Pike County 30-Year Water Resources Management Plan

Acknowledgements

The following Pike County Water Planning Committee (PWPC) members were instrumental in providing information and guidance throughout the development of the Pike County Water Resources Plan. These committee members include:

Carol Berry, City of Williamson

Scott Huckaby, PCWA

Tina Lee, City of Molena

Joyce Corley, City of Molena

Doug Neath, City of Concord

Brandon Roger, Pike County

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The consulting team included representatives from the following two firms.

Sustainable Water Planning and Engineering

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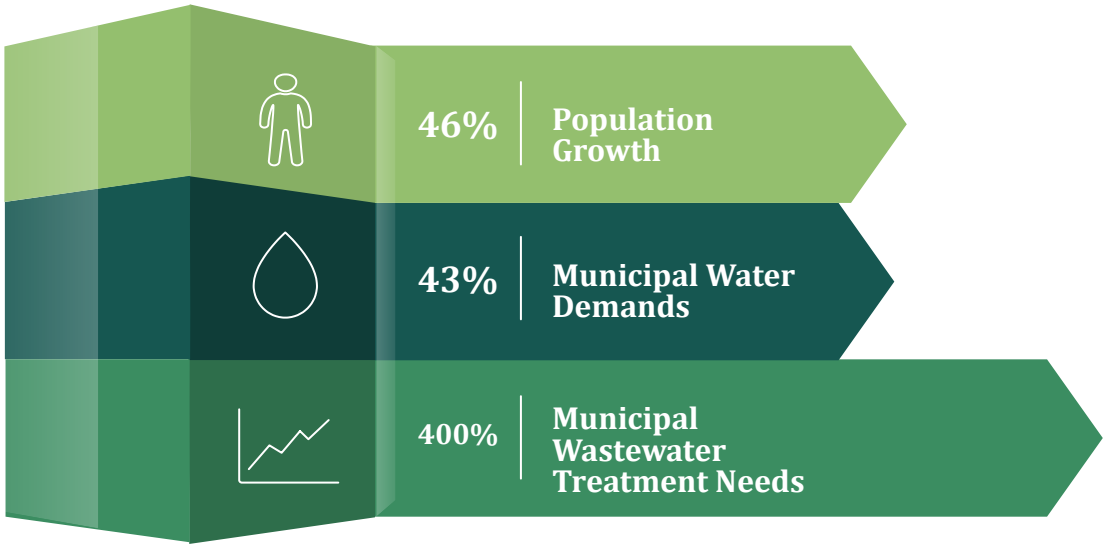
0 Executive Summary

Pike County, located in the west central portion of Georgia, includes five cities: Concord, Meansville, Molena, Williamson, and Zebulon. The county is blessed with a network of major roadways, a reputable public school system, and a strong quality of life which has attracted new residents and a flurry of development activity. The impending growth led to the formation of the Pike County Water Planning Committee (PWPC) and the vision for this Pike County Water Resources Plan (Plan).

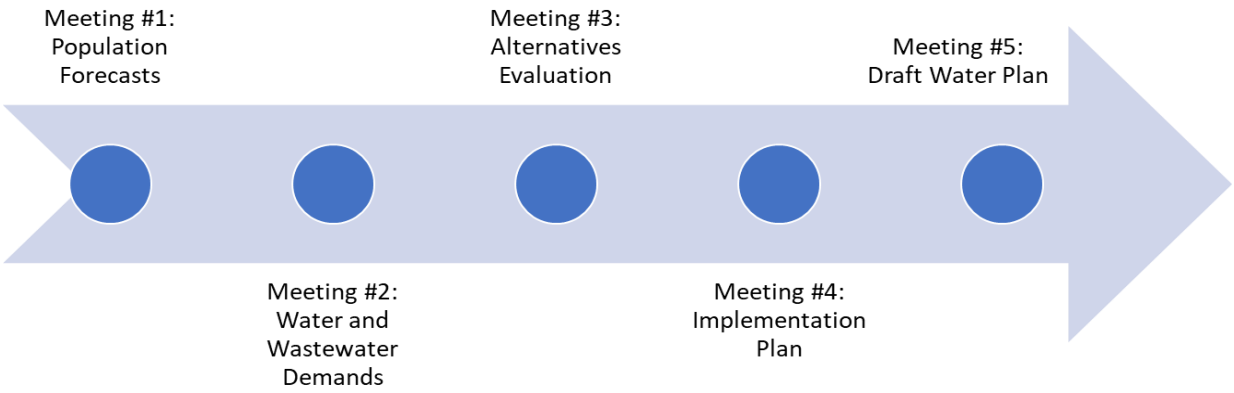
The Pike County population is expected to grow from 18,889 in 2020 to 27,655 in 2060, an impressive 46% growth rate. Most of the new growth is expected to be served by one of the six public water systems (Concord, Meansville, Molena, Williamson, Zebulon, and Pike County Water and Sewerage Authority). Two cities currently provide municipal wastewater treatment, Concord and Zebulon, and growth in these cities will be served. The intensity of development, especially in Zebulon, is expected to increase the need for wastewater treatment capacity. The forecasted increases are shown in Figure ES-1.

FIGURE ES-1: PIKE COUNTY GROWTH PROJECTIONS (2020 TO 2060)



To proactively plan for the forecasted growth, each jurisdiction nominated a representative to serve on the PWPC. The PWPC met five (5) times over the course of a 2-year period to guide the development of the Plan, Figure ES-2.

FIGURE ES-2: PLANNING PROCESS



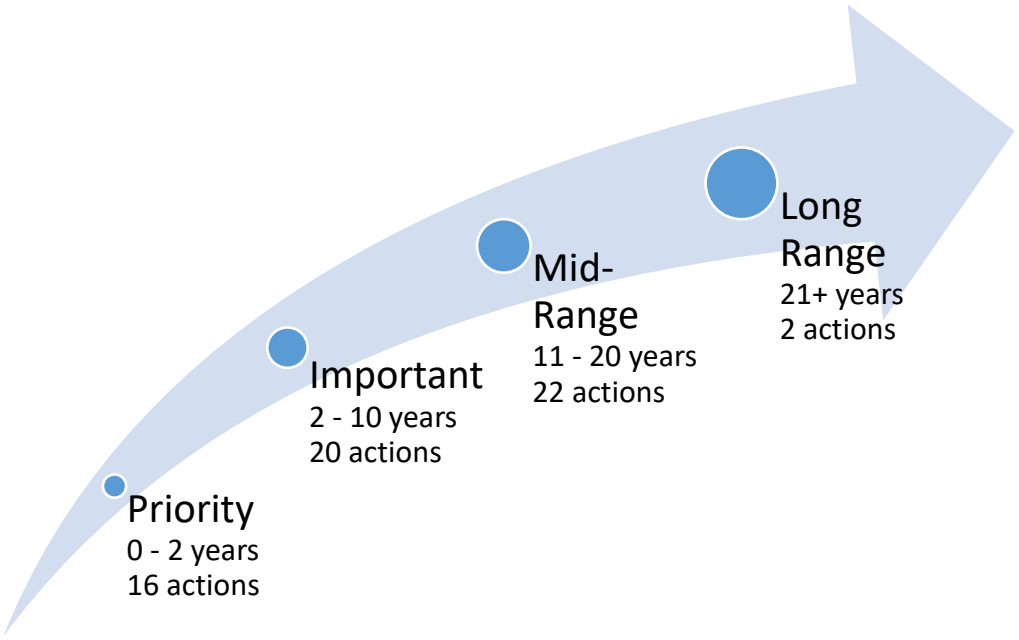
The Plan recommends that the PWPC continue to meet bi-annually to collaborate on implementation of the recommended actions.

One of the challenges during the planning process was the lack of consistent system mapping information and electronically available system data. System maps ranged from Auto-CAD to paper maps to pictures of marker boards to partial as-built records. One of the outputs of this Plan is the creation of a standard data dictionary that creates a common platform for collecting and storing asset data. This will enable each system to develop consistent local data needed for system operations and maintenance, fire flow reporting, and facilitate future shared planning efforts.

The Plan includes an extensive list of 58 action items designed to improve the existing water and wastewater systems to facilitate the future expansion to serve additional customers. The action items focus on water systems, wastewater systems, and overall action items. Each action item was assigned to an implementation timeline of priority, important, mid-range, and long range. Figure ES-3 shows the number of implementation actions included in each implementation timeline.

During meetings with the PWPC, stakeholders weighed in on which implementation actions are highest priority for their water systems. These **priority** action items are designated as bolded text throughout the document.

FIGURE ES-3: NUMBER OF ACTION ITEMS BY TIMELINE



Four (4) of the **priority** recommendations are considered “overall” recommendations that apply to all six jurisdictions. The overall recommendations are listed below.

OIA1. Share and Build GIS Data

OIA3. Adopt Policies for Sustainable Growth

OIB1. Evaluate Existing Rate Structure

OIB2. Adopt Revised Rates

The first two recommendations focus on the importance of guiding future development to existing water and wastewater infrastructure to allow for sustainable system expansion. The last two action items focus on evaluating existing rates and adopting rates that fully cover the cost of operations. Water and wastewater systems must continually invest in maintenance and system rehabilitation to remain viable; thus, having sufficient revenues is critical.

There are six (6) water system priority action items, listed below, that apply to the six public water systems in Pike County.

IA1. Install Production Meters at Each Source

IA2. Identify Non-Metered Service Connections

IB1. New Supply to Meet Current Demands

IC1. Map Fire Hydrants and Pipes in GIS

IC2. Implement a Valve Assessment Program

IE2. Update Construction & Inspection Requirements

The most urgent of the water action items is the immediate need for additional water supply in Molena (**IB1**), as water demands currently exceed available supply. Additionally, Concord's demands will exceed supplies in the next decade and both Meansville and Pike County Water and Sewerage Authority will approach supply limits at the end of the planning horizon. New supplies must be identified to meet these demands.

The remaining water priority actions involve collecting data needed to implement the "Important" recommendations. Several of the "priority" and "important" action items target reducing non-revenue water (total water loss including any authorized unbilled consumption) and improving the county's fire flow ratings.

Priority actions for the wastewater systems in Concord and Zebulon include addressing current treatment facilities and planning for facility expansions anticipated within the planning horizon.

WWIA1. Concord North Pond Rehabilitation

WWIA2. Concord South Pond Rehabilitation

WWIA4. Automated Flow Monitoring of Plant Influent & Effluent

WWIC1. Identify Priority Infiltration & Inflow Sewersheds

WWIC2. Assess Priority Sewersheds

WWID1. Update Construction & Inspection Requirements

Rehabilitation of the aging collection system is a priority and can reduce the amount of groundwater/surface water that enters the system and must be treated. Data collection and planned operations and maintenance are also themes for the priority wastewater action items.

The local investment in water supply and wastewater treatment is significant, yet critical to meet the current and future needs within Pike County. The immediate investment to meet current needs and in measured improvements to current operations and maintenance programs will allow the water and wastewater systems to meet the future demands.

1 Background and Introduction

This section includes background information that serves as a basis for the planning process and the Plans' recommendations. A review of historical population trends and population forecasts are presented in this section.

1.1 Location

Pike County is in the west central portion of Georgia (Figure 1-1). There are five cities located within Pike County: Concord, Meansville, Molena, Williamson, and Zebulon (Figure 1-2). Pike County is largely rural, and its residents value the strong sense of community. Residential and commercial development is expected during the planning horizon due to the location along transportation corridors, strong public school system, and recent economic development activities. The five cities and the county have partnered to create this Pike County Water Resources Plan (Plan) to look strategically at the existing water and wastewater treatment systems and identify actions needed to prepare the existing infrastructure for this future growth.

FIGURE 1-1: PIKE COUNTY LOCATION MAP

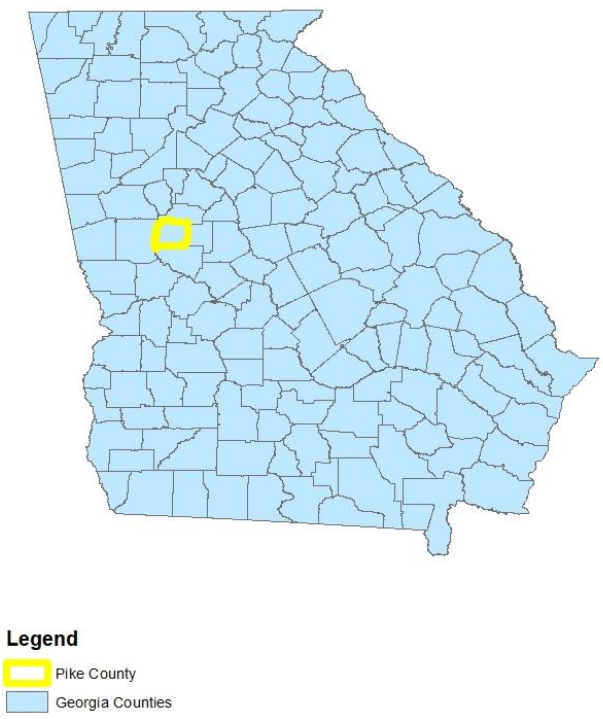
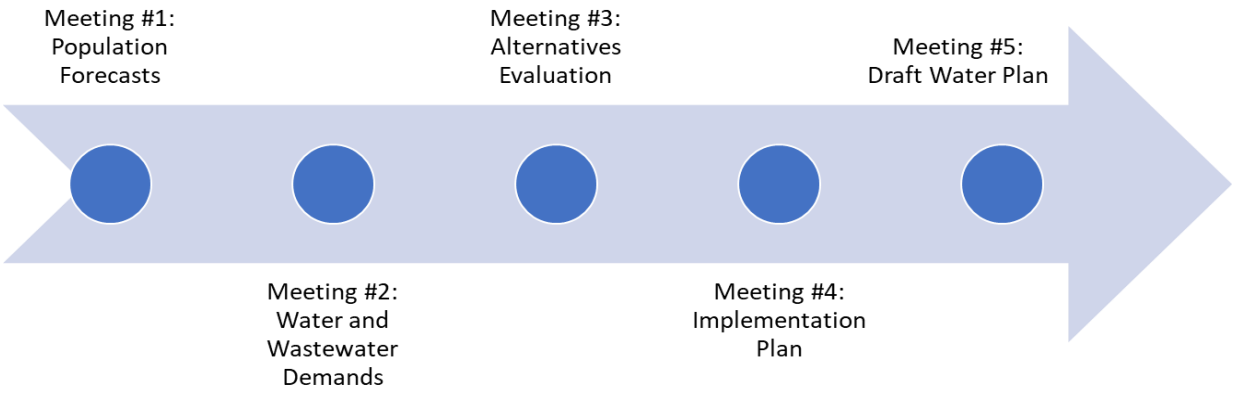


FIGURE 1-2: PIKE COUNTY

1.2 Planning Process

The planning process included input and guidance from the Pike County Water Planning Committee (PWPC), which included representatives from each of the cities as well as the county. The PWPC met five (5) times during the planning process (Figure 1-3) to review draft work products and guide the recommendations that are reflected within this Plan.

FIGURE 1-3: PLANNING PROCESS

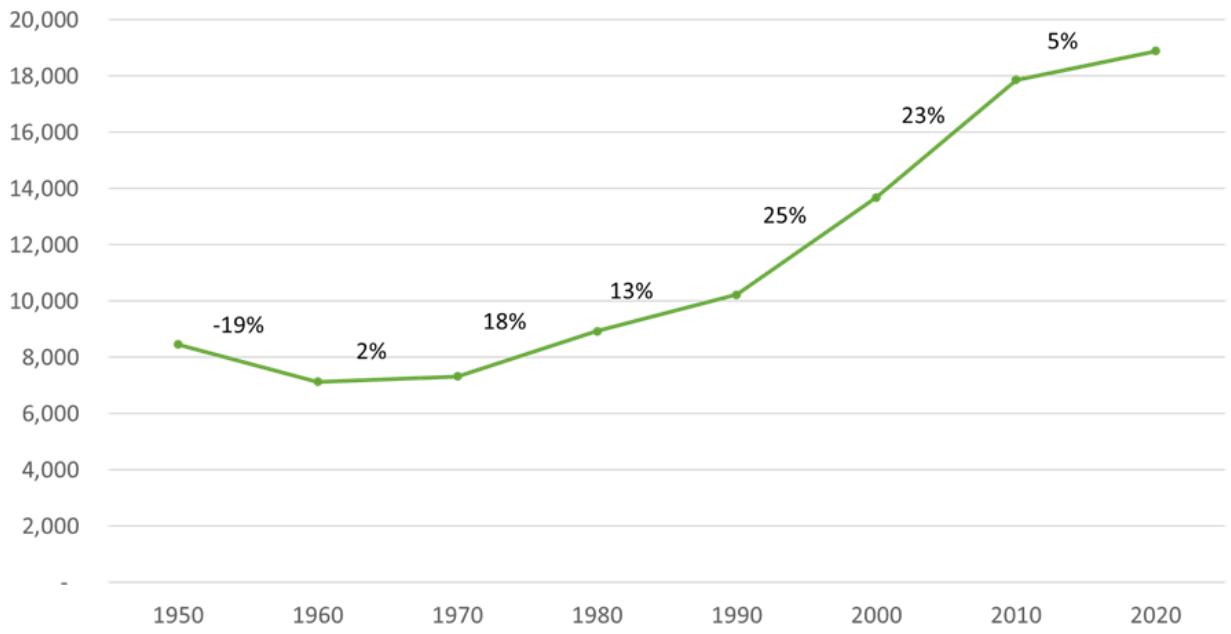


Section 4.5 of this Plan recommends that the PWPC continue to meet bi-annually to collaborate on ongoing implementation of this Plan. In addition to providing an opportunity to gather data and confirm assumptions for the Plan, these meetings offered a chance for each system to collaborate and share expertise. The need to collaborate and share expertise extends beyond the planning process.

1.3 Population Projections

The population in Pike County is 18,889 according to the 2020 US Census Bureau data, an almost 6% increase from 2010. As shown in Figure 1-4, there has been steady population growth in Pike County since 1950 with small periods of slower growth followed by periods of more rapid growth. The average growth rate is 18% from 2000 to 2020 while the overall trend from 1950 to 2020 is at 10% growth. The growth pressures are present locally, with an increase in development activity that the PWPC members believe will continue.

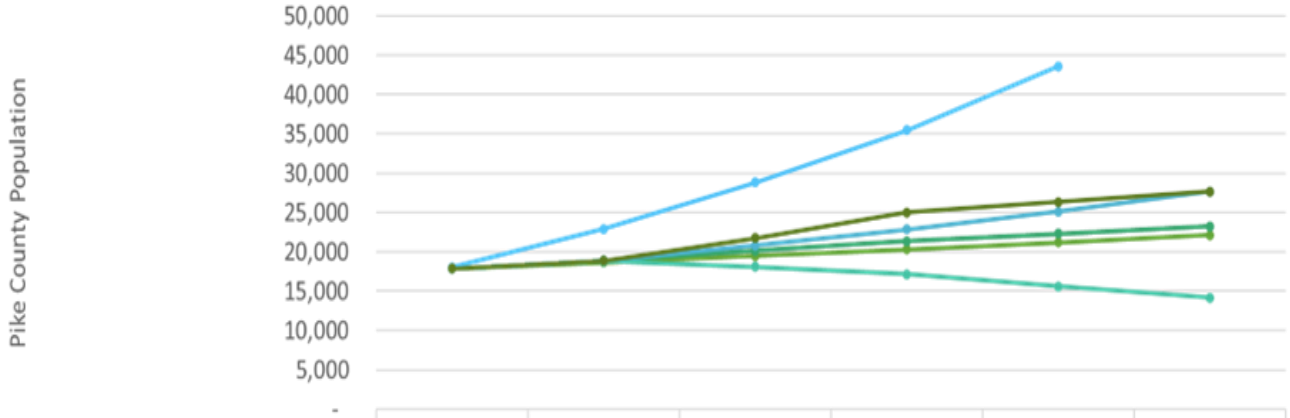
FIGURE 1-4: HISTORIC POPULATION TRENDS



The PWPC reviewed seven potential growth scenarios that ranged from rapid growth to declining growth as described below and shown in Figure 1-5.

