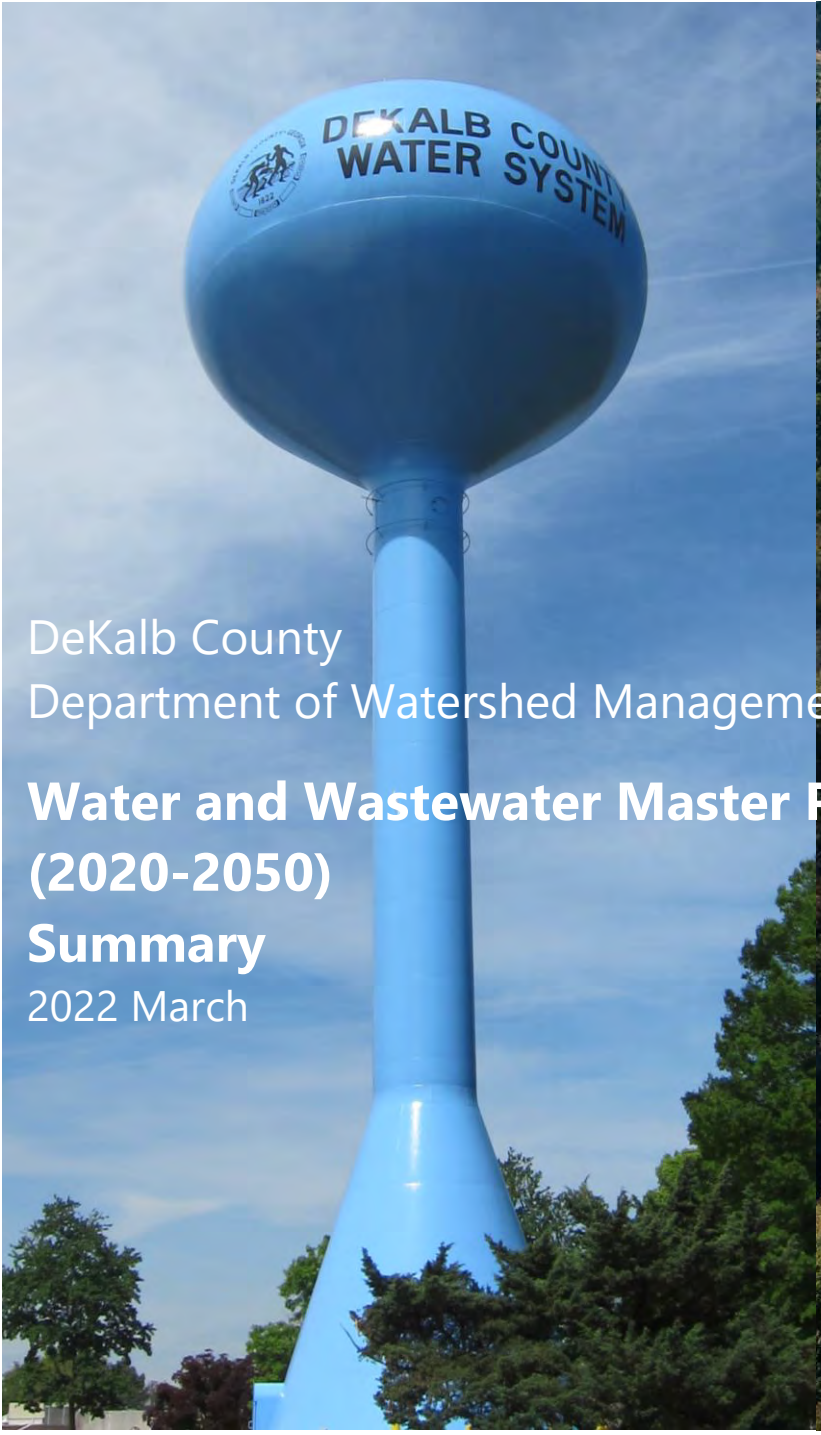

DeKalb County
Department of Watershed Management

Water and Wastewater Master Plans (2020-2050) Summary

2022 March

DeKalb County
GEORGIA

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Acronyms and Abbreviations

AADD	Annual average daily demand
AADF	Annual average daily flow
AWTF	Advanced Wastewater Treatment Facility
BOD_5	Five-day biochemical oxygen demand
CD	Consent Decree
CDPMT	Consent Decree Program Management Team
CIP	Capital improvement plan
COA	City of Atlanta
DWM	Department of Watershed Management
EPA	Environmental Protection Agency
GAEPD	Georgia Environmental Protection Division
HGL	Hydraulic Grade Line
IBT	Interbasin transfer
IGA	Intergovernmental agreement
I/I	Infiltration and Inflow
IPS	Influent pump station
LOS	Level of service
MBR	Membrane bioreactor
MG	Million gallons
MGD	Million gallons per day
MLSS	Mixed liquor suspended solids
MMF	Maximum monthly average daily flow
FT MSL	Feet above mean sea level
MWF	Maximum weekly flow
NFPC	North Fork Peachtree Creek
NH_4-N	Ammonia-nitrogen
NRW	Non-revenue water
PDD	Peak daily demand
PHF	Peak hourly flows
RWPS	Raw water pump station
SCADA	Supervisory control and data acquisition
SCWTP	Scott Candler Water Treatment Plant
SFPC	South Fork Peachtree Creek
STEP	Septic Tank Elimination Program

TP	Total phosphorus
TSS	Total suspended solids
UV	Ultraviolet
VSS	Volatile suspended solids
W2	Non-potable water pipeline
W3	Chlorinated plant effluent pipeline
WRC	Water Reclamation Center

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WATER AND WASTEWATER MASTER PLANS SUMMARY

