable Trusts, June, 2012.

<http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2012/06/06/north-carolina-agency-is-local-government-lifeline>

38. The State Role in Local Government Financial Distress; The Pew Charitable Trusts, July, 2013

<http://www.pewtrusts.org/en/research-and-analysis/reports/2013/07/23/the-state-role-in-local-government-financial-distress>

### Acronyms Used in this Master Plan

**AIA**

Asset Inventory and Assessment

**AMWA**

Association of Metropolitan Water Agencies

**ASCE**

American Society of Civil Engineers

**ASCE-NC**

American Society of Civil Engineers, North Carolina Section

**AWWA**

American Water Works Association

**BAMI-I**

Buried Asset Management Institute-International

**CDBG**

Community Development Block Grant

**CDBG-ED**

Community Development Block Grants for Economic Development

**CDBG-I**

Community Development Block Grant-Infrastructure

**CIP**

Capital Improvement Plan

**COG**

Council of Government

**CWA**

Clean Water Act

**CWSRF**

Clean Water State Revolving Fund

**DEQ**

Department of Environmental Quality

**DW**

Drinking Water

**DWSRF**

Drinking Water State Revolving Fund

**EDA**

(U.S.) Economic Development Administration

**EFCN**

Environmental Finance Center Network

**EPA**

(U.S.) Environmental Protection Agency

**EUM**

Effective Utility Management

**FAQs**

Frequently Asked Questions

**GAAP**

Generally Accepted Accounting Principles

**GASB**

Governmental Accounting Standards Board

**GIS**

Geographic Information System

**HUC**

High Unit Cost

**HUD**

(U.S.) Department of Housing and Urban Development

**IAM**

Institute of Asset Management

**LGC**

Local Government Commission

**LGU**

Local Government Unit

**MHI**

Median Household Income

**MRF**

Merger/Regionalization Feasibility

**NACWA**

National Association of Clean Water Agencies

**NCACC**

North Carolina Association of County Commissioners

**NCAWWA-WEA**

North Carolina American Water Works Association-Water Environment Association

**NCGS**

North Carolina General Statutes

**NCLM**

North Carolina League of Municipalities

**NCRWA**

North Carolina Rural Water Association

**NCWOA**

North Carolina Waterworks Operators Association

**PWS Section**

Public Water Supply Section of the Division of Water Resources

**RCAP**

Rural Community Assistance Partnership

**SDWA**

Safe Drinking Water Act

**SERCAP**

Southeast Rural Community Assistance Project

**SRF**

State Revolving Fund

**UIM**

Utility Infrastructure Management

**UNC**

University of North Carolina

**UNC-EFC**

University of North Carolina Environmental Finance Center

**UNC-SOG**

University of North Carolina School of Government

**UOTF**

Utilities of the Future

**USDA**

United States Department of Agriculture

**USDA-RD**

United States Department of Agriculture-Rural Development

**US EPA**

United States Environmental Protection Agency

**WEF**

Water Environment Federation

**WRF**

Water Research Foundation

**WW**

Wastewater







*Water Infrastructure*  
ENVIRONMENTAL QUALITY

MAILING ADDRESS

1633 Mail Service Center | Raleigh, NC 27699-1633

PHYSICAL ADDRESS

512 N. Salisbury Street | Raleigh, NC 27604

Phone: 919-707-9160

Fax: 919-715-6229

<http://go.ncdenr.gov/wi>