- Scenario 1: Upper Flint Regional Water Planning Council forecasts with even growth rates among the cities and unincorporated county.
- Scenario 2: Population growth based on recent trends (2010 to 2018) for each community, resulting in populations higher than the Upper Flint Regional Water Plan.
- Scenario 3: Upper Flint Regional Water Planning Council with growth distributed based on historical growth patterns among the cities and unincorporated county.
- Scenario 4: Office of Planning and Budget Forecasts, which show a slight decline in population over the planning horizon.
- Scenario 5: Growth Scenario with a steady 10% per decade population increase distributed among the cities and unincorporate county.
- Scenario 6: Griffin 2050 Water Master Plan
- Scenario 7: Growth Burst Scenario ends at the same population in Scenario 5 but includes a “burst” of growth by 2040 followed by a period of steady growth through 2060. This mimics the historical population growth that includes periods of more rapid growth followed by periods with steady growth.

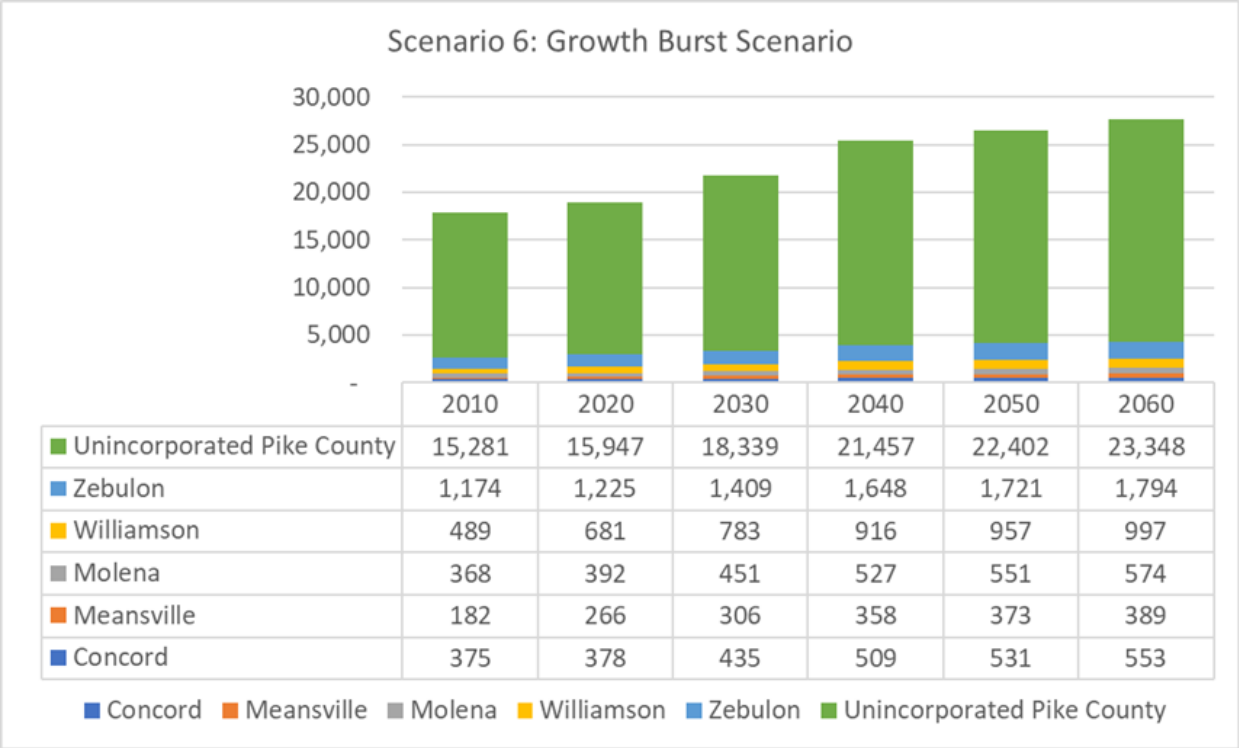
FIGURE 1-5: POPULATION PROJECTION SCENARIOS



	2010	2020	2030	2040	2050	2060
Scenario 1: UF, Even Distribution	17,869	18,860	20,147	21,335	22,276	23,262
Scenario 2: Recent Trend	17,869	18,647	19,461	20,313	21,205	22,138
Scenario 3:UF Variable	17,869	18,860	20,147	21,335	22,276	23,262
Scenario 4: OPB Decline	17,869	18,814	18,119	17,174	15,584	14,146
Scenario 5: Growth Scenario	17,869	18,889	20,778	22,856	25,141	27,655
Griffin 2050 Water Master Plan	18,064	22,931	28,815	35,438	43,582	
Scenario 6: Growth Burst Scenario	17,869	18,889	21,722	24,981	26,318	27,655

Based on the growth trend over the last 20 years and the active development projects, the PWPC dismissed the one growth scenario with declining population and the scenarios with stagnant population. Similarly, the Griffin 2050 Master Plan growth was significantly greater than current population numbers and was dismissed from further consideration. Scenario 5 and Scenario 6 were closely reviewed by the PWPC at two meetings. After careful review and consideration, the growth burst scenario was seen as the most probable based on historic development patterns, planned growth, and recent development patterns. The population projections from the Growth Burst Scenario (Figure 1-6) were used throughout the plan to project future water demands and wastewater treatment needs.

FIGURE 1-6: POPULATION PROJECTIONS



	2010	2020	2030	2040	2050	2060
Unincorporated Pike County	15,281	15,947	18,339	21,457	22,402	23,348
Zebulon	1,174	1,225	1,409	1,648	1,721	1,794
Williamson	489	681	783	916	957	997
Molena	368	392	451	527	551	574
Meansville	182	266	306	358	373	389
Concord	375	378	435	509	531	553

1.4 Anticipated Growth Patterns

Each city and the unincorporated county have a Comprehensive Land Use Plan and zoning map that govern the intensity of development that is allowed within the jurisdiction. These Comprehensive Land Use Plans are currently being updated by the communities with the support of the Three Rivers Regional Commission. The sustainability of the water and wastewater systems in Pike County is dependent on an infrastructure-based approach to growth within the Comprehensive Land Use Plan and Zoning Ordinance.

Using the current Comprehensive Land Use Plans and feedback from the Pike Water Planning Commission, the intense growth is expected to occur in the areas shown in Figure 1-7. Generally, growth is expected to extend out from the existing water and wastewater infrastructure and along major roadway corridors, specifically US 19 and Hwy 18. Understanding the expected development pattern was important during the evaluation of alternatives.

FIGURE 1-7: ANTICIPATED FUTURE GROWTH AREA

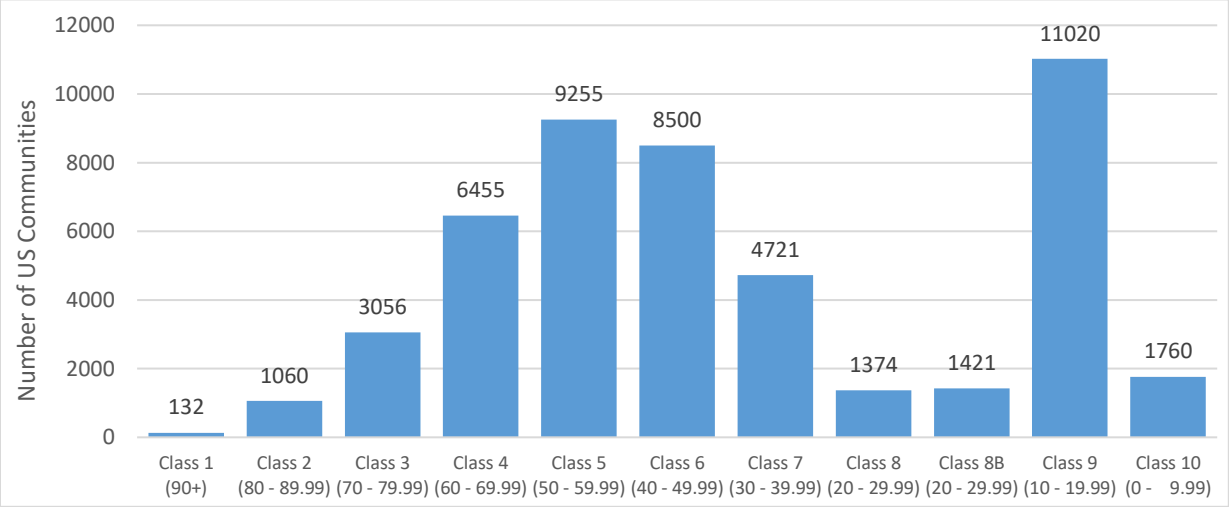
1.5 Insurance Services Office (ISO) Rating Program

One of the goals of this Plan is to improve the Insurance Services Office (ISO) Public Protection Classification (PPC) score in Pike County by 1 rating from the current Class 5 rating. The PPC score rates the community's readiness for fire prevention and fire suppression. The community score, along with features specific to each individual property, influence the property insurance premiums paid by individual homeowners and businesses. This section provides an overview of the ISO Rating Program and a summary of the most recent Pike County scores.

The PPC scoring system assigns points to different desirable actions with up to 100 points possible. The points translate to a "grade" from 1 to 10, with Class 1 being the

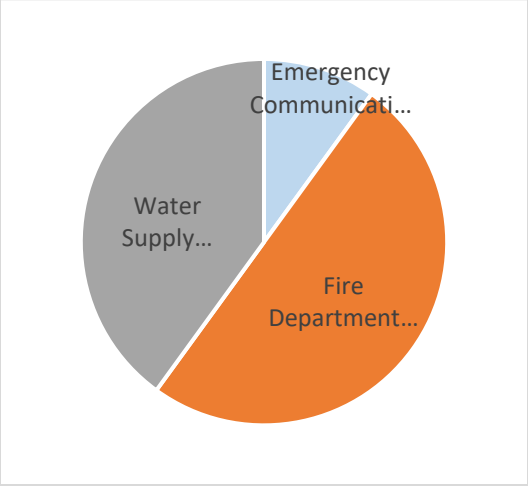
"best" in terms of fire prevention and fire suppression programs (90 or more points) and a Class 10 being the baseline for all communities (0 to 9.99 points). Each Class is separated by 10 points. Therefore, the goal of reducing the PPC by 1 translates into adding programs or policies that would result in 10 additional points. Figure 1-8 shows the number of communities across the US that fall within each rating class as well as the range of scores for that class.

FIGURE 1-8: NUMBER OF US COMMUNITIES BY FIRE PREVENTION AND PROTECTION CLASS



The points are assigned to three main categories, with a specific percentage of the total points assigned to each, as shown in Figure 1-9.

FIGURE 1-9: PUBLIC PROTECTION CLASSIFICATION (PPC) PERCENTAGE OF POINTS BY CATEGORY



Pike County's PPC Score from May 2016 provided the baseline for the evaluation in this Water Resources Plan. Table 1-1 shows the points earned by each category as well as the percentage of the total points earned from that category.

Table 1-1. PPC Score by Category

PPC Category	Points Earned	Total Points for Category	% Total Points Earned
Emergency Communications	7.06	10	71%
Water Supply	21.27	40	53%
Fire Department	21.89	50	44%

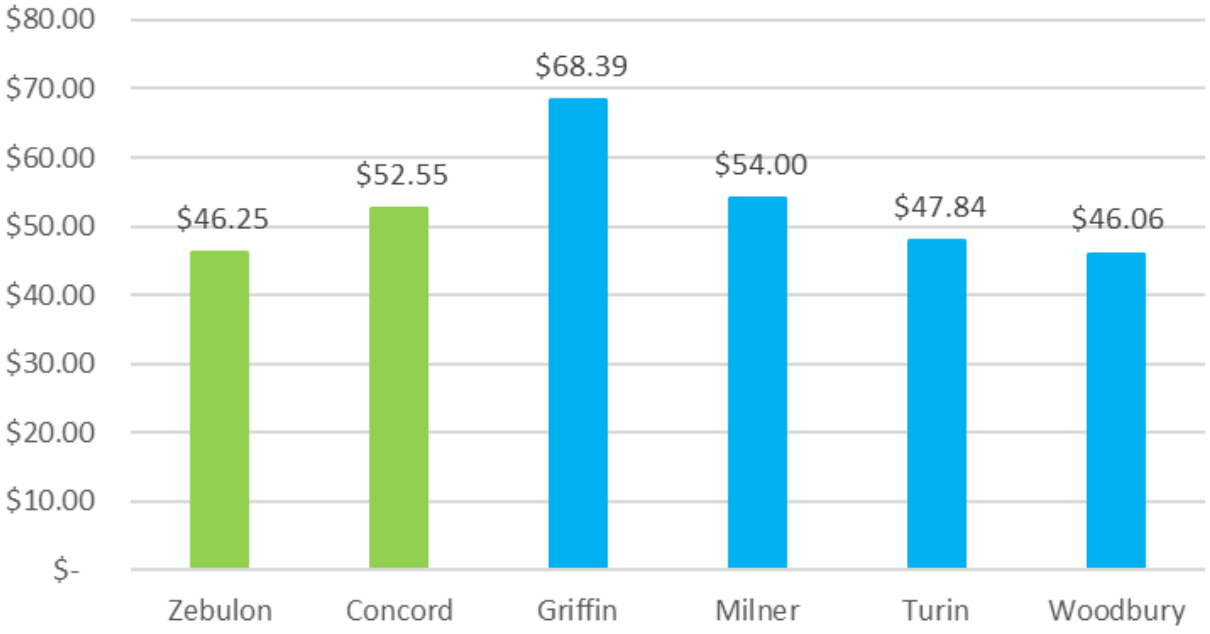
The PPC Rating Score for Pike County was 50.22 points, which is within Class 5. Pike County ranks within the top 40% of all communities in the US in terms of fire prevention and suppression programs. The alternatives evaluation described in Section 3 targeted recommendations based on the county's current scores.

1.6 Current Rate Structures

This Plan included an evaluation of the existing water and wastewater rates as these rates are the foundation of a healthy water and sewer system. The evaluation compared the current rates for the water systems within Pike County to several neighboring water systems. While each system should establish rates based on their unique circumstances to cover the cost of providing services, it is helpful to compare system fees. This comparison leveraged the Georgia Environmental Finance Authority (GEFA) 2022 GA Water and Wastewater Rates Dashboard and used a standard consumption level of 5,000 gallons per month. Figure 1-10 shows that the water rates in Pike County are generally the same or lower than the surrounding systems. Figure 1-11 shows that the wastewater rates are also generally the same or lower than the surrounding systems.

FIGURE 1-10. WATER BILLS BASED ON 5,000-GALLON CONSUMPTION

FIGURE 1-11. WASTEWATER BILLS BASED ON 5,000-GALLON CONSUMPTION



The dashboard also presents the cost recovery for each system in Pike County. The cost recovery is the operating revenues divided by the operating expenses (including depreciation and amortization). The cost recovery ratio should be greater than one. If the cost recovery is less than one, that indicates that the provider is spending more on system operations than they are receiving as rates. The cost recovery rates for the Pike County systems are presented in Table 1-2.

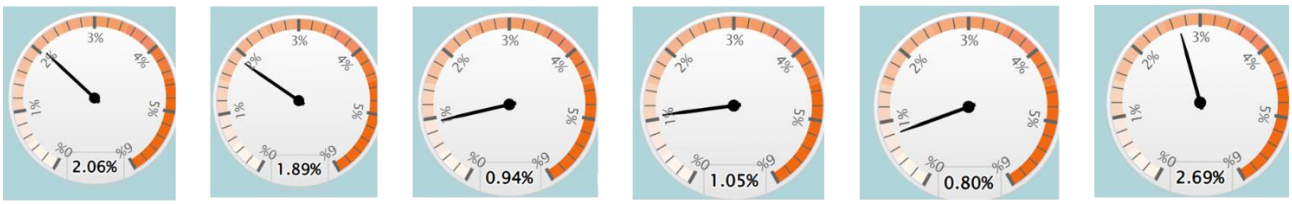
Table 1-2. Cost Recovery Ratio by Provider

Provider	Cost Recovery Ratio
Williamson	1.11
Meansville	1.04
Molena	0.97
Zebulon	0.85
Concord	0.60
Pike County WSA	N/A*

** Pike County WSA did not provide financial data for this survey*

Another important consideration when discussing water and sewer rates is affordability. Affordability refers to the ability of customers to pay for water and sewer service and reflects the annual water and wastewater bill divided by the annual median household income in that community. There is no accepted definition of “affordable rate” but generally a combined water and sewer rate that is 3% or less of the median household income is considered “affordable”. All Pike County systems have rates below 3% of their median household income, Figure 1-13.

FIGURE 1-13: WATER AND WASTEWATER RATE AFFORDABILITY



1.7 Upper Flint Regional Water Plan

Pike County is within the Upper Flint Water Planning Region, one of eleven water planning districts in Georgia. The Upper Flint Region includes thirteen (13) counties and is in the central-western portion of the state (Figure 1-14). The 2017 Upper Flint Regional Water Plan was created by representatives from the region who served on the Upper Flint Regional Water Planning Council and outlines strategies to meet the region's water and wastewater needs through 2050.

FIGURE 1-14: PIKE COUNTY WITHIN THE UPPER FLINT REGIONAL WATER PLANNING DISTRICT

One of the goals of this Plan is to be consistent with the priorities within the Upper Flint Regional Water Plan. Several priorities that were factored into this Plan are listed below.

- DM2 – Non-farm water conservation practices.
- SF1 – Evaluate storage options to provide supply and flow augmentation.
- SF3 – Replace surface water withdrawals with groundwater withdrawals.
- RM1 – Treatment systems with high return flows.

The Upper Flint Regional Water Plan is currently being reviewed and updated. While the Plan includes efforts to remain consistent and supportive of the Regional Plan, the PWPC would like the more detailed information and projections developed through this planning process to be factored into the Regional Plan update.

2 Existing Systems and Future Demands

This section provides an overview of the existing water and wastewater systems within Pike County as well as the forecast of future water and wastewater demands by system.

2.1 GIS Mapping

The existing water and wastewater infrastructure serves as the foundation for the Plan and therefore, water and wastewater system maps are important. System maps are also critical for the effective management of water and wastewater systems. A consistent mapping software and platform was not available, so a mapping platform with consistent terminology was created as part of the planning process.

Appendix B includes the data dictionary for the PWPC members that will support the migration toward consistent maps across each water and wastewater provider, which will support future planning efforts. The data dictionary is based on ESRI's Water Distribution Utility Network and Sewer Utility Network. ArcGIS was selected as the platform as it interacts with a wide range of other mapping tools (AutoCAD, Diamond Maps, etc.) and is used by the Three Rivers Planning Commission, so system data can be used within the ongoing Comprehensive Land Use Planning process.

The feature types included in the Water Distribution Data Dictionary are listed below.

Mains	Storage	Hydrants
Service Lines	Pump Stations	Meters
Supply	Valves	Backflow

The feature types included in the Wastewater Data Dictionary are listed below.

- Discharge
- Treatment Plants
- Pump Stations
- Manholes
- Force Mains
- Gravity Mains
- Septic Systems

Each feature type above is a different tab in the data dictionary spreadsheet and includes details that describe that feature. The goal of the data dictionary is to allow for continuous improvement of mapped data over time following the consistent methodology.

The data dictionary was presented at the second PWPC meeting and the PWPC provided concurrence with the use of the data dictionary for the project. The system data collected from the PWPC members varied greatly from AutoCAD, paper maps, and pictures of marker boards. Due to the time and budget constraints, the data that was available in a mapping format (AutoCAD) was converted into ArcGIS following the data dictionary format based on available data. Data gaps will need to be filled by each system. Systems without baseline maps should digitize their system maps following the data dictionary. A common mapping platform with consistent terminology will facilitate future planning and implementation efforts for the PWPC members.

2.2 Existing Water Supply Sources and Distribution Systems

Each city and the unincorporated county have their own water distribution system that conveys potable water to their customers. Some of the systems also have their own water supply, while several systems rely on wholesale water purchase agreements. This section outlines the current water supply sources and distribution systems.

2.2.1 Current Water Supply Sources

The active water supply sources are listed by water provider in Table 2-1 and shown in Figure 2-1. There are currently 7 active wells, two communities that primarily purchase water from the City of Griffin (Williamson and Zebulon), and other interconnections to serve specific service areas or for emergency water supply purposes.