DeKalb County's (County) first-ever Water and Wastewater Master Plans support the community's vision for sustained growth and prosperity and the County's economic development plan. This milestone initiative of responsible long-term planning has established processes and financing practices for the identification and implementation of water and wastewater system policies, capital improvement plan (CIP) projects, and service strategies. The County's mission for the Master Plans is to create a blueprint for infrastructure upgrades, development, and maintenance activities. The Department of Watershed Management (DWM) is the primary provider of water and wastewater services in the County and the sponsor of both Master Plans.

The goals and objectives of the Water and Wastewater Master Plans are to:

- Protect water resources
- Deliver excellent customer service
- Support the County's economic development
- Foster long-term asset stewardship

Specifically, the Master Plans:

- Identify CIP projects through year 2050, including critical (2025), short-term (2030), mid-term (2040) and long-term (2050) projects
- Provides service strategies through year 2070 for County consideration

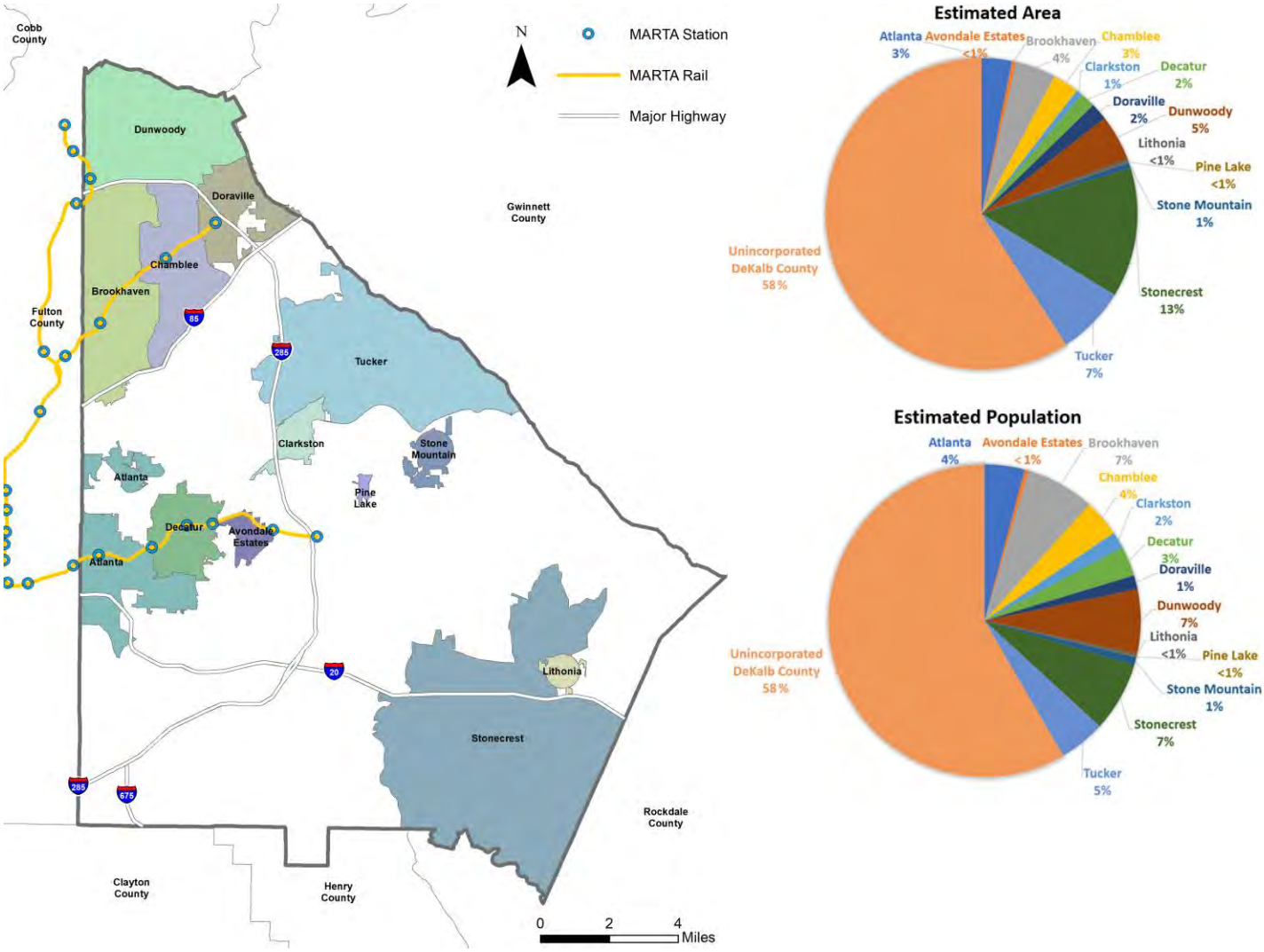
The 3-year effort of developing the Water and Wastewater Master Plans drew heavily on stakeholders' input and guidance to generate the resultant policies, service strategies, and capital improvement projects. Stakeholders who have contributed to the Master Plans include:

- DWM program/project management team
- DWM and County leadership
- DWM Technical Committee (technical and operational staff)
- DeKalb County Board of Commissioners
- Steering Committee (incorporated cities and local agencies in DeKalb County)
- Regional and state agencies

Background

Founded in 1822, DeKalb County is Georgia's fourth most populous county, with an estimated population of approximately 759,000 (based on 2019 Census estimates). The County encompasses 271 square miles (sq. mi.) and has a total of 13 incorporated cities (**Figure 1**). These include the City of Decatur, which serves as the County seat, Avondale Estates, Brookhaven, Chamblee, Clarkston, Doraville, Dunwoody, Lithonia, Pine Lake, Stone Mountain, Stonecrest, Tucker, and a portion of the City of Atlanta (COA) located in the central-western portion of the County. Today, these cities encompass approximately 42 percent of the total County area, while the unincorporated area is approximately 58 percent of the total County area.

Figure 1: DeKalb County Municipalities



The County is divided into two watersheds: the Chattahoochee and Ocmulgee River Basins (**Figure 2**). The northern portion of the County is in the Chattahoochee River Basin (which eventually flows to the Gulf of Mexico), and the southern portion of the County is in the Ocmulgee River Basin (which eventually flows to the Atlantic Ocean). Cities such as Atlanta, Decatur, Avondale, Tucker and Stone Mountain, are located in higher elevation areas of the County on the Eastern Continental Divide.

The varying topography (nearly 500 feet of elevation difference) causes some challenges in water delivery and management for the single water treatment facility servicing both watersheds. The wastewater collection and treatment system follows the natural divide of the two basins, with wastewater collected in each of the watersheds being treated by separate wastewater treatment facilities.