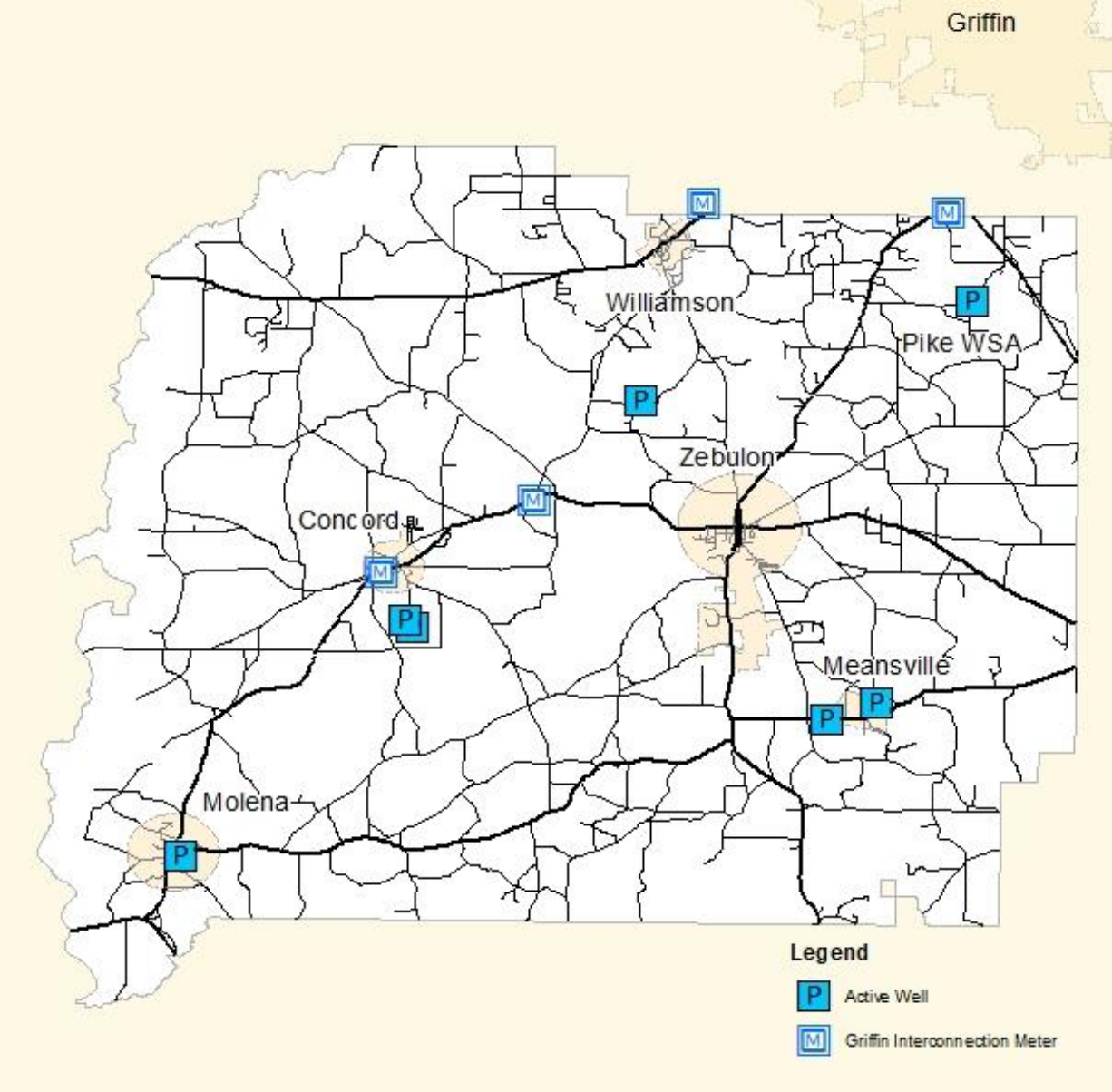
The interconnections with Griffin by Williamson and Zebulon are governed by a contract that ends in 2045. These contracts require that Griffin be the sole treated water supplier. The City of Concord’s contract expires in 2055 and is for supplemental and/or emergency use, allowing the City to use existing water supply sources or consider other water supply sources.

Table 2-1. Current Water Supply Sources by Provider

Provider	Active Water Supply Sources	Estimated Yield
Concord	Concord-Spring Road Well	0.18 MGD
	Spring Road Spring	0.0252 MGD
	Griffin Interconnection	NA[1]
Meansville	Well #1 (Hwy 109)	0.0288 MGD[2]
	Well #3 (Collier Ave)	0.108 MGD
Molena	Well #2 (Springs Street)	0.0288 MGD
Pike County WSA	Well #1 (Midway Road/ Lewis Lake)	0.144 MGD[3]
	Well #2 (Shackleford Road)	0.069 MGD[3]
Williamson	Griffin Interconnection	< 2.0 MG/ month[4]
Zebulon	Griffin Interconnection (2 connections)	<12.0 MG/month[5]

1. Per Concord Wholesale Agreement, notification for non-emergency demand >100,000 gpd
2. Well #1 not operational at estimated yield due to pump
3. GW Permit #114-0001 limits withdrawal to 0.207 MGD (monthly and annual average)
4. Per Williamson Wholesale Agreement (June 28, 1996)
5. Per Zebulon Wholesale Agreement (July 23, 1996)

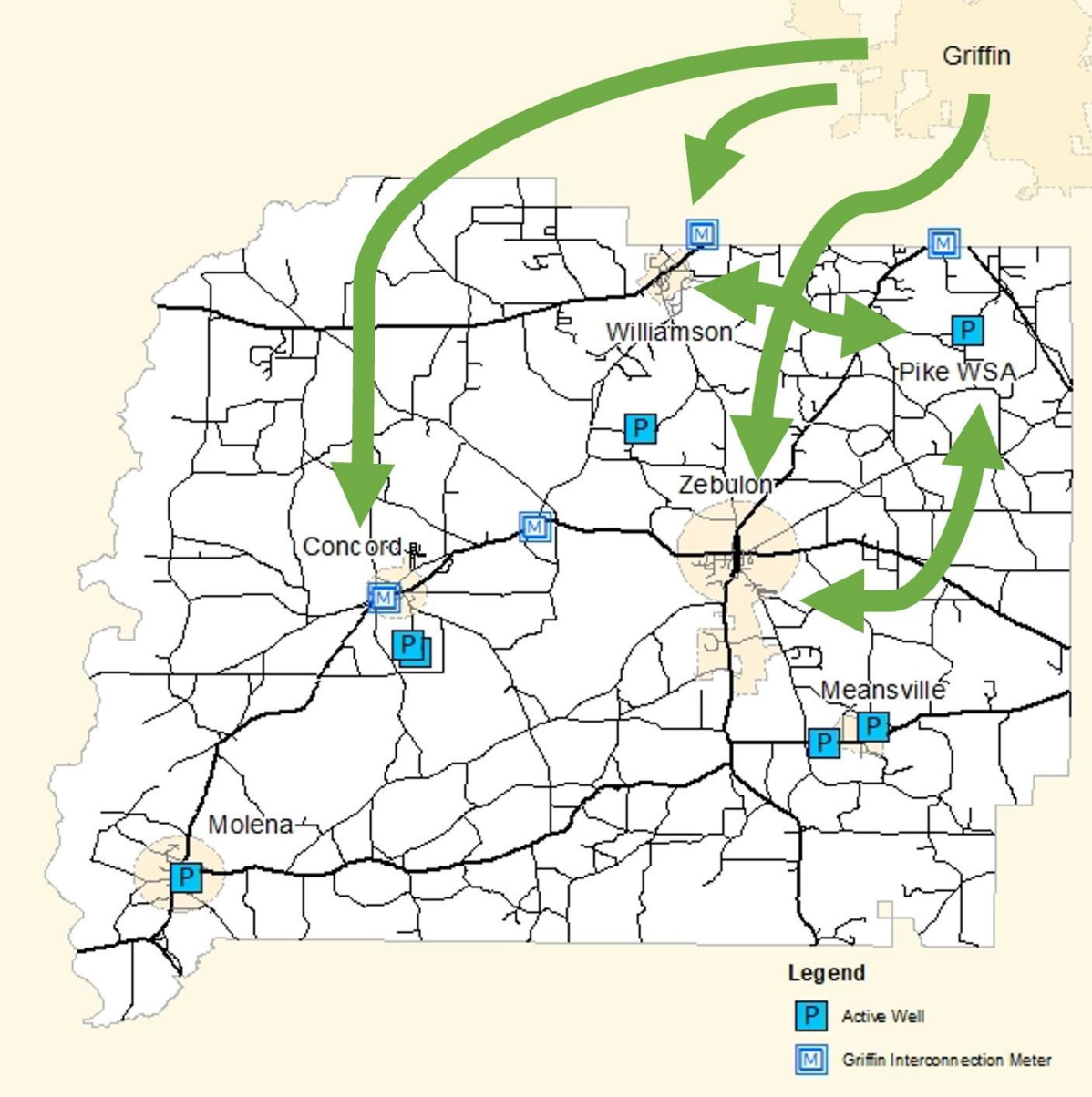
FIGURE 2-1. ACTIVE PRIMARY WATER SUPPLY SOURCES



2.2.1.1 Emergency Water Supply Sources

In addition to the primary water supply sources listed above, there are several system interconnections that provide supplemental water and/or serve as an emergency water source. Figure 2-2 shows the current flow of water available during an emergency or water shortage in green arrows. While there is no strict standard for an emergency water supply source, generally an emergency supply would meet half of the daily demand for a period of three days.

FIGURE 2-2. EMERGENCY WATER SUPPLY INTERCONNECTIONS

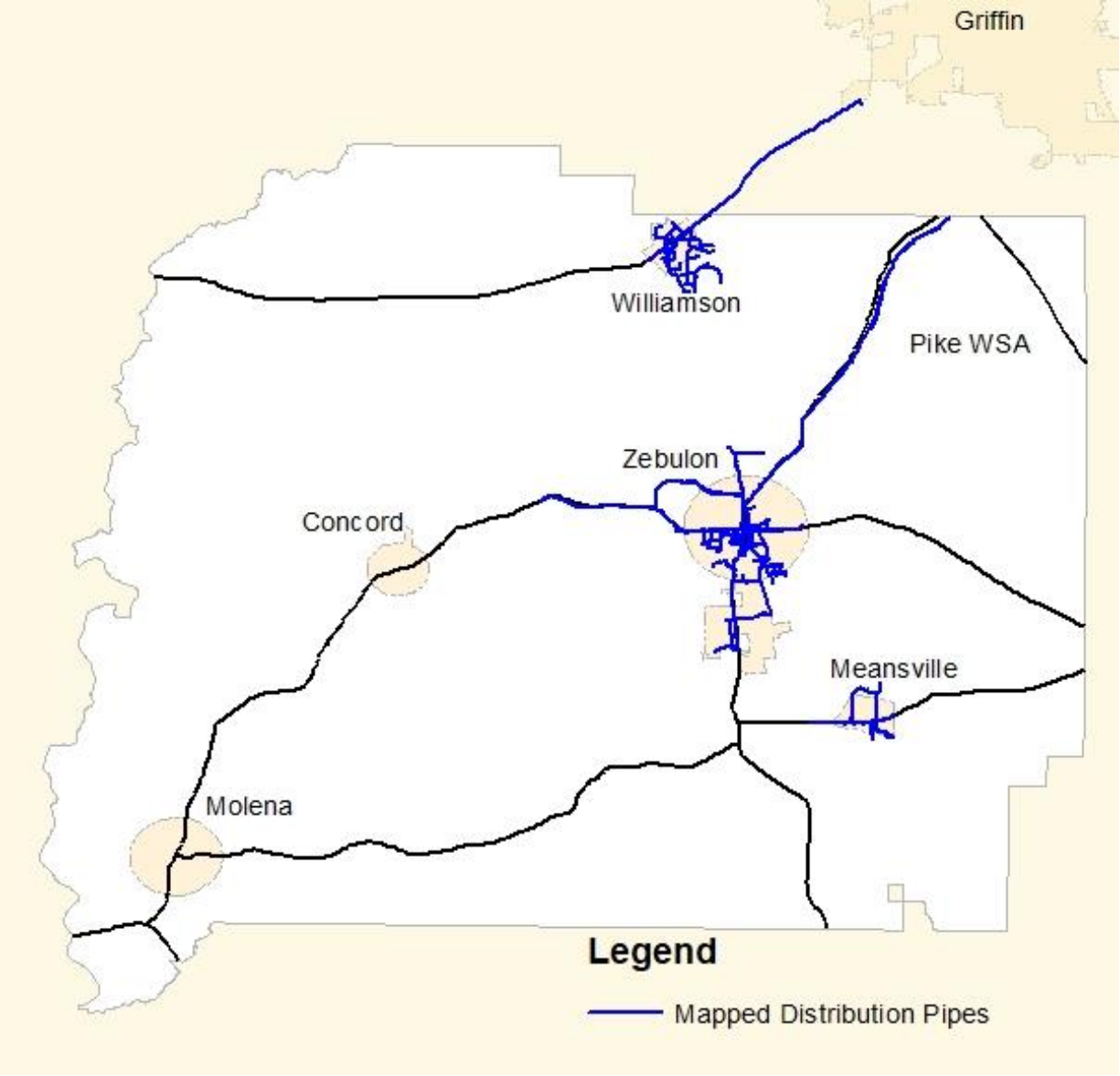


2.2.2 Distribution Systems

The independent water systems in Pike County manage over 250 miles of distribution pipelines that deliver safe drinking water to approximately 1,500 customers. The distribution networks include an integrated array of assets including storage tanks, valves, pump stations, meters, and fire hydrants that distribute potable water from the source to each customer.

As presented in Section 2.1, none of the existing water distribution systems were mapped in GIS but systems with AutoCAD data available were converted to GIS. Figure 2-3 shows the water pipelines that were converted but is not a comprehensive view of the water distribution systems. Additional GIS data collection and digitizing is needed to create a comprehensive network of infrastructure.

FIGURE 2-3. MAPPED WATER DISTRIBUTION PIPELINES



Challenges within the distribution systems in Pike County are common to most city distribution systems. Non-Revenue Water (NRW) is specifically defined to include the

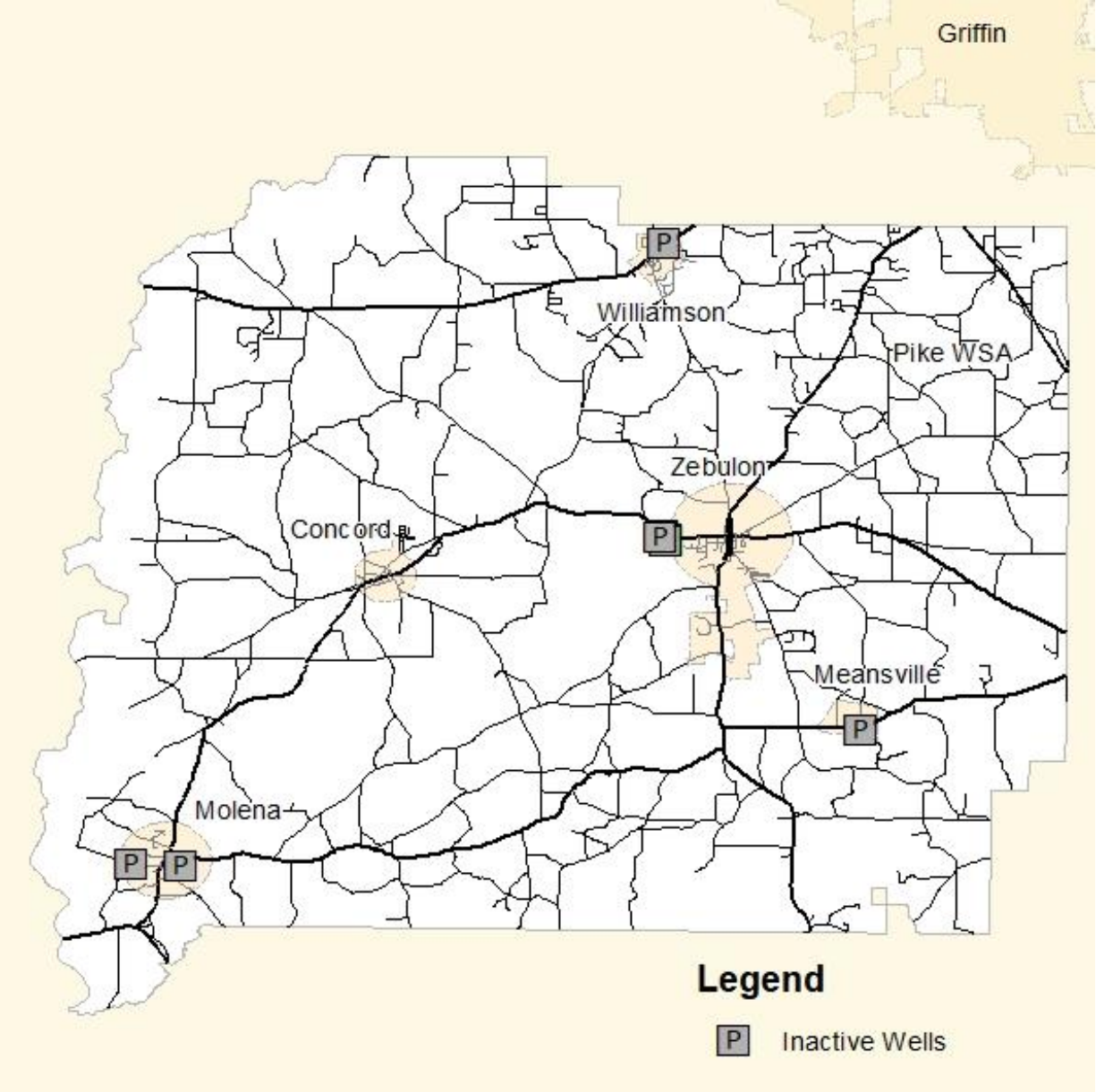
sum of specific types of water loss and any authorized, unbilled consumption that occurs within water distribution systems. NRW includes water lost through leaks but also water consumed through un-metered connections. NRW is very specific to each system, but all efforts to reduce NRW contribute toward a more sustainable water system.

The other common challenge is aging distribution system pipes and assets. Programmed maintenance can defer rehabilitation of the distribution system, but a capital improvement program to rehabilitate aging assets will still be needed.

2.2.3 Inactive Water Supply Sources

In addition to the seven (7) active wells in Pike County, there are ten (10) inactive wells. These wells are inactive due to a variety of reasons ranging from the failure of a primary pump to water quality issues that require additional filtration, to conflicts with the sole source Griffin water supply contracts. The inactive wells are shown in Figure 2-4.

FIGURE 2-4. INACTIVE WATER SUPPLY WELLS



2.3 Existing Collection Systems and Water Reclamation Facilities

The city of Zebulon and city of Concord operate municipal wastewater collection and water reclamation systems. The remainder of Pike County is served by private wastewater systems as described in Section 2.4.

2.3.1 Collection Systems

The collection system is the collection of pipes, lift stations, manholes, force mains, and other control structures that collect and convey wastewater from homes and businesses to the treatment facilities described in Section 2.3.1. This section presents the known information for the two collection systems in Pike County.

Common collection system challenges include inflow and infiltration (I&I) and aging assets. I&I refers to excess rain or groundwater that enters sewer collection pipes through infiltration (such as seepage through damaged pipes or manholes) and/or rain-derived inflow (rapid flow such as through cross-connections, water that pours into manhole covers, etc.). Cross connections can include stormwater pipes and private sources such as yard/roof drains, cooling towers, and condensate lines that are connected to the municipal sewer system. While local plumbing codes often preclude these cross connections, pipelines may be relocated and/or systems modified in a manner that changes the flow. Excess water in the wastewater system can result in sanitary sewer overflows (SSOs) that allow untreated sewage into local streams, treatment water quality issues due to overwhelming flows and lack of balance in treatment levels, and higher energy and treatment costs.

Both systems should clearly define what portion of the collection system is publicly maintained, including lower laterals. A lower lateral is the section of the lateral between the property line and the connection point to public sewer. Lower laterals can be a source of I&I thus it is important to clearly establish maintenance responsibility.

The other common and related challenge is aging infrastructure. Similar to the water distribution system, a consistent maintenance program can extend the life of collection system assets. However, each wastewater system needs to plan for the rehabilitation of aging pipelines and other assets.

2.3.1.1 City of Concord Collection System

Concord has a map of the collection system on a marker board that is periodically updated and serves as a resource for managing the system. This plan recommends digitizing the system in GIS following the data dictionary presented in Appendix B to support future planning efforts.

Concord is currently receiving higher than expected flows from the Hilltop area within the city limits, indicating I&I issues. Much of the collection system infrastructure in this part of town was recently replaced and the city is working to identify the source of the

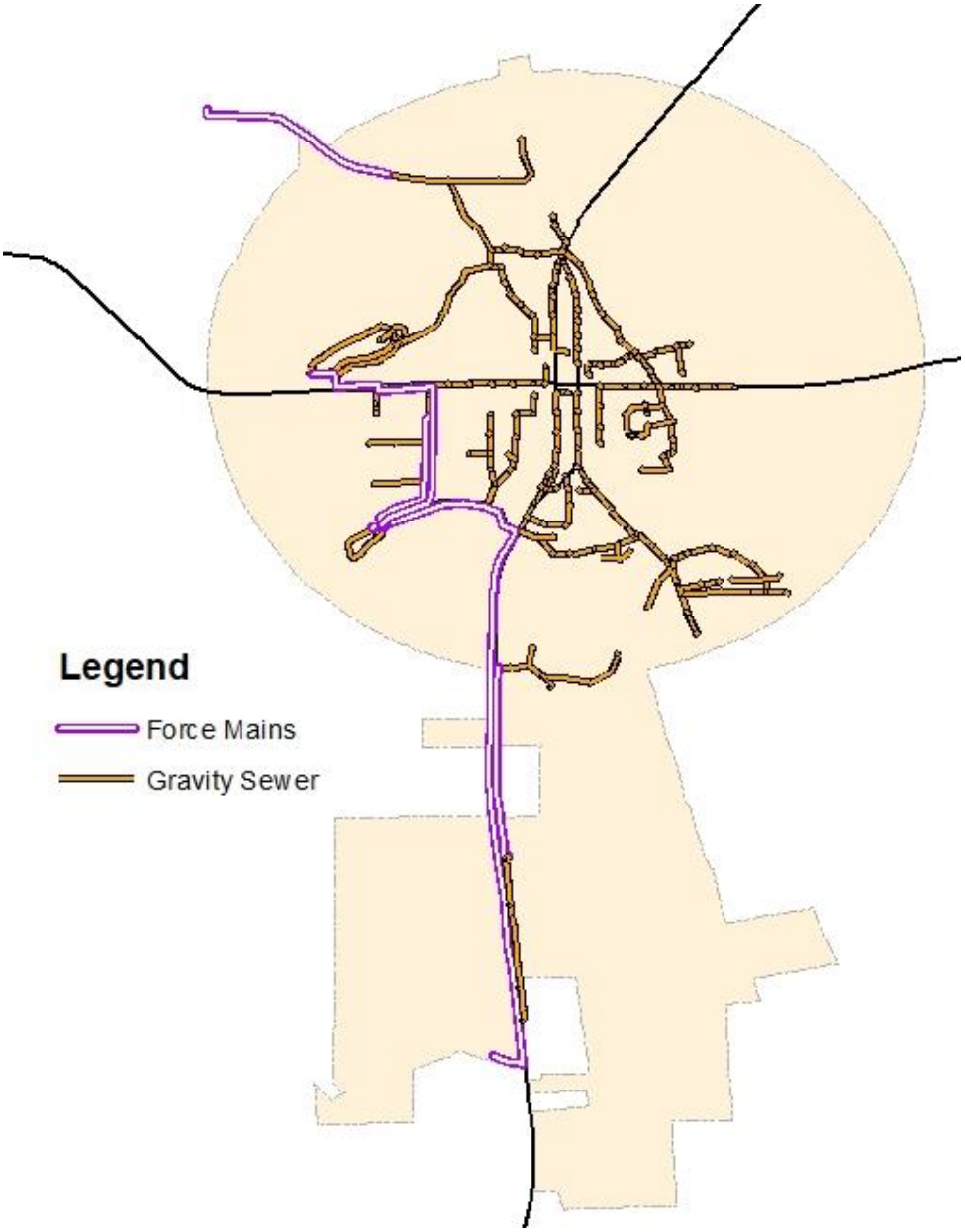
water that appears to be flowing into the system from a non-sewered source. Other areas within the collection system are older and near or past their expected life and may require rehabilitation.

2.3.1.2 City of Zebulon Collection System

Zebulon has a collection system map that was converted from AutoCad to GIS, shown in Figure 2-5. There are currently 4.9 miles of force main and 16.5 miles of sewer line in the collection system. There are some concerns on the eastern portion of the collection system of excessive I&I entering into the collection system that must be treated.

The city has plans to expand the collection system to serve future development. The recently constructed Veterans Affairs facility is expected to bring an influx of commercial uses. These commercial uses are expected to generate a higher volume of wastewater than single-family homes. Plans include extending the collection system to the northern city limits along US19/SR 3 to serve approximately 749 acres of mixed commercial and medium-density residential areas. The service would include approximately 1,325 feet of 8-inch and 1750 feet of 10-inch gravity sewer mains, a duplex lift station with 10 horsepower pumps, and 3,850 feet of 8-inch force main. Zebulon was unable to secure ARPA funds for this project but has applied for a GEFA Clean Water State Revolving Fund loan to prepare the system for these future demands.

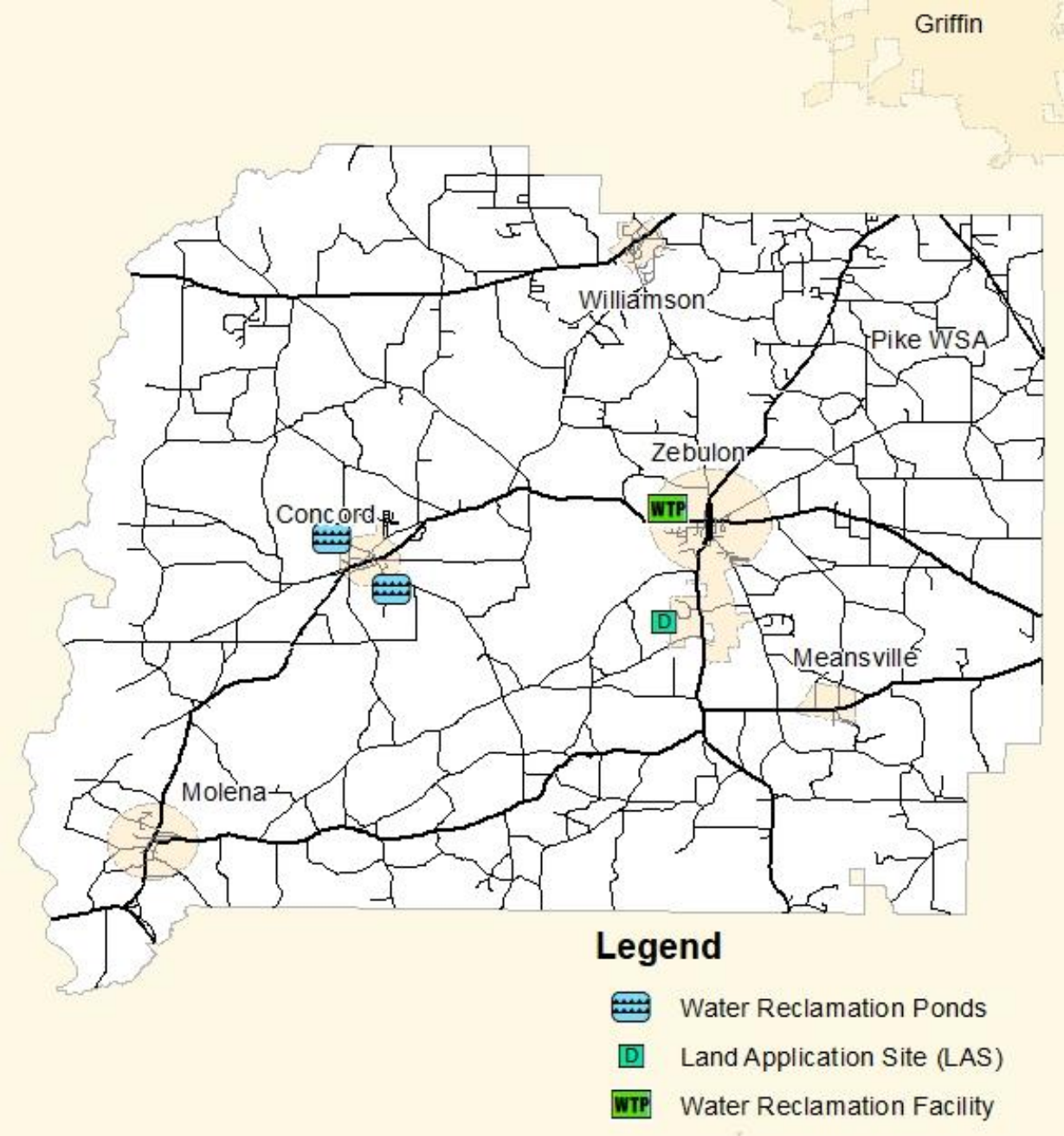
FIGURE 2-5. WASTEWATER COLLECTION SYSTEMS



2.3.2 Water Reclamation Facilities

There are three water reclamation facilities in Pike County. Two are operated by the city of Concord and one by the city of Zebulon. Zebulon's treatment includes two phases, a water reclamation facility and a land application facility that are in two different places. The facilities are shown in Figure 2-6 and described by system below.

FIGURE 2-6. WATER RECLAMATION FACILITIES



2.3.2.1 City of Concord Water Reclamation Facilities

The city of Concord operates two water reclamation oxidation ponds, the North Pond, and the South Pond facilities that are described in Table 2-2 below.

Table 2-2. City of Concord Water Reclamation Facilities

Facility	Permit #	Receiving Water	Approx. Size	Discharge Limit (monthly avg flow)
North Pond	GA0025461	UNT to Birch Creek	1.75 acres	0.038 MGD
South Pond	GA0025470	UNT to Elkins Creek	9.0 acres	0.10 MGD

The North Pond facility has received several recent notices of violation from the Georgia Environmental Protection Division (EPD). While these compliance issues have either been addressed or are currently being addressed, the issues provide for system understanding and are described below.

In 2019, the city received a letter of noncompliance and determined that erosion from the unnamed tributary surrounding the North Pond had eroded a portion of the dam surrounding the pond. The erosion compromised the integrity of the pond and required a Corrective Action Plan (CAP). The city completed the CAP with assistance from a GEFA emergency loan, and completed the actions outlined in the CAP to address the erosion around the dam.

Concord also applied for and received American Recovery Plan Act (ARPA) funds to address treatment issues at North Pond following several letters of non-compliance for exceeding biological oxygen demand (BOD) limits, total suspended solid (TSS) limits, and fecal coliform bacteria limits. The ARPA project includes the installation of two aerators and baffle curtains in a y-configuration to extend the treatment time and improve water quality. The project also includes the installation of an influent screen and efforts to control the duckweed and watermeal. These actions will also improve the pond functionality and protect water quality. Completion of the ARPA project is a high priority for this Plan (**WWIA1** presented in Section 3).

The South Pond is a larger facility and includes both an aeration pond and a polishing pond with a chlorine contact treatment prior to discharge. While this pond has not experienced the violations of the North Pond, there is some sludge accumulation and duckweed/ watermeal growth that will need to be addressed to maintain permit compliance.

2.3.2.2 City of Zebulon Water Reclamation Facility

The city of Zebulon operates one wastewater treatment plant that currently discharges to a land application site (LAS).

Table 2-3. City of Zebulon Water Reclamation Facilities

Facility	Permit #	Receiving Water	Approx. Size	Discharge Limit (monthly avg flow)
Zebulon LAS	GA0049476	LAS Town Branch	72.9 acres	0.499 MGD LAS 0.286 MGD discharge

In Zebulon, wastewater flows are first treated at a Wastewater Pollution Control Plant (WPCP) and then sent to a pond system with bar screen, aeration, and chlorination. From there, treated wastewater is discharged to a Land Application System (LAS), which is a series of irrigation lines that spray treated wastewater into a wooded area for final polishing treatment.

In addition to the LAS, Zebulon has a permitted discharge to Town Branch that will meet the near-term future demands. The city is currently not using the direct discharge option.

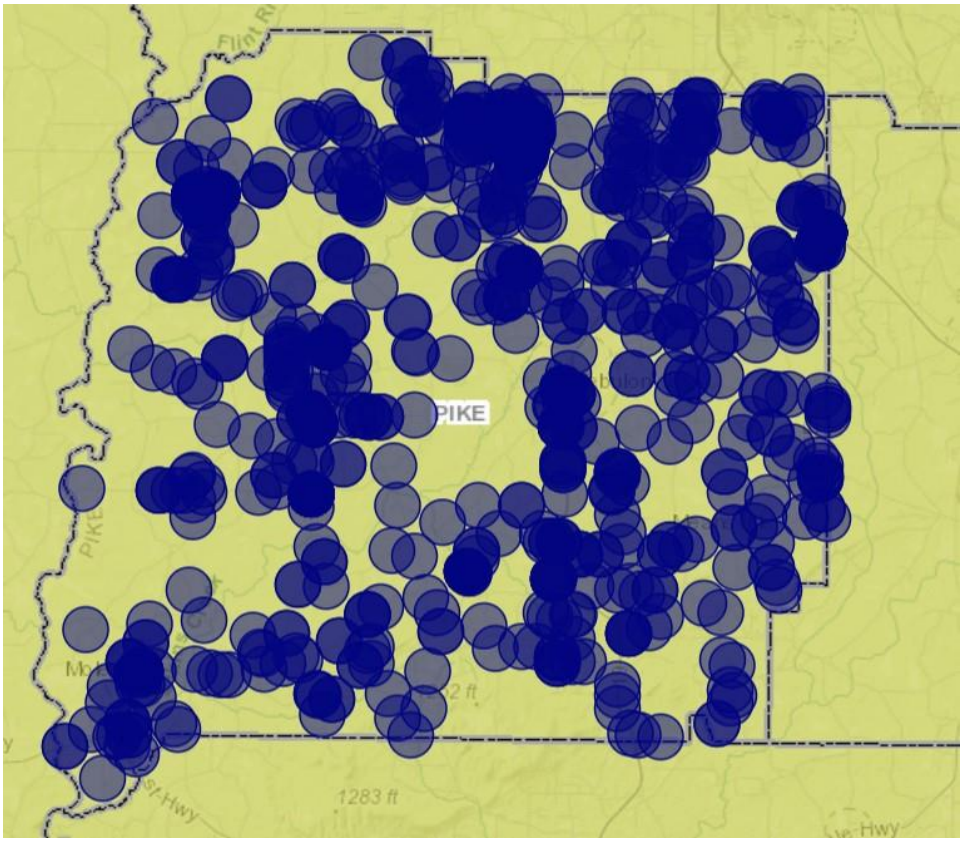
2.4 Septic Systems

Most of the households and businesses in Pike County are served by private, on-site sewage management systems (i.e., septic systems). Septic systems, if properly designed and maintained, are an environmentally sound treatment alternative where municipal sewer service is unavailable.

Septic system designs and installations are reviewed and approved by the Pike County Environmental Health Department within the Georgia Department of Public Health. The *Rules for On-site Sewage Management Systems* (Department of Public Health, Chapter 511-3-1) govern the minimum standards for design and installation of septic systems.

The Department of Public Health created a well and septic tank GIS map to better track the location of permitted septic systems. This database was built based on available septic tank records. The database shows 1,578 septic systems in Pike County (Figure 2-7). There are 9,690 parcels in Pike County and approximately 450 parcels are served by sanitary sewer in the cities of Concord or Zebulon. While some of the parcels are likely vacant, the number of actual septic systems in Pike County may be as high as 7,500 systems, meaning the location of most of the septic systems is unknown.

FIGURE 2-7. KNOWN SEPTIC SYSTEMS FROM PIKE COUNTY ENVIRONMENTAL HEALTH



*Requested GIS data from Environmental Health to improve map quality.

The PWPC noted that septic system failures are not a common or pervasive issue at present. Most parcels have sufficient land to build a new drainfield that is outside of sensitive areas and compliant, if needed. As new development occurs in Pike County, it is important to ensure the development regulations and policies consider the future rehabilitation needs associated with septic systems in areas that are not sewered, especially if new lots are smaller than existing lots.

Septic systems require periodic maintenance and pumping of accumulated septage. Currently, septage is accepted at the Concord South WPCP facility, which has the needed screening and aeration. Concord accepts up to 2 loads of septage per day with each load capped at 2,000 gallons/load. Currently, Concord receives approximately 3 to 4 loads per week. It will be important to monitor the effluent quality and adjust the number of loads accepted to ensure required treatment levels are achieved. Future wastewater treatment projects in both Concord and Zebulon should consider the local

septage demands when designing upgrades or expansions. Fees charged for accepting septage should fully recoup the cost of service.

2.5 Water Demand Forecasts

The water demands are calculated following the formula in Figure 2-8. The methodology received concurrence from the PWPC at the first meeting. The population projections presented in Section 1.3 provide the baseline and were adjusted to account for the percentage of the population served by the water system versus served by private well. The daily per capita water use was based on locally available data where provided. Where data was not provided, the Upper Flint Regional Water Plan value of 171 gallons per capita per day (gpcpd) was used. The commercial and industrial water demand was based on available billing records and future projections tied to the expected shift in patterns based on community input. Non-revenue water was 20% unless local data demonstrated a lower or higher number was appropriate. The inputs by water provider are provided in Table 2-4.

FIGURE 2-8. WATER DEMAND FORECASTING METHODOLOGY

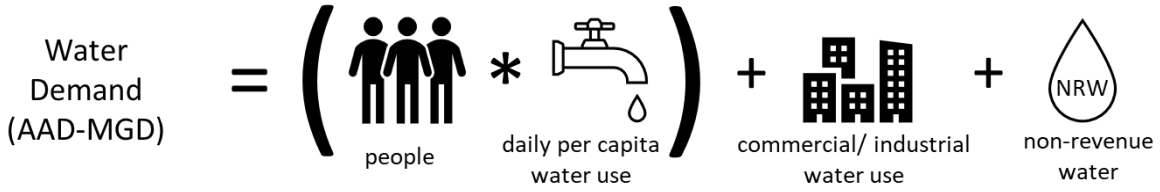


Table 2-4. Water Forecast Inputs by Community

Provider	Daily Per Capita Water Use (gpcpd)	Non-Revenue Water (%)
Concord	150	30%
Meansville	150	50% → 20%
Molena	60	20%
Pike County WSA	171	20%
Williamson	73	20%
Zebulon	150	10%

The water forecasts for each water provider in Figure 2-9 through Figure 2-14, compare the demand forecasts to the available current water supply. The presentation allows a comparison of whether sufficient supply is available for future needs. The communities that exclusively purchase water from Griffin are not presented with an available water supply limit, as the contracts permit significantly more water than current demand.