Figure 2: DeKalb County Watersheds

Water System Overview

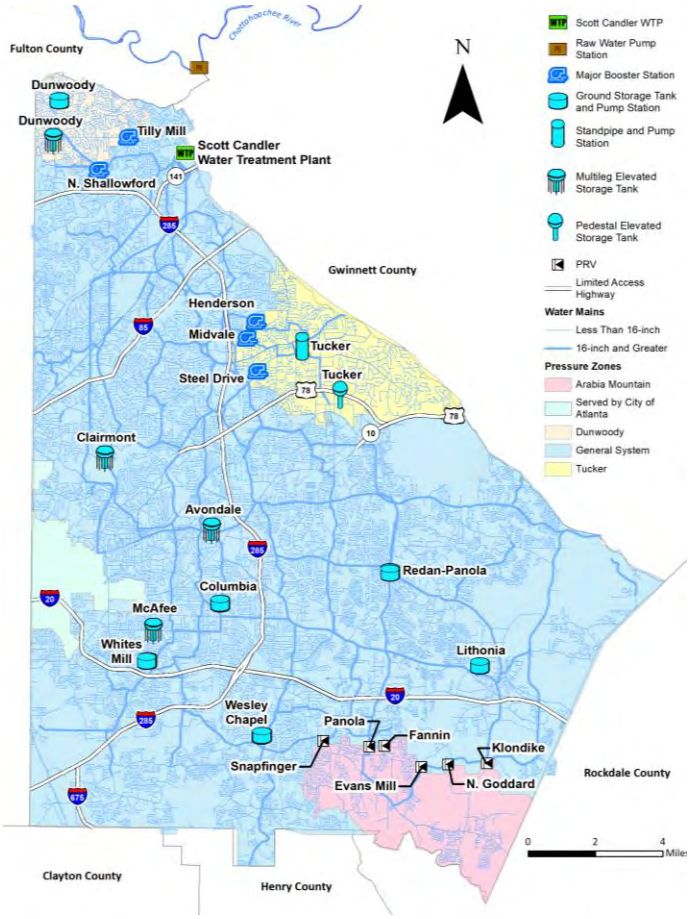
The County's water distribution system encompasses approximately 264 sq. mi. (i.e., 97 percent of the County's total land area). Providing potable water to approximately 730,000 county residents, the County is one of the largest water utilities in the southeastern region of the United States. The County does not provide water service to 3 percent of the county land area that is within the COA boundary and served by the COA's water system, as shown in **Figure 3**. The Chattahoochee River is the County's primary water supply source. The water supply intake is located on the river in Fulton County, just north of the County border.

Figure 3: Water System Service Area

Water System Components

The County's water system consists of over 3,000 miles of distribution mains ranging from 1.5-inch to 54-inch in diameter and 16 pump stations (including two high service pump stations at the County's Scott Candler Water Treatment Plant (SCWTP). The SCWTP is located in the northeastern portion of the County (**Figure 4**) and is permitted to treat 128 million gallons per day (MGD) on a maximum daily basis. It was designed to treat up to 150 MGD without facility expansion and can be expanded to 200 MGD.

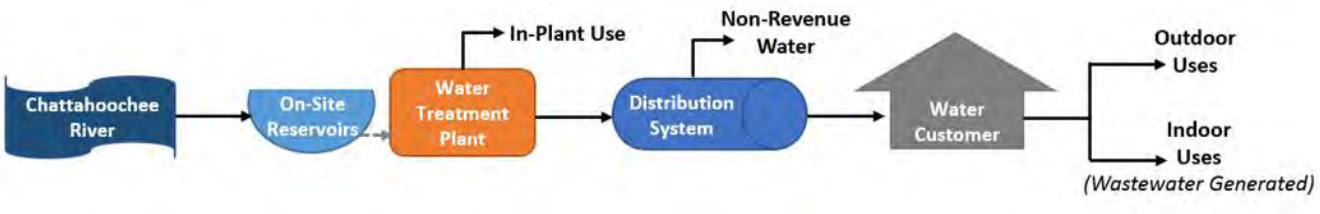
Figure 4: Water System Components



To overcome differences in elevation (ground surface elevations range from 690 to 1,160 feet above mean sea level [ft MSL]), DWM moderates the water distribution system's water pressure with four pressure zones: General System, Dunwoody, Tucker, and Arabia Mountain (**Figure 4**). The distribution system has a total of 67.5 million gallons (MG) of finished water storage from five elevated storage tanks and 16 ground storage tanks (including five ground storage tanks at the SCWTP). The system storage is used to meet demand fluctuation, sustain operating pressure, and provide fire flow and emergency supply to the system.

As shown in **Figure 5,** water from the Chattahoochee River is treated and distributed to customers for indoor and outdoor water uses. During distribution, a certain portion of the water is lost as non-revenue water (NRW), which includes water loss from leaks, apparent losses (billing errors, metering errors, illegal use), and unbilled authorized consumption (such as water used to fight fires).