FIGURE 2-9. CONCORD WATER DEMAND FORECASTS

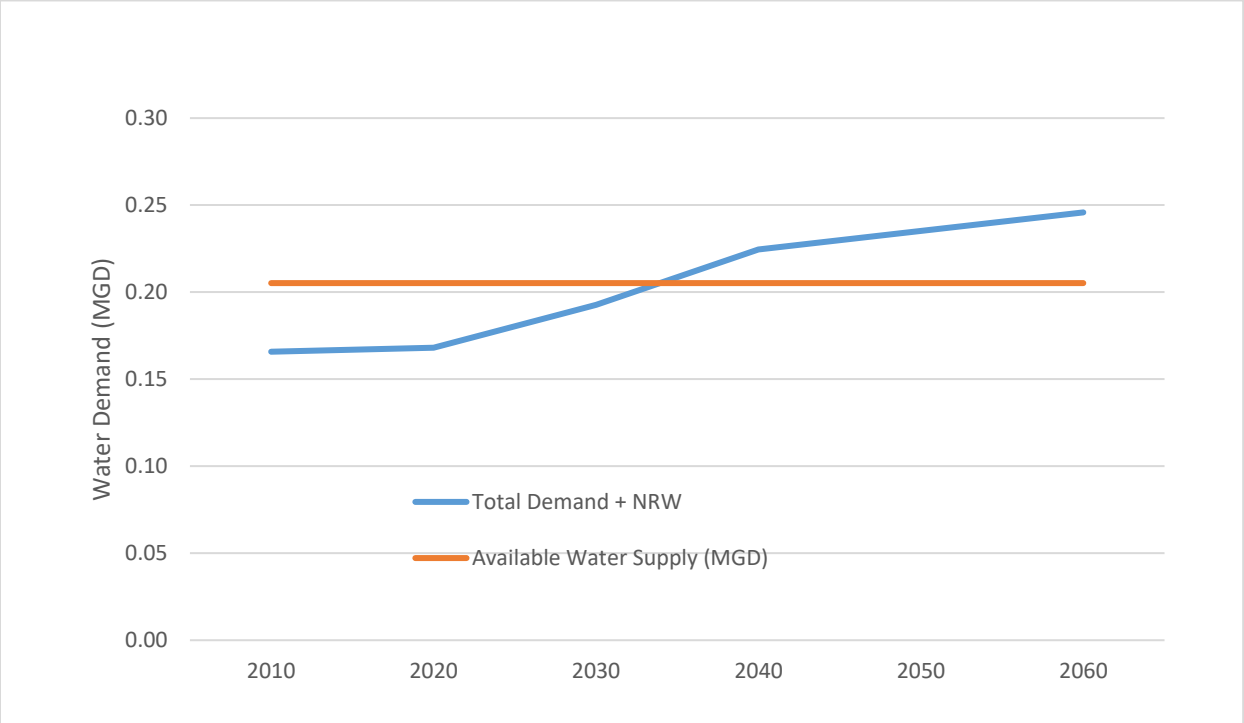


FIGURE 2-10. MEANSVILLE WATER DEMAND FORECASTS

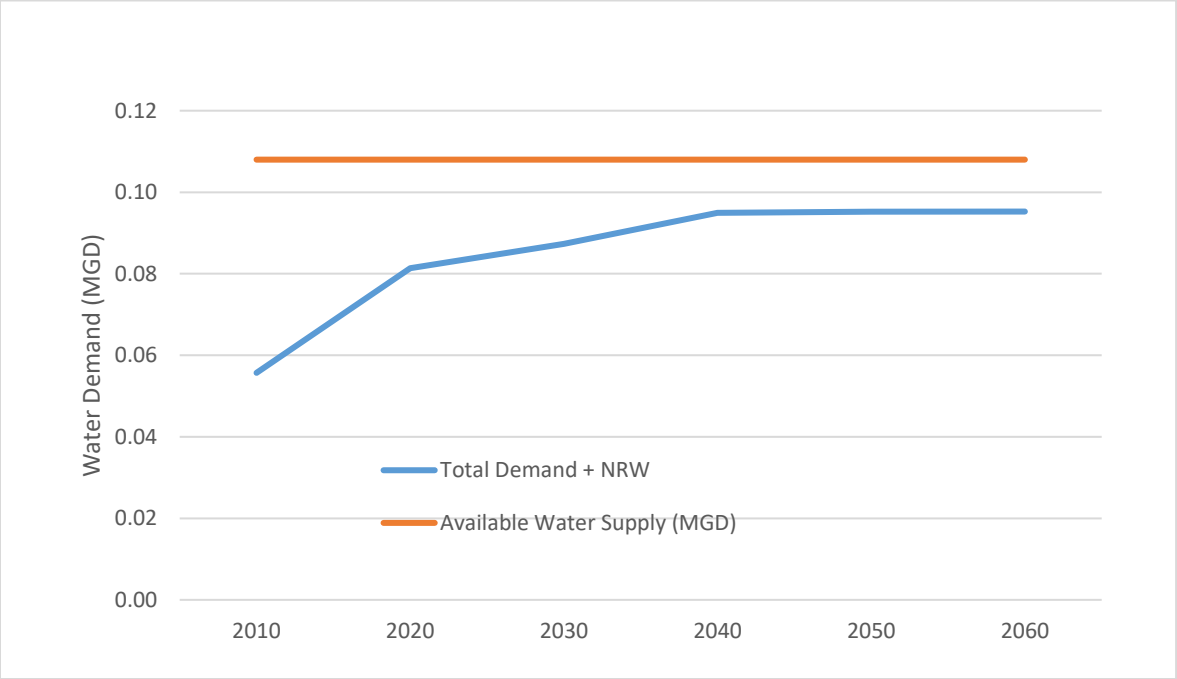


FIGURE 2-11. MOLENA WATER DEMAND FORECASTS

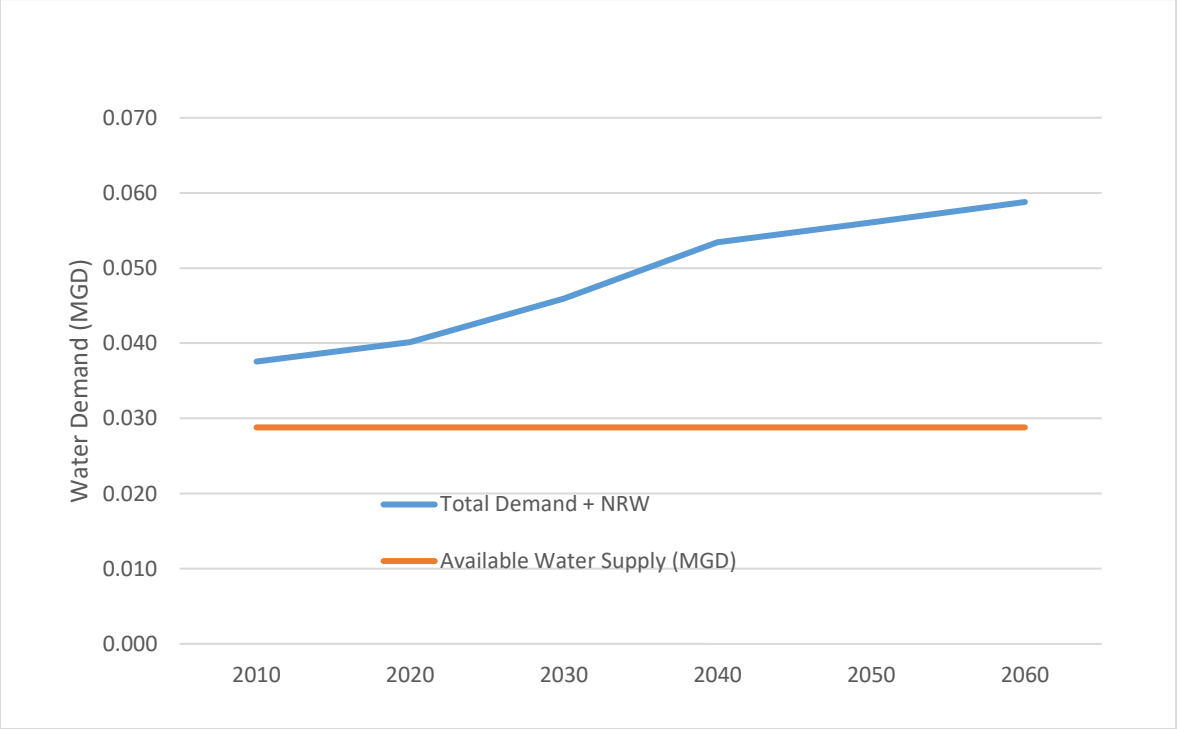


FIGURE 2-12. WILLIAMSON WATER DEMAND FORECASTS

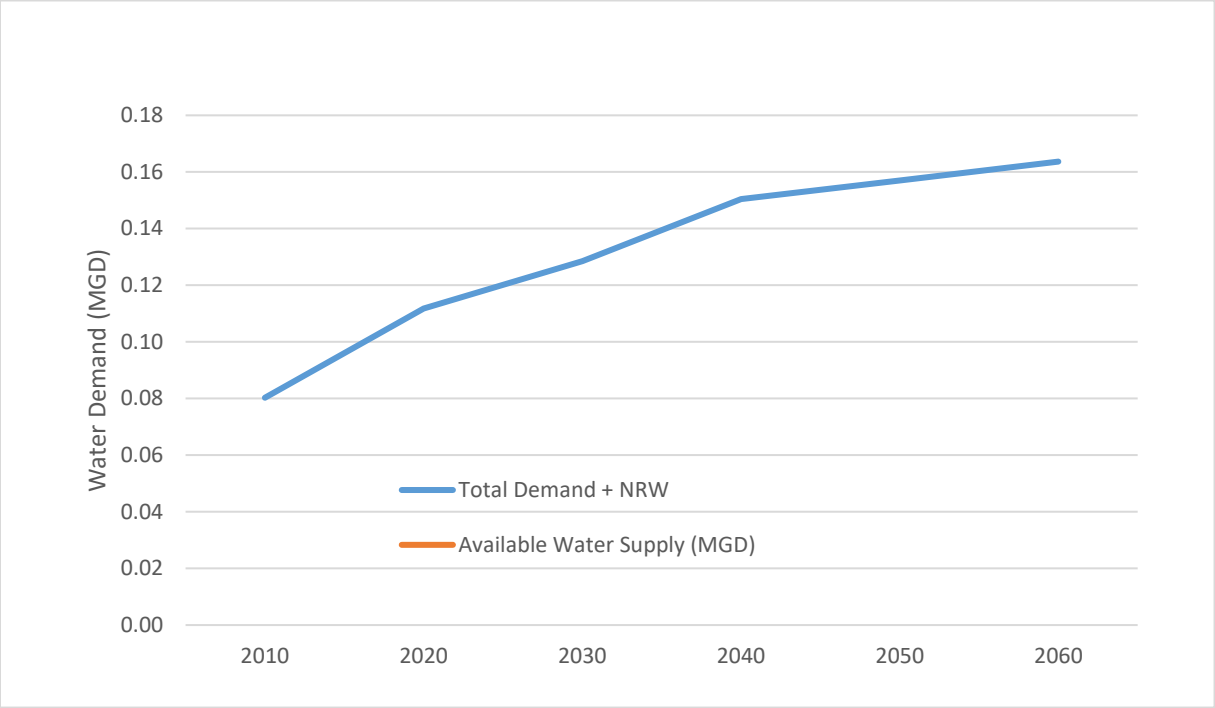


FIGURE 2-13. ZEBULON WATER DEMAND FORECASTS

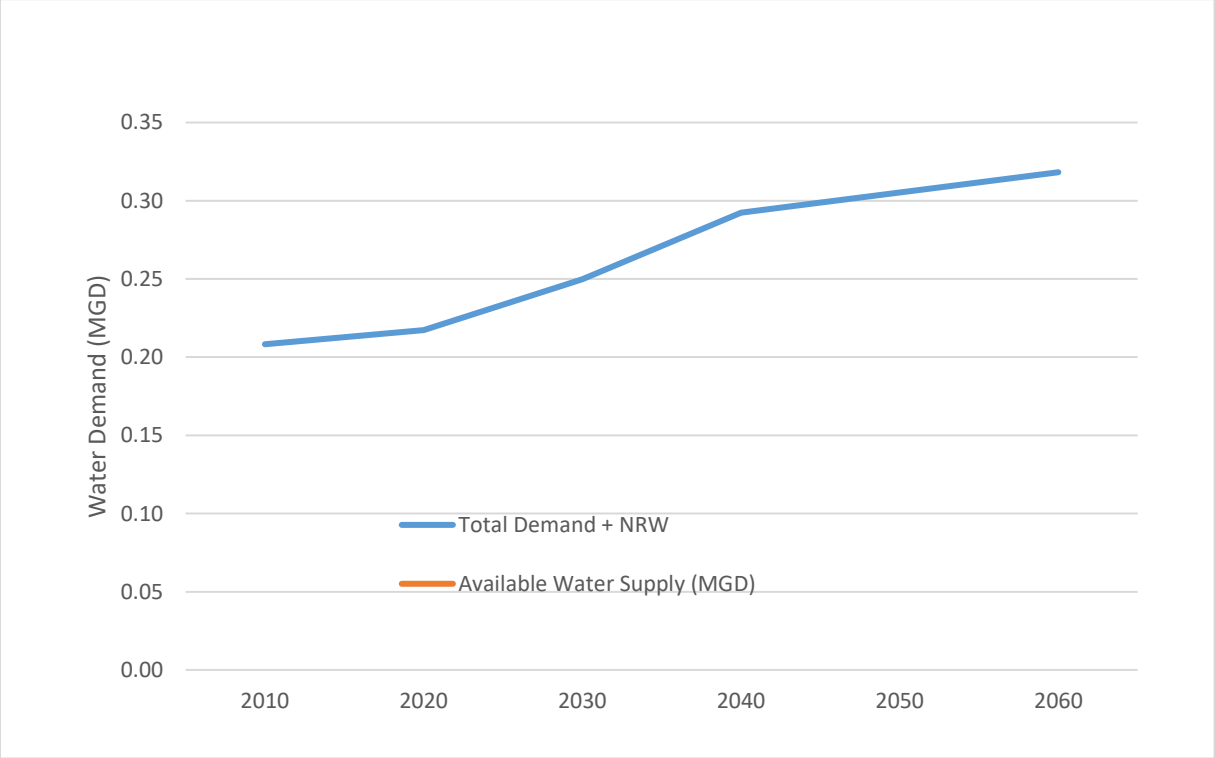
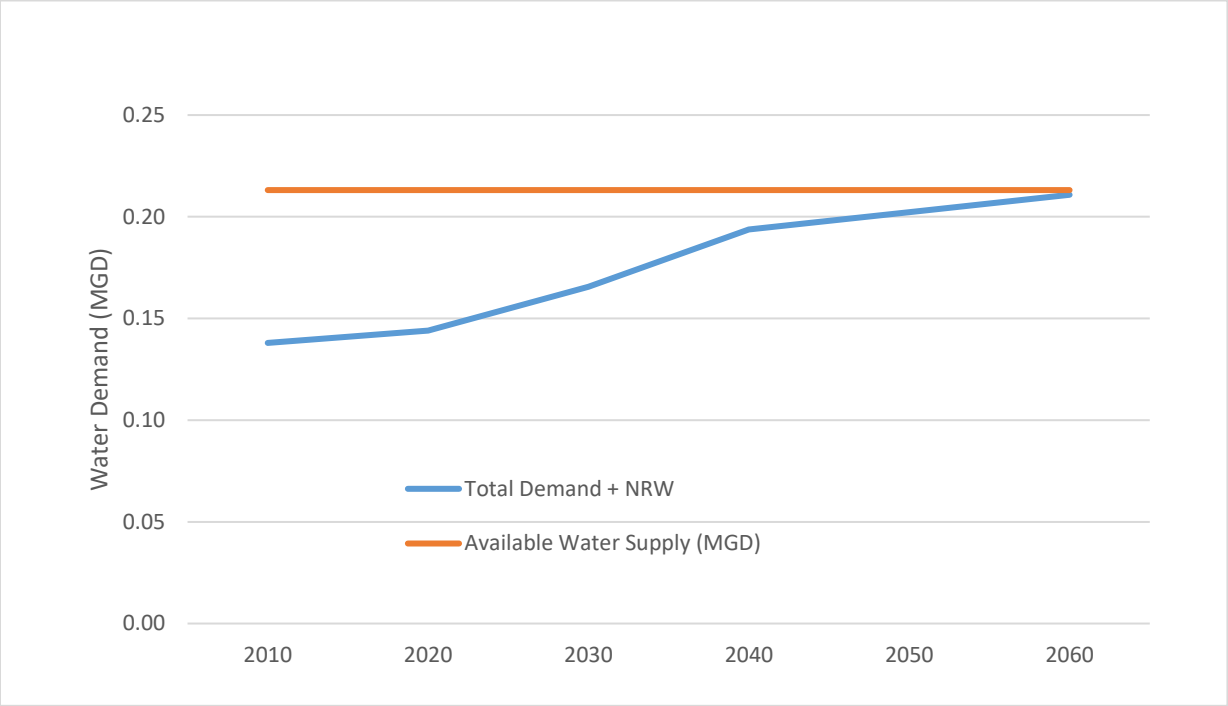


FIGURE 2-14. PIKE COUNTY WATER & SEWER AUTHORITY WATER DEMAND FORECASTS



Currently, Molena's water demand exceeds the available supply. Concord exceeds its current water supply by 2040, and Meansville and Pike County Water and Sewerage Authority approach their demand in 2060. These communities will need to consider alternative water supply sources which will likely include a combination of new wells and/or interconnections as well as an emphasis on reducing NRW.

2.6 Wastewater Flow Forecasts

The wastewater flows to the water reclamation facilities are calculated following the formula in Figure 2-15. Wastewater generated in homes and businesses will be treated either at a water reclamation facility for those connected to the Concord or Zebulon systems or by a private septic system. The municipal flows are forecasted to determine if the existing facilities can treat current and future flows. Septic flows are presented in Section 2.7.

Wastewater flows use the water demands calculated in Section 2.5 as well as assumptions presented in Table 2-5 and described below. The PWPC concurred that the following planning assumptions were appropriate.

- Outdoor Water Use: Outdoor water does not flow to the water reclamation facility for treatment and therefore is removed from the indoor water demands. A conservative estimate of 20% of total water use is for outdoor purposes was used.
- Commercial Demands: There are very few commercial customers, and the type of commercial customers is expected to change. Flows were based on planned development data provided by each wastewater system.
- I&I: Inflow data was not available to estimate I&I, therefore an industry benchmark of 20% of the annual average wastewater flows was used.
- Peaking Factor: Influent flow data was not available to calculate the maximum flows received at the water reclamation facility, therefore a 25% peaking factor was used.

FIGURE 2-15. WASTEWATER FLOW FORECAST METHODOLOGY

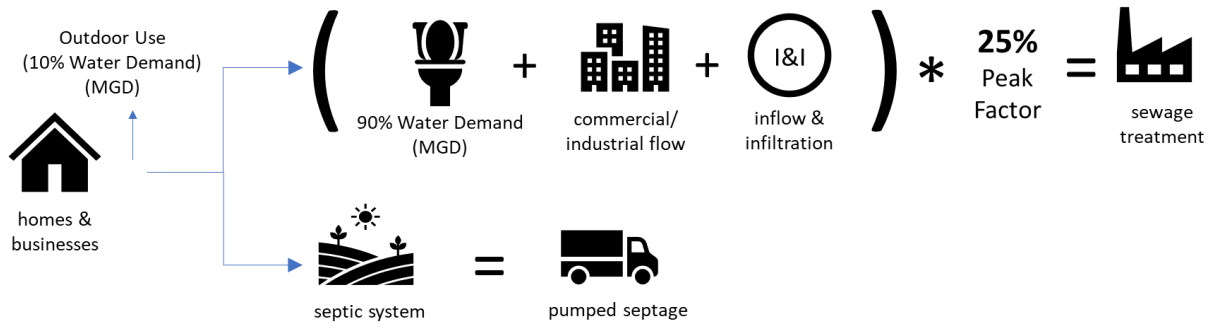


Table 2-5. Wastewater Flow Inputs by System

Provider	% Population Sewered	Inflow & Infiltration (I&I)	Treatment Peaking Factor
Concord	60% → 80%	20%	25%
Zebulon	80%	20%	25%

The wastewater flow forecasts for Concord and Zebulon are compared to the permitted treatment to determine if sufficient treatment is available for future flows. Both systems will need to expand treatment capacity to meet the expected wastewater flows.