Figure 5: Water System Schematic

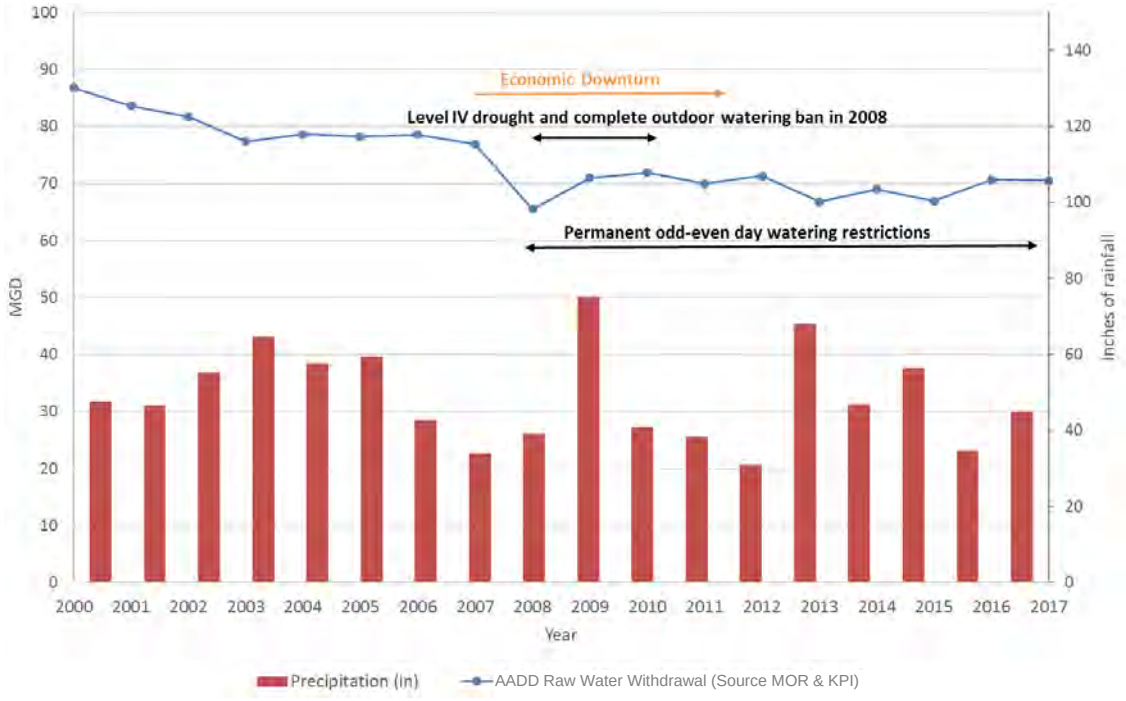


Historical Water Withdrawals

The County holds a surface water withdrawal permit (#044-1290-03) for a maximum daily and monthly average withdrawal of 140 MGD. Recent annual average withdrawals have been approximately 70 MGD, based on 2013-2017 records. During years 2013-2017, the SCWTP processed an annual average daily demand (AADD) of approximately 71 MGD and a maximum daily demand of 90 MGD, based on production records.

Figure 6 shows the historical annual average raw water withdrawals from 2000 to 2017, as compared to annual rainfall. The highest peak day demand (PDD) for the most recent decade occurred in 2012 (101 MGD) during a drought. The year 2008 (impacted by both drought and economic downturn) marked an important milestone in Georgia's water management with the implementation of a permanent odd-even day watering restriction, as well as many other water conservation requirements and incentives in the 15-county Metro North Georgia Water Planning District (District).

Figure 6: Water Withdrawals 2000-2017



Aging Water Distribution System

The age of the water mains generally corresponds with the development of municipalities in the County. The County's oldest water mains were installed in the early 1900s in the Druid Hills area, just north of the COA boundary. These unlined cast iron mains are between 90 and 110 years old; a portion of these mains were replaced recently (2019-2020) to address low pressure issues caused by deterioration of the water mains. The majority (over 98 percent) of water mains were installed

beginning in the 1940s, as the County experienced rapid growth, and continued steadily through the early 2000s. **Table 1** summarizes the distribution system mains that will reach 70 years of age or older during the 30-year planning horizon of the Water Master Plan.