FIGURE 2-16. CONCORD WASTEWATER FLOW FORECASTS

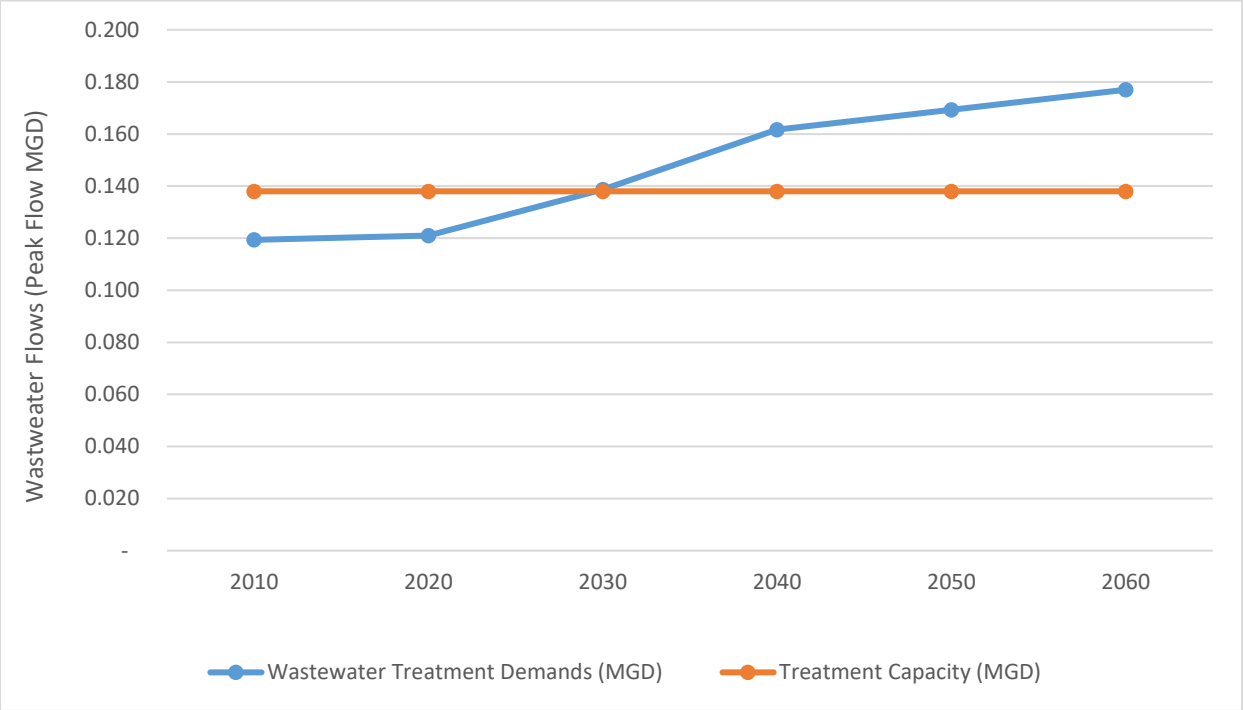
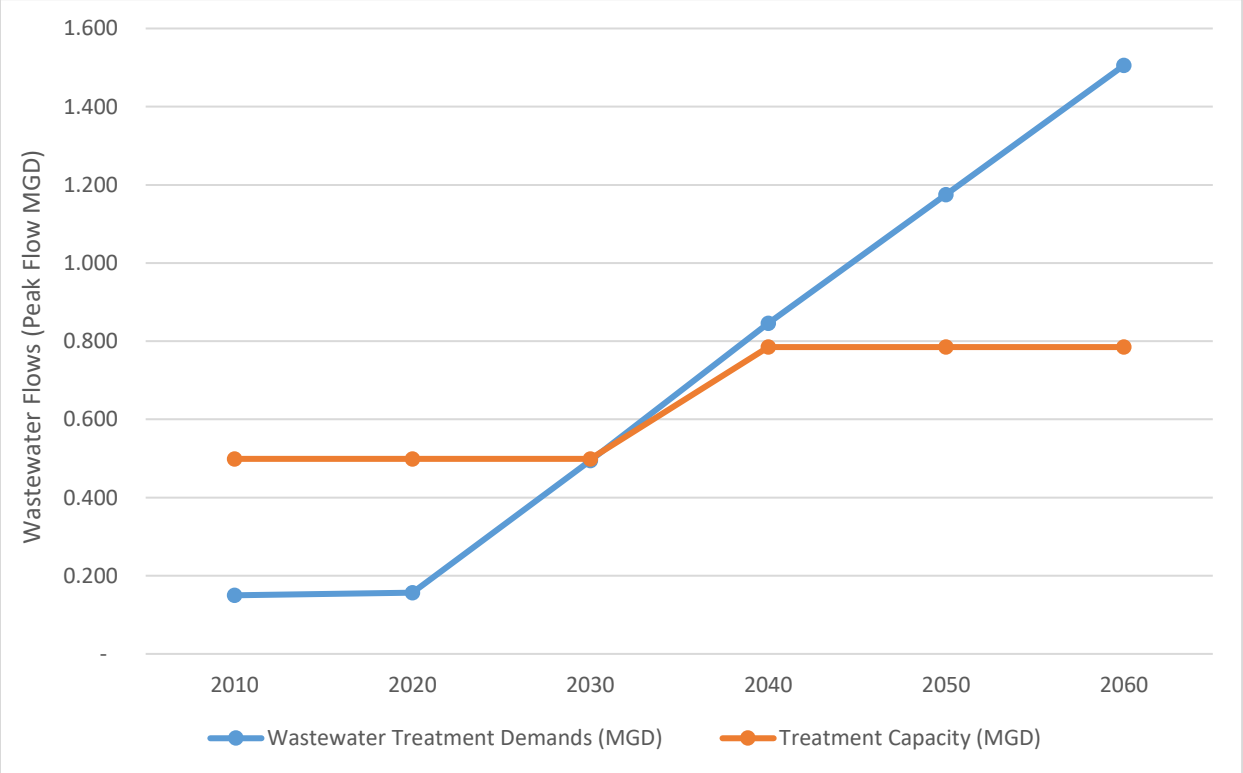


FIGURE 2-17. ZEBULON WASTEWATER FLOW FORECASTS



2.7 Septic System Forecasts

Most of Pike County residents are served by private septic systems. The performance of private septic systems depends on proper siting, installation, use, and maintenance. Every 5 to 10 years, depending on use, septic systems tanks are pumped. The septage must be properly pumped, transported, and disposed. Currently, pumped septage is accepted at the Concord South Pond facility as described in Section 2-4.

The flows treated by septic system are presented in Table 2-6 by community. The flows are presented so that the pumped septage can be accounted for either in wastewater treatment planning by Concord or Zebulon or as each community evaluates zoning requirements and the density of potential new septic systems.

Table 2-6. Septic System Forecasts by Community in MGD

Community	2020	2030	2040	2050	2060
Concord	0.054	0.062	0.072	0.075	0.079
Meansville	0.065	0.070	0.076	0.076	0.076
Molena	0.032	0.037	0.043	0.045	0.047
Williamson	0.089	0.103	0.120	0.126	0.131
Zebulon	0.070	0.080	0.094	0.098	0.102
Pike County	0.115	0.132	0.155	0.162	0.169

3 Alternatives Evaluation

A series of alternatives was developed and reviewed by the PWPC before selecting the plan recommendations. The water and wastewater alternatives are presented in progressive tiers that transition from more basic action items to more advanced action items. Generally, a system would address the action items in the more basic tier before progressing to the more advanced tier action items. There are three tiers of water alternatives with 29 total action items and two tiers of wastewater alternatives with 22 total action items. In addition, there are seven (7) overall recommended actions that are recommended for all systems that are not specific to water or wastewater and are not divided into tiers.

3.1 Water Supply and Distribution Alternatives

The water supply and distribution alternative action items are presented in three tiers, with the action items within each tier building on the action items in the previous tier. The three tiers described in the following section include focused improvements, development node, and regional water system.

3.1.1 Focused Improvements

The focused improvement action items, Table 3-1, generally address the overall functionality and efficiency of the existing water supply and distribution systems. These are seen as base recommended actions for each system with the implementation timeframe varying by system.

Table 3-1. Focused Improvements (I) Recommended Actions

#	Action Item	Description
IA. Non-Revenue Water (Basic)		
IA1	Install Production Meters at Each Source	Meter the volume of water entering the distribution system at all sources to better understand consumption and NRW. Reducing NRW can extend existing water supplies. Most systems have manually read meters

#	Action Item	Description
		with data stored in notebooks. Advanced Metering Infrastructure (AMI) allows for automated meter reading and is preferred to manually reading. If AMI is not installed, manual read results should be stored in spreadsheets.
IA2	Identify Non-Metered Connections	Install meters at every service connection to track water consumption, including City Hall, Fire Department, Public Library, etc. Identify and plan to install meters at all non-metered connections. This effort may be combined with IE1 as mapping known meters is an effective strategy to identify unmetered connections.
IB. Emergency Supply		
IB1	New Supply to Meet Current Water Demands	Molena's current water demands exceed the available supply. The current operable well fills the distribution tank that serves the daily needs. Either another well and/or an interconnection is needed to meet this critical need. Concord, Meansville, and Pike County WSA may need additional supplies by 2060 and should begin evaluating future supply sources.
IB2	Emergency Water Supply Plan	Each system should have an emergency water supply plan capable of providing approximately half of the daily demand for a period of 3 days. The Plan should consider a variety of emergencies such as well pump failure, power outage, tank failure, water main break, treatment system failure, etc. and how these emergencies may affect supply. The Plan may recommend an emergency interconnection to another system, secondary interconnection point, another well, or additional storage.
IB3	Emergency Repair Plan	Develop a plan to replace or repair major water system components that could result in water outages if it fails. The plan should include details on the component (make, model number, etc) as well as sources to secure a replacement part. The plan may include an inventory of some critical parts. The plan may also

#	Action Item	Description
		recommend an emergency generator. Communities should consider joining GAWARN, a network of water and wastewater providers poised to provide emergency support.
IC. Fire Flow Improvements (Basic)		
IC1	Map Fire Hydrants in GIS	Map the location of all fire hydrants in GIS along with the hydrant attributes (size, type, installation, outlet size, nozzle size, etc.). Maintenance needs or repairs are typically noted during mapping. The map will visually show areas where new hydrants are needed. The GIS template for hydrants is provided in Appendix B.
IC2	Implement a Valve Assessment and Mapping Program	Follow the standard methodology, defined by American Water Works Association (AWWA) in Manual of Practice M44, to effectively manage valves. In addition, each valve should be located and mapped in GIS to include location, depth, size, type, current position, and number of turns. The program should include a schedule to regularly exercise known valves. Maintenance records and rehab needs should be documented. The GIS template for valves is provided in Appendix B.
IC3	Fire Flow Review in Permitting	Review all construction plans for new non-residential construction, additions, remodeling, etc. for compliance with adopted fire prevention codes. This fire prevention program ensures that the water system and the developer are aware of issues prior to construction. If the infrastructure is not sufficient to meet fire flow needs, the system may partner with the developer to implement projects to meet the demands. A permit should not be issued for a project that cannot meet fire flow requirements.

#	Action Item	Description
ID. ISO Rating Improvements (Basic)		
ID1	Perform Annual Hydrant Inspections	National Fire Protection Association (NFPA) Manual of Practice 291 requires annual inspection of fire hydrants to ensure the hydrants are operational and in proper condition. An inspection report should be completed for each hydrant listing static pressure reading, date and time, along with any issues or repairs. Inspections should follow procedures in Manual of Practice AWWA M17.
ID2	Budget for Volunteer Firefighter Training	Increase budget allowance for fire fighter training to maximize ISO points. Recommend budgeting for the training class as well as to pay volunteer fire fighters for time attending training to increase participation. Maximizing training from the 2016 ISO audit could result in the desired one-point rating improvement. A training spreadsheet tool is included in Appendix C.
ID3	Fire Inspection of New Development/ Redevelopment	Inspect new development for compliance with adopted fire prevention codes prior to issuance of the certificate of occupancy (CO). Points are awarded for inspecting all new residential construction and all new non-residential construction prior to CO issuance.
IE. Water Infrastructure Management		
IE1	Map the Water System in GIS	Create a map of all water system attributes in GIS in coordination with IC1 and IC2. The GIS template for pipes, tanks, meters, and other assets is provided in Appendix B.
IE2	Implement Inspections & Maintenance Program	Create a plan for routine inspections of the water system assets and a procedure for tracking maintenance and capital improvement projects. Maintenance records should be maintained in a spreadsheet or a Computerized Maintenance Management System (CMMS).

#	Action Item	Description
IE3	Update Construction, Inspection, & Warranty Requirements	Review the construction standards and revise to ensure materials and methods support long-term system maintenance. Inspect developer and/or contractor completed projects prior to acceptance and prior to end of the warranty period. Consider whether current warranty or bond requirements are sufficient. Example construction & inspection requirements are in Appendix D.

3.1.2 Development Node

The development node action items build on the focused improvement actions and allow for the controlled expansion of the water supply and distribution systems.

Table 3-2. Development Node (II) Recommended Actions

#	Action Item	Description
IIA. Maximize Production		
IIA1	Well Rehabilitation Study	There are 10 inactive wells in Pike County that were previously operational. A well rehabilitation study will ideally include a camera inspection and review of the installation records to determine the rehabilitation needs and the cost to restore the well's original yield. Wells with a high yield to cost ratio can be placed back in service, with water available for local use, a neighboring community, or emergency use.
IIA2	Maximize Current Well Yield and Storage	Evaluate the operational wells to determine if rehabilitation or similar alterations could increase the well yield. Ensure existing system storage is sufficient to maximize well yield during normal operations. Site and construct additional storage in conjunction with the Water Distribution Model (IIB1).
IIB. Water Distribution Model & Enhancements		

#	Action Item	Description
IIB1	Develop a Water Distribution Model	Develop a calibrated model, using AWWA Manual of Practice M32, to support long-range planning and rehabilitation. The model should recommend projects to improve system efficiency, address water quality issues, improve fire flows, and meet planned development demands. The model will be based on the GIS maps developed in IE1.
IIB2	Implement Distribution System Upgrades	Create a Capital Improvement Plan (CIP) that prioritizes the installation of recommended projects from the Model (IIB1). Typically, the most cost-effective projects are implemented first.
IIB3	Develop a Distribution System O&M Plan	Create an Operations & Maintenance (O&M) Plan that identifies routine inspections and maintenance activities, as well as a program for rehabilitation of aging pipes and system components. This Plan should leverage EPD's *Guidance Manual for Preparing Public Water Supply System O&M Plans* (May 2000 or current).
IIC. Non-Revenue Water (Moderate)		
IIC1	Perform a Full Non-Revenue Water Audit	Perform an annual Non-Revenue Water Audit using the AWWA Free Water Audit Software to better understand and identify actions to reduce Non-Revenue Water. This assessment uses high quality and detailed data inputs to recommend cost-effective actions.
IIC2	Implement Recommendations from the NRW Audit	Use AWWA M36 methodology to identify and implement cost-effective actions identified in the Non-Revenue Water Audit. Prioritize actions based on available staffing and funding. These actions should be integrated into a CIP Plan (IIB2).
IID. ISO Rating Improvements (Moderate)		
IID1	Perform Fire Flow Testing of Hydrants Every 5 Years	Test each hydrant following AWWA M17 and NFPA 291 methodology, every 5 years. Results and date tested should be recorded. Additional ISO points are

#	Action Item	Description
		available for color-coded hydrant marking based on flows. Maintenance or rehabilitation needs should be tracked in spreadsheets or a CMMS system.
IID2	Implement Projects to Increase Fire Flow	Implement distribution system improvements to improve fire flows as recommended by the Water Distribution Model (IIB1).
IID3	Construct a Training Facility	Identify at least 2-acres of land and construct a fire service training center compliant with NFPA 1402. A live fire training structure including smoke room and a drill tower at least 3 stories tall will maximize points and facilitate completion of required training hours.
IID4	Budget for a Full-Time, Paid Fire Department	ISO points are awarded to communities with full-time fire fighters. This action item includes budgeting for full-time staff as well as a training budget sufficient to maximize training points for the full-time staff.

3.1.3 Regional Water System

The Regional Water System action items build upon the recommended actions in both the focused improvement and development node scenarios. This alternative allows for an aggressive growth of the water infrastructure to meet future demands.

Table 3-3. Regional Water System (III) Recommended Actions

#	Action Item	Description
IIIA. New Water Supply Study		
IIIA1	New Water Supply Study	Leverage previous studies in and around Pike County and explore options for a new surface water reservoir and/or new groundwater wells. The new sources should be consistent with the Upper Flint Regional Water Plan and sustainable.

#	Action Item	Description
IIIA2	Construct New Water Supply	Design, permit, and construct new water supply sources to meet future demands.
IIIB. Distribution System Expansion		
IIIB1	Plan Distribution System Expansions	Leverage the water system model (IIB1), to plan the extension of the distribution system to meet demands in a sustainable fashion, mindful of water quality and fire flow considerations.
IIIC. Evaluate Water Production Wholesale Model		
IIIC1	Evaluate Water Production Wholesale Model	Evaluate the creation of a new wholesale water production entity who distributes potable water to existing distribution systems. Communities currently purchasing water from Griffin, would transition to the local wholesale provider as contracts permitted. Typically, wholesale models create a water authority board that includes representatives from each of the communities purchasing water. The study should carefully weigh the long-term cost-benefits as well as the upgrades that may be needed to each distribution system, including storage, to provide a sustainable system.

3.2 Wastewater Collection and Treatment Alternatives

The wastewater collection and treatment action items are presented in two tiers, with the recommendations within each tier building on the recommendations in the previous tier.

3.2.1 Focused Wastewater Improvements

The focused wastewater system action items focus on operating the existing collection system and treatment facilities at peak efficiency, thereby optimizing the existing

treatment capacity. These recommendations only apply to the City of Concord and the City of Zebulon who operate public wastewater systems. These are seen as base recommendations for both systems and recognize that implementation timeframes may vary.

Table 3-4. Focused Wastewater Improvements (WWI) Recommended Actions

#	Action Item	Description
WWIA. Wastewater Treatment		
WWIA1	Concord North Pond Rehabilitation	Implement planned Concord North Pond rehabilitation actions to address the short treatment time and water quality challenges. Actions include installation of baffles and aeration (power, pump, and motor). This project is ongoing and partly funded with ARPA funds.
WWIA2	Concord South Pond Rehabilitation	Dredge the Concord South Pond to maximize treatment volumes and eradicate algae.
WW1A3	Emergency Repair Plan	Create a plan for replacing major system components. Include the age, condition, replacement cost, anticipated replacement timeframe as well as the make/ model/ supplier of major system elements. This plan could also recommend budgeting for emergency generators to ensure critical pump stations remain operational during power outages. Communities should consider joining GAWARN, a network of water and wastewater providers poised to provide emergency support.
WW1A4	Flow Monitoring of Plant Influent & Effluent	Flow monitoring of the influent and the effluent provides critical data for system planning and operations. Automated monitoring of plant influent is strongly

#	Action Item	Description
		recommended for to assist in I&I assessment. Until installed, manually read data should be stored in a spreadsheet and not just a notebook.
WW1A5	Septage Records	Maintain records of the volume of septage received, the time of day received, and any impact on water quality in a spreadsheet. Data can guide future policies or improvements to septage treatment.
WWIB. Collection System Operations & Maintenance		
WWIB1	Collection System Map in GIS	Create a map of all wastewater system assets, including attributes, in GIS. The GIS template for pipes, pump stations, manholes, and other assets is provided in Appendix B.
WWIB2	Implement Inspections & Maintenance Program	Create a plan for routine inspections of the wastewater system and a procedure for tracking maintenance and capital improvement projects. Maintenance records should be maintained in a spreadsheet or a Computerized Maintenance Management System (CMMS).
WW1B3	Collection System Rehabilitation Program	Create a CIP for the ongoing rehabilitation of aging wastewater collection pipes, lower laterals (if publicly maintained), and manholes. The CIP should prioritize projects based on criticality so that the most important pipes in the system are rehabilitated first.
WW1B4	Outreach & Education	Educate the public and businesses on proper use of the wastewater system and septic systems. Fats, Oils, and Grease

#	Action Item	Description
		(FOG) and 'flushable' wipes educational materials can be added to existing communication vehicles.
WWIC. Targeted I&I Reduction Program		
WWIC1	Identify Priority I&I Sewersheds	Use available data from lift station run times, flow meters or level sensors, repeat wet weather SSO locations, or anecdotal information to prioritize sewersheds for investigation. A sewershed refers to the collection system that drains to a certain downstream point. A sewershed can range in size based on the downstream point.
WWIC2	Assess Priority Sewersheds	Assess priority watersheds, one at a time, to determine the source(s). Assessment techniques may include temporary flow meters and/or level sensors, targeted smoke testing if inflow is suspected, or small-scale CCTV if excessive infiltration is expected. Consider a regional resource or contract for I&I field work. Document all defects in spreadsheets or a CMMS. Some I&I sources may be private sources, such as cooling towers, swimming pools, or condensate lines. Coordination with the property owner to address private side issues should be documented in spreadsheets or a CMMS.
WW1C3	Priority Sewer Rehabilitation	Prioritize and address the sources of I&I identified during the priority sewershed assessment (WWIC2) on the public collection system. Notify private property owners if I&I issues are suspected from private side sources and follow local notification and enforcement policy.

#	Action Item	Description
WWID. Construction & Maintenance Strategy		
WW1D1	Update Construction & Inspection Requirements	Review the construction standards and revise to ensure materials and methods support long-term system maintenance. Inspect developer and/or contractor completed projects prior to acceptance and prior to the end of the warranty period. Inspect new buildings for potential cross connections to the sewer system. Consider whether current warranty or bond requirements are sufficient. Example construction & inspection requirements are in Appendix D.

3.2.2 Wastewater System Expansion

The wastewater system expansion action items are geared toward expanding and extending the current wastewater collection and treatment facilities in Concord and Zebulon.

Table 3-5. Wastewater System Expansion (WWII) Recommended Actions

#	Action Item	Action Item Description
WWIIA. Wastewater Treatment Expansion		
WWIIA1	Evaluate Zebulon Treatment Expansion	Zebulon flows are projected to exceed the LAS capacity around 2030 necessitating the use of their discharge permit. Flows are expected to exceed permitted discharge levels in 2040 based on commercial growth. Planning for the 2030 discharge is needed as well as careful monitoring of flows.

#	Action Item	Action Item Description
WWIIA2	Evaluate Concord Treatment Flows	Concord flows are projected to exceed the total capacity for both ponds in 2030. Actions WWIA1 and WWIA2 include improvements to the efficiency of the ponds. Influent and effluent flows should be carefully tracked in a spreadsheet to determine if the facilities are at capacity. When flows reach 75% of capacity, Concord should begin planning for these future wastewater needs.
WWIIA3	Evaluate Pumped Septage Demands	Concord currently accepts limited residential pumped septage. Data collected in WWIA5 as well as data on new septic systems installed should be considered when designing any facility upgrade or expansion. Design considerations might include additional screening or better septic intake facilities.
WWIIB. Wastewater Collection System Model		
WWIIB1	Develop a Static Model Structure	A static model's structure is the physical representation of the collection system and relies on the GIS mapping in WWIB1. The static model structure is the starting point for developing a calibrated model.
WWIIB2	Develop Flow Estimates by Land Use	The static model structure (WWIIB1) is improved with accurate flow estimates by land use. Temporary flow meters that isolate a specific land use are often used to develop community-specific values, or assumptions may be made using available industry data.
WWIIB3	Develop Assumptions for Wet Weather Contributions	Flow monitoring and rainfall data provide data for estimating community-specific wet weather assumptions that are added to

#	Action Item	Action Item Description
		the static model structure (WWIIB1), or assumptions may be made for peaking factors. The assumptions may vary by sewershed or may be consistent across the system.
WWIIB4	Calibrate the Model Using Temporary Flow Meters	The static model structure (WWIIB1) with assumptions (WWIIB2 & WWIIB3) are calibrated against actual flow and rainfall data to ensure the model predictions reflect the system. The model is then used to prioritize capital improvements and forecast the systems response to potential system extension projects.
WWIIC. Collection System Expansion and Rehabilitation		
WWIIC1	Extend the Wastewater Collection System	Use the calibrated system model (WWIIB4) to identify sustainable system expansion projects. Planned developer extensions should be modeled to determine whether system upgrades are needed in conjunction with the extension.
WWIIC2	Implement Priority Wastewater Rehabilitation Projects	Implement the CIP projects identified through modeling efforts (WWIIB4) as well as priority sewershed rehabilitation projects (WWIB3 and WWIC3). Budget for rehabilitation and prioritize CIP projects based on benefit, risk, and budget constraints.

3.3 Overall Recommendation Actions

The overall recommended actions apply to each system within Pike County. These recommendations focus on sustainable growth with development being planned around existing infrastructure as well as ensuring that rates create sufficient revenues so that the system is sustainable.

Table 3-6. Overall (O) Recommended Actions

#	Action Item	Description
OIA. Plan Growth around Water & Wastewater Infrastructure		
OIA1	Share and Build GIS Data	Share the water and wastewater system GIS maps with the Three Rivers Regional Commission as part of the ongoing Comprehensive Plan Update. The development should focus on areas with existing infrastructure. Most water and wastewater action items result in better system data and thus map updates.
OIA2	Update Zoning Maps	Each local jurisdiction should update zoning maps to reflect the development pattern identified in the Comprehensive Plan, so that zoning aligns with existing water infrastructure.
OIA3	Adopt Policies for Sustainable Growth	Each community should assess the adequacy of the existing policies and procedures to support the overall health of the system. Example policies are provided in Appendix E that can be tailored to each community following the review by local legal counsel.
OIA4	Septic System Planning & Permitting	Septic system installation is managed by the Pike County Department of Environmental Health. Each jurisdiction can require that all new lots served by septic system identify and protect an area on the lot that could serve as a secondary drainfield in the event of failure. Each jurisdiction could also require larger minimum lot sizes for septic systems (i.e., 1-acre). These policies will ensure that suitable land area is available on each lot for the eventual septic drainfield replacement. As part of this effort, each

#	Action Item	Description
		community should improve the Environmental Health map of known septic systems in GIS in accordance with the data dictionary in Appendix B.
OIB. Rate Structures and Value of Water		
OIB1	Evaluate Existing Rate Structure	Rate structures should be evaluated at least once every 5 years to ensure that rates are sufficient to cover capital and operating expenses, including depreciation. Rates should allow the system to build a reserve fund that is at a minimum one month to 45 days of operating expenses. Tiered water rates and base rate levels are important considerations, as is ensuring affordability. The Georgia Water & Wastewater Rates Dashboard is a good resource for evaluating and comparing rates.
OIB2	Adopt Revised Rates	This Plan recommends implementing rate structures that automatically adjust annually to reflect inflation or similar economic indicator. The Consumer Price Index (CPI) and the Waste & Trash Service Index within the CPI are two such indicators. The automatic adjustments create a more financially stable system.
OIB3	Value of Water Education	Coordinate with the Extension Service, Three Rivers Regional Commission, ACCG/GMA, and the Upper Flint Regional Water Planning District to educate the community on the value of water. This education may include water conservation, proper grease management, or cross connection control programs. Local water systems should use water

#	Action Item	Description
		bills and other public messaging options to communicate the benefits of important system improvements.

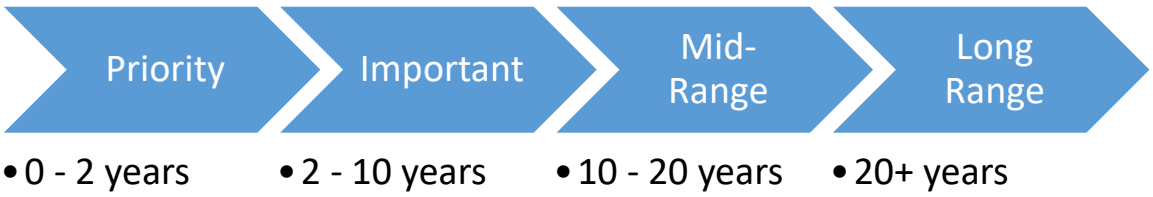
4 Recommended Actions

The action items presented in Section 3 are assigned to an implementation timeframe that prioritizes the most critical actions. This section presents information to support implementation of the priority action items.

4.1 Implementation Timeframe

Each action item outlined in Section 3 was assigned an implementation timeframe based on the criticality of the recommendation. The implementation timeframes (Figure 4.1) range from priority to long range based on the urgency of the action item. The priority action items are those that should be completed first with implementation within approximately two (2) year from Plan adoption. The important action items are generally those that could be implemented within one decade following Plan adoption. The mid-range and long-range action items will likely occur following the next update to this Plan. Each system is unique and has individual needs, thus the timeframes, as presented, are not intended to be followed rigorously.

FIGURE 4.1. IMPLEMENTATION TIMEFRAME CATEGORIES



The implementation timeline is presented in Tables 4.1 through 4.6, shown in the same tiers as presented in Section 3. The tables include planning level costs that are intended to assist with planning and budgeting. The planning level costs are based on the EPD "*Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison*" guidance document. An inflation and contingency of 25% was added to the base costs to reflect price escalation since 2011. Since the planning level costs are for budgeting purposes, several of the recommended action items present a relatively nominal cost for program setup and legal review with a user fee that would generate the ongoing implementation costs of that program.

Table 4-1. Focused Water Alternatives Implementation

Focused Water Alternatives	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
IA. Non-Revenue Water (Basic)					
IA1. Install Production Meters at Each Source	■				$10,000/ meter
IA2. Identify Non-Metered Service Connections	■				$5,000/ meter
IB. Water & Emergency Supply					
IB1. New Water Supply to Meet Current Demands	■				$50,000 - $5,000,000+
IB2. Emergency Water Supply Plan		■			$20,000
IB3. Emergency Repair Plan		■			$30,000
IC. Fire Flow Improvements (Basic)					
IC1. Map Fire Hydrants in GIS	■				$50 - $100/ hydrant
IC2. Implement a Valve Assessment and Mapping Program	■				$50 - $100/ valve
IC3. Fire Flow Review in Permitting		■			$5,000 + user fee
ID. ISO Rating Improvements (Basic)					
ID1. Perform Annual Hydrant Inspections		■			$50 - $100/ hydrant
ID2. Budget for Volunteer Firefighter Training		■			$2,000+ / firefighter
ID3. Fire Inspection of New Development/ Redevelopment		■			$5,000 + user fee
IE. Water Infrastructure Management					
IE1. Map the Water System in GIS		■			$10,000 - $50,000+
IE2. Implement Inspections & Maintenance Program		■			varies
IE3. Update Construction & Inspection Requirements	■				$5,000 + user fee

Table 4-2. Water Development Node Alternatives Implementation

Water Development Node Alternatives	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
IIA. Maximize Production					
IIA1. Well Rehabilitation Study			■		$5,000 - $20,000/ well
IIA2. Maximize Current Well Yield and Storage			■		$5,000 - $20,000/ well
IIB. Water Distribution System Model & Enhancements					
IIB1. Develop a Water Distribution Model			■		$20,000 - $50,000+
IIB2. Implement Distribution System Upgrades			■	■	Varies
IIB3. Develop a Distribution System O&M Plan			■		$10,000 - $20,000+
IIC. Non-Revenue Water (Moderate)					
IIC1. Perform a Full Non-Revenue Water Audit			■		$10,000 - $20,000+
IIC2. Implement Recommendations from the NRW Audit			■	■	Varies
IID. ISO Rating Improvements (Moderate)					
IID1. Perform Fire Flow Testing of Hydrants Every 5 Years			■		$50 - $100/ hydrant
IID2. Implement Projects to Increase Fire Flow		■	■	■	Varies
IID3. Construct a Training Facility			■		$2,000,000 - $5,000,000+
IID4. Budget for a Full-Time, Paid Fire Department			■		Varies

Table 4-3. Regional Water System Alternatives Implementation

Regional Water System Alternatives	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
IIIA. New Water Supply					
IIIA1. Water Supply Study			■		$250,000+
IIIA2. Construct New Water Supply				■	Varies
IIIB. Distribution System Expansions					
IIIB1. Plan Distribution System Expansions			■	■	Varies
IIIC. Evaluate Water Production Wholesale Model					
IIIC1. Evaluate Water Production Wholesale Model			■		$60,000+

Table 4-4. Focused Wastewater System Alternatives Implementation

Focused Wastewater System Alternatives	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
WWIA. Wastewater Treatment Projects					
WWIA1. Concord North Pond Rehabilitation	■				$750,000+
WWIA2. Concord South Pond Rehabilitation	■				$750,000+
WWIA3. Emergency Repair Plan		■			$50,000+
WWIA4. Automated Flow Monitoring of Plant Influent & Effluent	■				$25,000 / meter
WWIA5. Septage Records		■			$1,000 + user fee
WWIB. Collection System Operations & Maintenance					
WWIB1. Collection System Map in GIS		■			$10,000 - $50,000+
WWIB2. Implement Inspections & Maintenance Program		■			Varies
WWIB3. Collection System Rehabilitation Program	■	■	■	■	Varies
WWIB4. Outreach and Education	■	■	■	■	$1,000/ year
WWIC. Targeted I&I Reduction Program					
WWIC1. Identify Priority I&I Sewersheds	■				$5,000 - $25,000
WWIC2. Assess Priority Sewersheds	■				$15,000 - $150,000+
WWIC3. Priority Sewer Rehabilitation	■	■	■	■	Varies
WWID. Construction & Maintenance Strategy					
WWID1. Update Construction & Inspection Requirements	■				$5,000 + user fee

Table 4-5. Wastewater System Expansion Alternatives Implementation

Wastewater System Expansion Alternatives	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
WWIIA. Wastewater Treatment Expansion					
WWIIA1. Evaluate Zebulon Treatment Expansion					$50,000 - $150,000+
WWIIA2. Evaluate Concord Treatment Flows					$25,000 - $100,000+
WWIIA3. Evaluate Pumped Septage					$15,000
WWIIB. Wastewater Collection System Model					
WWIIB1. Develop a Static Model Structure					$25,000 - $75,000+
WWIIB2. Develop Flow Estimates by Land Use					$10,000
WWIIB3. Develop Assumptions for Wet Weather Contributions					$10.000
WWIIB4. Calibrate the Model Using Temporary Flow Meters					$50,000 - $250,000+
WWIIC. Collection System Expansion and Rehabilitation					
WWIIC1. Extend the Wastewater Collection System					Varies
WWIIC2. Implement Priority Wastewater Rehabilitation Projects					Varies

Table 4-6. Overall Recommendations Implementation

Overall Recommendations	Implementation Timeframe				Planning Level Costs (per system)
	Priority	Important	Mid-Range	Long-Range	
OIA. Plan Growth around Water & Wastewater System					
OIA1. Share and Build GIS Data	■	■	■	■	$1,000/ year +
OIA2. Update Zoning Maps		■			$5,000 - $15,000
OIA3. Adopt Policies for Sustainable Growth	■				$3,000 - $10,000
OIA4. Septic System Planning, Mapping & Permitting		■	■	■	$3,000 planning; $100/system mapping; user fee for permitting
OIB. Value of Water and Water Rates					
OIB1. Evaluate Existing Rate Structure	■				$10,000
OIB2. Adopt Revised Rates	■				$1,000
OIB3. Value of Water Education		■	■	■	$1,000/ year

4.2 Funding Sources

This section highlights funding sources that are commonly used to fund water and wastewater projects, such as those recommended in this Plan.

4.2.1 Georgia Environmental Finance Authority (GEFA) Programs

GEFA offers three primary low-interest financing programs to local governments for drinking water, water supply, water quality, and stormwater projects. Two of the loans leverage federal dollars, therefore federal requirements apply including environmental review, contractor wage rates, disadvantaged business enterprise inclusion, and American iron and steel material requirements.

GEFA holds a pre-application period each year from fall to early spring, termed “call for projects”. GEFA scores each pre-application assigning both a project score and an affordability score. The project score is typically higher for priority project types, described under each loan program below. The affordability score along with the project score determine whether a community is eligible for principal forgiveness, and the percentage of loan principal forgiveness. The scoring is explained in the annual “call for projects” on GEFA’s website.

Most of the recommendations in this Plan could be financed through one or more of the GEFA loans. Any system that plans to finance a project through GEFA should sign up for the “water resources outreach list” on the GEFA website to receive important communications. Additionally, there are points awarded within the project score for “project readiness” which rates the applicant’s progress toward meeting federal loan requirements such as engineering procurement and state environmental review process. Project readiness activities ideally occur prior to the submission of the pre-application is submitted to maximize points.

4.2.1.1 Drinking Water State Revolving Fund

The Drinking Water State Revolving Fund (DWSRF) finances a wide range of drinking water projects using federal funds. The annual borrowing cap is $25M and the loan term is 30 years, which can be extended to 40 years if GEFA determines that a community is financially distressed. Priority DWSRF projects include those that address public health and compliance-related projects, redundancy projects, and water conservation projects. Projects that may be considered priority projects recommended in this Plan include:

- New Supply to Meet Current Demands (IB1) as a public health-related water supply project
- Emergency Water Supply Plan (IB2) as redundancy
- Well Rehabilitation Study (IIA1) and Maximize Well Yield (IIA2) as projects that address capacity and pressure system deficiencies

Water conservation related projects are eligible for the "conservation interest rate," which is a 1-percent reduction from the standard interest rate. Projects eligible for the conservation rate that are associated with Plan recommendations include:

- Pipe replacement or rehabilitation to reduce water loss and prevent water main breaks (IIC2)
- Upgrades at a water treatment plant that result in greater energy efficiency
- Installing water meters in previously unmetered areas (IA1 and IA2)
- Replacing broken/malfunctioning water meters or upgrading existing water meters with automatic meter reading (AMR) and advanced metering infrastructure (AMI) systems (IIC2)

Projects that are ineligible for funding include projects that are solely for economic development (e.g., extending water to a new business), reservoirs, and projects that are primarily for fire flow improvements.

4.2.1.2 Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) finances wastewater projects using federal funds. The annual borrowing cap is $25M and the loan term is 30 years. Priority CWSRF projects include those that address water quality, repairing and replacing sewer lines, and conservation projects. Projects within this Plan that could be funded with CWSRF include:

- Concord North Pond Rehabilitation (**WWIA1**) and Concord South Pond Rehabilitation (**WWIA2**)
- Identify and Assess Priority Sewersheds (**WWIC1, WWIC2**) and Priority Sewer Rehabilitation (WWIC3)
- Evaluate Pumped Septage (WWIIA3)
- Implement Priority Wastewater Rehabilitation Projects (WWIIC2)

CWSRF projects that are eligible for the "conservation interest rate" and are also priority projects. The conservation projects associated with the Plan recommendations include:

- Pipe rehabilitation to address inflow and infiltration
- Upgrades at a wastewater treatment plant that result in greater energy efficiency
- Sewer extension to areas served by faulty septic tanks

Projects that are ineligible for funding include projects that are solely for economic development (e.g. extending sewer to a new business).

4.2.1.3 Georgia Fund

The Georgia Fund, unlike DWSRF and CWSRF, is a state-funded program to serve additional needs beyond what the SRF programs can finance. The Georgia Fund is available for economic development-focused water and sewer projects, dams, and emergency projects that address actual or potential public health hazards. Emergency loans are capped at $0.5M dollars, while other Georgia Fund loans have a maximum of $3M dollars. The loan term is 20 years. Emergency loans require a project tied to an urgent need that has arisen within the last 6 months and that is not the result of lack of maintenance.

Most of the Plan's recommendations are eligible for the Georgia Fund. One project, New Supply to Meet Current Demand (**IIB1**) would qualify for an emergency loan to perform the well study to identify a new source of supply while applying for other funding to support the infrastructure needed to connect the new supply source to the Molena water system.

4.2.2 American Rescue Plan Act (ARPA)

The Coronavirus State and Local Fiscal Recovery Funds, established by the American Rescue Plan Act (ARPA) of 2021 are available to address acute pandemic response needs, fill revenue shortfalls, and support communities hardest hit by the crisis. ARPA funds are specifically available for water and sewer investments to improve access to clean drinking water and support vital wastewater infrastructure.

Additional information on the funding and eligible projects is available in "Fact Sheet" located on the Governor's Office of Planning and Budget website.

One recommended Plan action item, Concord North Pond Rehabilitation (**WWIA1**), has received ARPA funding. Several communities applied for ARPA funds for projects recommended in this Plan but were not selected. It is uncertain whether additional rounds of funding will be offered and if future rounds would include the same priorities.

4.2.3 EPD Regional Water Plan Seed Grants

EPD awards grants annually to communities to support and incentivize implementation of projects recommended within their Regional Water Plan. The grant awards are limited to $75,000 and the projects must be completed within thirty (30) months. Applicants must attend a pre-application meeting with EPD prior to the deadline with applications typically due in the fall. This Plan is funded, in part, through an EPD Seed Grant.

The grants require a 40% local match, of which 10% of the total project cost must be a cash match and the remaining can be in the form of in-kind services or resources. The application mut include a letter of endorsement signed by the Regional Water Planning Council Chair and describe how the project is consistent with the goals articulated in the Regional Water Plan. A Regional Water Plan Seed Grant guideline document is available on the EPD website that describes the key ranking criteria, project priorities, and outlines the application process.

4.2.4 Special Purpose Local Option Sales Tax (SPLOST)

A Special Purpose Local Option Sales Tax (SPLOST) is an optional one-percent sales tax on items subject to state sales tax to fund local capital projects identified by the county and participating cities. Pike County voters approved a SPLOST on May 24, 2022. The SPLOST will start on October 1, 2022 and will not exceed six years with the intent of raising $20M for water and sewer among other infrastructure projects within Pike County and the cities of Concord, Meansville, Molena, Williamson, and Zebulon.

4.2.5 Georgia 319(h) Grants

The 319(h) grant are federal funds issued by the state to prevent or abate nonpoint source pollution. Grants are awarded following a competitive process to eligible projects that address nonpoint sources of pollution and result in measurable improvements to water quality. The grants require a cost-share ration of 40% local match with 60%

federal dollars with a maximum award of $400,000. Applications are accepted annually through the Grant Application Portal (GAP). Completing the map of known septic systems (OID) would be an eligible 319(h) project.

4.3 Priority Implementation Action Items

A description of each of the priority implementation actions is included in greater detail, as these are the first actions recommended for implementation.

4.3.1 Share and Build GIS Data (**OIA1**)

The GIS data compiled and used to create this Water and Wastewater Master Plan have been shared with the Three Rivers Regional Commission. The Three Rivers Regional Commission is currently working with Pike County and the cities on updating their Comprehensive Land Use Plans. As these Plans will guide future growth and development, it is important that they facilitate growth in areas that are currently served by water and/or sewer.

A limited amount of GIS data was available and several of the action items recommend collecting additional GIS data to support future decision making and sound asset management. General guidance for building GIS data is listed below.

- Integrate data mapping in GIS or compatible mapping system into every project budget (including grant and loan funded projects).
- Collect as-built data in CAD from developers and contractors.
- Maintain data in a spreadsheet following the format in Appendix B if data collection in a GIS-compatible mapping system is not possible.
- Coordinate GIS data updates with the Three Rivers Regional Commission

Appendix B includes data dictionary spreadsheets for each asset type that outline the attributes that should be collected for each asset type. Using a consistent methodology across jurisdictions will improve the ability to collaborate in the future.

4.3.2 Adopt Policies for Sustainable Growth (**OIA3**)

The regulations, policies, and procedures adopted for each system should allow for planned systematic growth and support cost recovery in coordination with the adopted rates (**OIB2**). A list of sustainable policies is listed below, and examples are provided in Appendix E.

- Adopt a schedule of rates, fees, and penalties.
- Adopt a water line extension policy.
- Create water and wastewater standard specifications and details.
- Adopt a water shortage plan.
- Create a fire flow test application with associated fees.
- Implement a pre-treatment program for wastewater systems.
- Adopt a cross-connection ordinance and associated policies.

Any local ordinance or policy should be adopted following local requirements and in consultation with legal counsel.

4.3.3 Evaluate Existing Rate Structure (**OIB1**)

Water and sewer rates provide the basis for a sustainable utility. The rates must balance two divergent goals: covering the costs of operation (including depreciation) while remaining affordable for the community. Section 1-6 presents the existing rates and while all systems have rates that are considered affordable, several systems have rates that are insufficient to cover costs. General rate setting guidance is listed below.

- Rates should cover the full cost of system operation including system rehabilitation and depreciation.
- Each system should build an emergency fund of 30 to 45 days of operating expenses.
- Tiered rates for consumption on a sufficient base rate are preferred, so long as the base rate is sufficient to cover operating expenses, as these rates incentivize conservation which delays the need for new supply.

- Evaluate fees for service and local policies (OIB1) to cover the cost of service when assessing rates. For example, meter fees, plan review fees, fire installation inspection, disconnect/reconnect fees, etc.
- Rates should be evaluated at least once every 5 years or prior to a large capital investment.

There are several guidance documents available on rate setting and rate structure options including those in Appendix F, or a rate consultant may be hired. The Georgia Water & Wastewater Rates Dashboard is a good resource to evaluate rates, but each system has different costs of operation and therefore will have different rates. In addition to creating a sustainable utility, most grant and loan programs require documentation that the system rates are sufficient prior to awarding funds.

4.3.4 Adopt Revised Rates (**OIB2**)

Once the rate structure is determined (**OIB1**), the rate must be adopted following procedures outlined in local ordinances regarding notifications and elected body vote. This Plan recommends adopting a cost of living or equivalent annual increase tied to a standard index, such as the Consumer Price Index (CPI). The CPI is compiled by the US Bureau of Labor Statistics and is a measure of the average change over time paid by urban consumers in the US. There is the overall CPI, but also a national price index for water and sewer and trash collection, based on the average for urban consumers in the US. These small annually increases should be built into the rate structure so that they do not require an annual approval or vote.

According to a recent GEFA Report, most Georgia utilities actively evaluate their rate structures every one to two years (*2022 Georgia Water & Wastewater Report*). Between 2021 and 2022, 12% of the water utilities and 14% of wastewater utilities participating in the GEFA survey increased their rates. A copy of the report is included in Appendix F.

4.3.5 Install Production Meters at Each Source (**IA1**)

Production meters provide valuable data on the water pumped from each water supply source into the distribution system. The data can show trends regarding well efficiency and allow tracking of non-revenue water. Most water systems have a meter that is manually read.

At a minimum, water production data should be saved in a spreadsheet to allow for quick calculation of averages, minimum, and maximum flows. The production data can be compared to water sold based on meter readings, to get a rough estimate of non-revenue water. Advanced Metering Infrastructure (AMI) allows for automated meter reading and is preferred to manually reading.

4.3.6 Identify Non-Metered Service Connections (**IA2**)

All connections in a water distribution system should be metered, even those that are not billed for water consumption. This Plan recommends scheduling and budgeting to install meters on all known non-metered facilities, such as City Hall, Fire Stations, Public Library, and Public Parks. Once those locations are metered, a review of the parcels along each public distribution line can help locate whether parcels may be connected to public water but do not have a water meter. While assessing the status of the meters, data on existing meters should be collected in GIS (or GIS compatible format) following the data dictionary in Appendix B.

Parcels identified during the investigation that are not metered, should be metered. Public facilities are typically metered by the water department when budgets and staffing are available. Private property owners will pay for meters, following the existing procedures for meter purchase for new developments.

4.3.7 Identify a New Supply Source to Meet Current Demands (**IB1**)

The City of Molena currently has one active water supply well and one above ground tank. That well has high uranium levels and therefore must be treated, which raises the cost of treated water and effectively reduces well yield.

Recently, a distribution system issue resulted in a serious system water outage. Molena urgently needs a new potable water supply source to meet current demands, future demands, and offer protection during an emergency. The viable future water supply alternatives include locating a new potable water supply well or an interconnection with an adjacent system. The cost of installing approximately 5 miles of 8” water main to connect to one of the adjacent water systems is estimated to be $5.5M. The cost of locating, testing, and installing a new well with treatment and pumping is estimated at $0.5M and the allowance for 1 mile of 8” water main to connect to the Molena system is estimated at $1.1M for a total project cost of $1.6M.

This Plan recommends that Molena engage a hydrogeologist to identify at least one additional groundwater well near the system limits. Preferably, the new well would not have high uranium, iron, or manganese levels so that additional level of expensive treatment is not needed. Depending on the location of that well and other system considerations, a second water tank may be needed. This project could be eligible for a Drinking Water State Revolving Fund Loan (DWSRF), Community Development Block Grant (CDBG), or American Plan Recovery Act (ARPA). Molena may evaluate using the Georgia Fund to install the well(s) identified by the siting study concurrent to applications for other funding sources for construction of the transmission main.

While not as urgent, Concord will need additional water supply by 2040. Concord has an interconnection with Griffin that by contract can provide 100,000 gallons/day of water and more if proper notification is provided. Concord should start planning now for their needs in 2040.

Meansville and Pike County WSA demands approach available supplies by 2060. These systems should continue to watch water demands and water supply capacity and plan ahead for future demands.

Molena and Concord may benefit from economies of scale if they jointly hire a hydrogeologist to investigate well locations in both communities.

4.3.8 Map Fire Hydrants in GIS (**IC1**)

The ISO certification process assigns points related to hydrants in several categories, therefore a GIS map of hydrants with the details of each hydrant will facilitate these calculations. Most water systems in Pike County have a map of fire hydrants that includes some information about the hydrant. Mapping hydrants provides an easy visual tool for determining where additional hydrants are needed.

For hydrants that are already mapped, the mapping effort includes documenting the attribute data (size, type, installation, outlet size, nozzle size, etc.) using the data dictionary in Appendix B. For previously unmapped hydrants, the location and attribute information are collected.

If maintenance needs are noted during the identification process, these repairs should be included on the CIP list or in the CMMS system. If possibly, communities may elect to perform annual hydrant inspections (ID1) while completing the map.

4.3.9 Implement a Valve Assessment and Mapping Program (**IC2**)

Valves are a critical component of the water distribution system and allow for certain portions of the system to be isolated in the event of a water main break and/or control flow or pressure in portions of the system. Valves are mechanical parts that must be exercised (opened and closed) to ensure they are functional during an emergency. It is also important to periodically check that a valve is in the correct position (allowing the proper amount of flow) and determine if any rehabilitation is needed.

The process for exercising valves should follow *AWWA M-44 Distribution Valves: Selection, Installation, Field Testing, and Maintenance*. Typically, the inspection will include the following elements:

- Ensure that the valve box is accessible, it is not full of mud or debris or buried.
- Inspect the valve for leaks around the valve stem.
- Ensure the valve handle is intact.
- Ensure that the valve can be fully opened and fully closed.
- Record important valve attributes including whether it is right-handed or left-handed and whether it is normally opened or closed.
- Record any necessary rehabilitation or maintenance.

The attribute collection during inspection should follow the GIS data dictionary in Appendix B.

4.3.10 Update Construction and Inspection Requirements (**IE3**)

Water distribution systems are often extended when new developments connect and dedicate privately constructed infrastructure to the local water system. Similarly, contractors are hired to repair and/or extend waterlines in the public system. A construction and inspection program ensures that the system extension and/or rehabilitation projects meet certain minimum quality standards.

Project designs should be reviewed prior to construction to ensure that materials and workmanship standards meet the minimum requirements for the system. The project should be inspected during installation/rehabilitation to ensure the materials and

installation methods are proper. Finally, there should be a certification step where the installation is tested and/or certified prior to acceptance into the public system.

Example water system construction specifications are included in Appendix D.

4.3.11 Concord North Pond Rehabilitation (**WWIA1**)

The Concord North Pond was recently rehabilitated to stabilize the exterior earthen dam that was experiencing erosion. This project, partly funded by a GEFA loan, included a seepage recovery system and electrical service. Currently, the pond is experiencing some water quality challenges as the result of a shortened treatment time within the pond. Concord received American Rescue Plan Act (ARPA) funds to construct improvements including installing of baffles and aeration (including power, pump, and motor).

In addition to addressing the shortened treatment time, there is some accumulation of duckweed that will also be addressed with the ARPA funds.

An alternative solution to address the water quality challenges could be floating treatment wetlands. The man-made “floating islands” provide an ideal habitat for microbes and plant species that expand the treatment quality and nutrient removal. The floating wetlands also effectively increase the retention time. Floating wetlands have a much lower cost than dredging a pond but bi-annual vegetation management in the floating wetlands is required. This alternative should be carefully considered by the engineer of record familiar with the pond design.

4.3.12 Concord South Pond Rehabilitation (**WWIA2**)

The Concord South Pond includes a 1-acre oxidation pond with aeration and a 6-acre finishing pond. The pond sludge was dredged approximately 10 years ago, and the sludge levels should be assessed to determine if dredging is needed.

The South Pond treatment process includes screening and aeration, therefore septage is accepted only at South Pond. Concord only accepts residential septage and only 2 loads per day with a typical load being 2,000 gallons/load. Action item WWIA5 recommends tracking the septage loads received compared to the water quality of the effluent. Tracking data will show whether septage is impacting water quality (positively or negatively) and whether adjustments to the volume accepted are needed.

Concord is experiencing issues with duckweed and algae blooms. Solutions to address these can include additional retention time through additional baffles or other methods, improving aeration, ultrasound, in addition to chemical treatment and physical removal. The duckweed and algae need to be addressed to maintain treatment quality.

4.3.13 Flow Monitoring of Plant Influent & Effluent (**WWIA4**)

Influent and effluent flows data is useful for proactively identifying treatment issues, better understanding of I&I in the collection system, and planning for future expansions. Influent monitoring is strongly recommended to assist in I&I assessments. Automated monitoring of both influent and effluent is recommended. Until installed, manually read data should be stored in a spreadsheet and not just a notebook.

Effluent is manually measured in Concord and Zebulon in accordance with their wastewater permits. At a minimum, this data should be stored in a spreadsheet so that trends can be easily tracked. Inflow measurements should be added, whether manual or automated. Tracking inflow to outflow can highlight treatment issues or inefficiencies. Comparing inflow to rainfall data may provide insights into inflow and infiltration (I&I). Comparing inflow volume to effluent quality may determine whether I&I is creating treatment issues.

Both inflow and effluent data should be managed in a spreadsheet if not automatically monitored and stored in a supervisory control and data acquisition (SCADA) system.

4.3.14 Identify Priority I&I Sewershed (**WWIC1**)

I&I exists in every collection system, and an allowance of acceptable I&I is factored into collection system and water reclamation facility designs. Generally, it is unaffordable to fix every defect in a collection system, therefore it is important to define “excessive I&I” and establish priorities to address the worst I&I problems first. This Plan recommends identifying one sewershed to address first, and once the major I&I sources have been determined, the assessment begins on the second highest priority sewershed. The following data can be helpful in determining the highest priority sewershed.

- Lift station run-time data can indicate I&I. If a lift station pump runs for a longtime and continuously after a rain event or if the pump starts and stops frequently after a significant rain event, this can indicate I&I issues. The I&I is taxing the lift station resulting in higher energy costs and shorter pump life in addition to the excess wastewater treatment costs.

- Temporary flow meter and/or level sensors installed in manholes document the flow increase in response to rainfall events at a particular location. Temporary flow/level meters are not permanent so they can be used in different locations once data is collected. Flow meters can be used to calibrate models as well as target I&I, whereas level sensors show height of wastewater flow within the manhole as a sign of upstream I&I sources. Devices that do not require confined space entry are preferred. Some devices offer proprietary software that helps isolate I&I issues but may not be able to be exported for use with other models. Each system should consider their short-term and long-term needs for the data. For determining priority sewersheds, typically one device is in the downstream point of each possible priority sewershed and the sewershed with the largest, normalized rainfall response is prioritized.

- Wet weather SSO location history is often the easiest and most valuable method for isolating locations. The sewershed can be drawn with the pervasive SSO location as the downstream point.

- Anecdotal information from system operators is often valuable and can focus the assessment efforts in **WWIC2**.

Concord has identified the priority sewershed as the Hilltop Area and Zebulon has identified the east side of town. The assessment techniques will help determine the next priority sewershed after these sewersheds have been assessed.

4.3.15 Assess Priority Sewershed (**WWIC2**)

There are several tools to assess priority sewersheds (**WWIC1**) including the installation of temporary flow meters and/or level sensors, targeted smoke testing if inflow is expected, and closed-circuit television video (CCTV). The goal of the assessment is to winnow a large area with excessive I&I, down to much smaller areas (ideally specific defects or I&I sources) that can be cost effectively remediated. This is the key to making I&I reduction cost effective.

- Temporary flow meter and/or level sensors are installed in manholes and can be deployed throughout the sewershed to isolate the area with the biggest fluctuation in flows following rainfall events. Temporary flow meters and/or level sensors are often combined with one of the techniques below once the location of the I&I source has been further isolated.

- Smoke testing involves blowing dense colored smoke into the sanitary sewer system. The smoke will escape through holes in the system such as cracks, breaks, and illegal connections as well as through sewer vents in manhole covers. Personnel will look for smoke and determine whether the smoke indicates an I&I repair is needed. All I&I locations are documented. Smoke testing is relatively inexpensive but does not uncover all system defects.

- CCTV involves sending a special camera on wheels that rolls through the sewer system pipes and takes video of the inside of the pipe. The camera technician will document the location and rank the severity of defects observed following a standard methodology. The CCTV also uncovers clogs and breaks that might not be detected during smoke testing.

Many of the I&I sources may be found on private property (missing clean outs, failed laterals, yard/roof drain connections, etc.). Both Concord and Zebulon should develop clear delineations between the public and private systems, including whether lower laterals are public or private responsibility. Policies and procedures for addressing I&I sources found on private property are also recommended such as template notification letters and enforcement processes if private property issues are not addressed.

The cost-effective public CIP projects and/or maintenance activities identified during inspections should be placed on a spreadsheet-based capital improvement list and/or in a CMMS system. CIP projects should be prioritized based on criticality so that the most important pipes in the system are rehabilitated first and completed when budget and staffing resources are available.

4.3.16 Update Construction & Inspection Requirements (**IE3**)

Private contractors construct wastewater collection systems as part of private development projects and dedicate some of the infrastructure to the local municipality. Similarly, systems may hire contractors to rehabilitate or extend sewer pipelines to serve new areas. It is important to ensure that the systems each community is responsible for maintaining are constructed using materials and methods that will provide for long-term sustainability. Each wastewater system should develop requirements for new and rehabilitated wastewater collection assets that includes inspection requirements during and after construction to ensure the accepted infrastructure is not defective, and if needed, take advantage of available warranties. An example of collection system standards and specifications in included in Appendix D.

4.4 Implementation Timeline

Table 4-7 presents the recommended timeline for implementing the priority action items recommended in this Plan. The timeline generally reflects the initiation of each of the action items, while some of the action items may have ongoing elements following

program development. This timeline is a suggestion and must be matched to the available budgets and staffing resources.

Table 4-7. Implementation Timeline for Priority Action Items

	FY 2023				FY 2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Overall Priority Implementation Actions								
OIA1. Share and Build GIS Data								
OIA3. Adopt Policies for Sustainable Growth								
OIB1. Evaluate Existing Rate Structure								
OIB2. Adopt Revised Rates								
Water Priority Implementation Actions								
IA1. Install Production Meters at Each Source								
IA2. Identify Non-Metered Service Connections								
IB1. New Supply to Meet Current Demands								
IC1. Map Fire Hydrants and Pipes in GIS								
IC2. Implement a Valve Assessment Program								
IE3. Update Construction & Inspection Requirements								
Wastewater Priority Implementation Actions								
WWIA1. Concord North Pond Rehabilitation								
WWIA2. Concord South Pond Rehabilitation								
WWIA4. Automated Flow Monitoring of Plant Influent & Effluent								
WWIC1. Identify Priority I/I Sewersheds								
WWIC2. Assess Priority Sewersheds								
WWID1. Update Construction & Inspection Requirements								

4.5 Progress and Plan Update

The PWPC meetings were valuable beyond the intent of guiding the development of this Plan. This Plan recommends that the PWPC continue to meet bi-annually or annually to review implementation progress and collaborate on water and wastewater issues of mutual interest.

This Plan recommends that the PWPC update the Plan, and review the demand and flow forecasts every 10 years so that action items can be tailored to actual development and growth patterns in Pike County.

5 Appendices

A – Implementation Plan by Community

B – GIS Data Dictionary

C – ISO Training Calculator

D – Construction & Inspection Requirement Examples

E – Policy and Procedure Examples

F – Rate Structure Evaluation Examples