Table 1: Water Mains Reaching 70 Years Old by Material and Planning Horizon (Cumulative)

Pipe Material	Miles of Water Main Reaching 70 Years Old by Planning Horizon (Cumulative)			
	2020 (Current)	2030	2040	2050
Asbestos Cement (AC)	37.8	184.1	521.5	560.9
Carbon Steel (CS)	13.1	51.5	77.3	79
Cast Iron (CI)	144.4	304.2	569.8	779.1
Copper (COP)	0.4	0.7	3.8	10.4
Ductile Iron (DI)	2.3	9.3	30.3	161.3
Galvanized Steel (GS)	16.9	43.7	56	58
Polyvinyl Chloride (PVC)	0.1	2.2	10.6	68.6
Precast Concrete (PC)	---	---	6.6	10.9
Unknown	---	---	11.3	14.6
Total	**215.0**	**595.7**	**1,287.2**	**1,742.8**

Due to concerns with ongoing small diameter and recent large diameter main breaks that have affected services, the Water Master Plan includes a risk-based evaluation to address aging water main replacement and assessment priorities. An annual program focused on small diameter water main replacement and large diameter water main condition assessment is included in the capital improvement project recommendations. This program will direct investment to where it is needed most to reduce main breaks/water loss and improve pressures, system resiliency, and the customer experience.

Wastewater System Overview

The County's wastewater collection system encompasses approximately 235 sq. mi. (87 percent of the County's total land area). As of 2015, the system provides service to approximately 619,500 residents representing 93 percent of the total residential population within the DWM collection system service area or 82 percent of total County residents. The County's wastewater service area is shown in **Figure 7**. Some residents and businesses in the County do not have public sewer service and are served by private septic systems. Customers within the COA boundary inside DeKalb County are served by the COA system.

Figure 7: Wastewater Treatment Service Areas

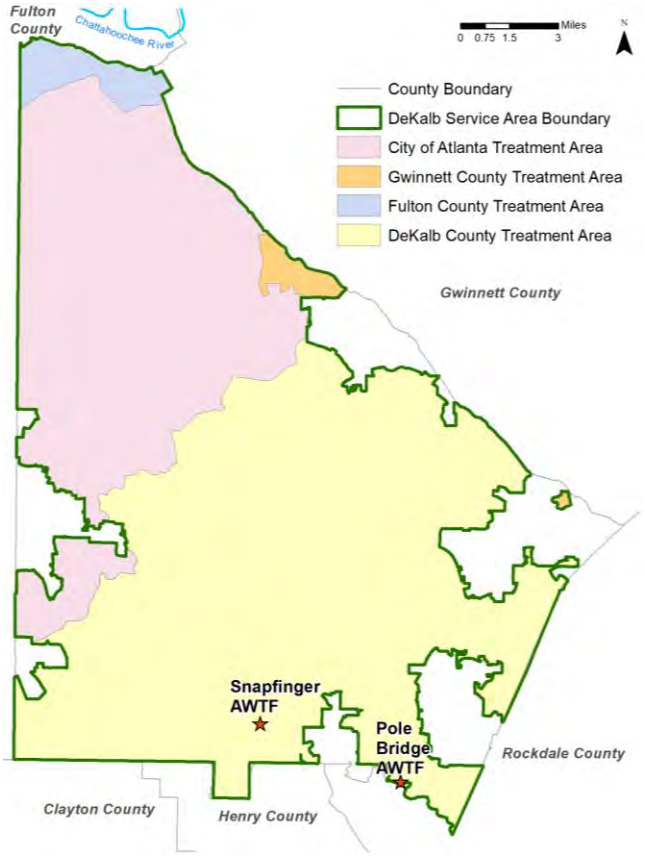


Figure 8: DeKalb County Sewersheds

The County is divided into three sewer basins — Intergovernmental Basin, Snapfinger Basin, and Pole Bridge Basin — consisting of 35 sewersheds (**Figure 8**). Wastewater is collected from 33 sewersheds; the remaining two sewersheds (Upper Stone Mountain Creek and South River sewersheds) have no sewer services.

DWM provides wastewater treatment only in the Snapfinger and Pole Bridge Basins (located in the Ocmulgee River Basin). The Snapfinger Basin is located in the south-central portion of the County; wastewater is conveyed to the Snapfinger Advanced Wastewater Treatment Facility (AWTF) for treatment. The Pole Bridge Basin is located in the southeastern portion of the County; wastewater is conveyed to the Pole Bridge AWTF for treatment.

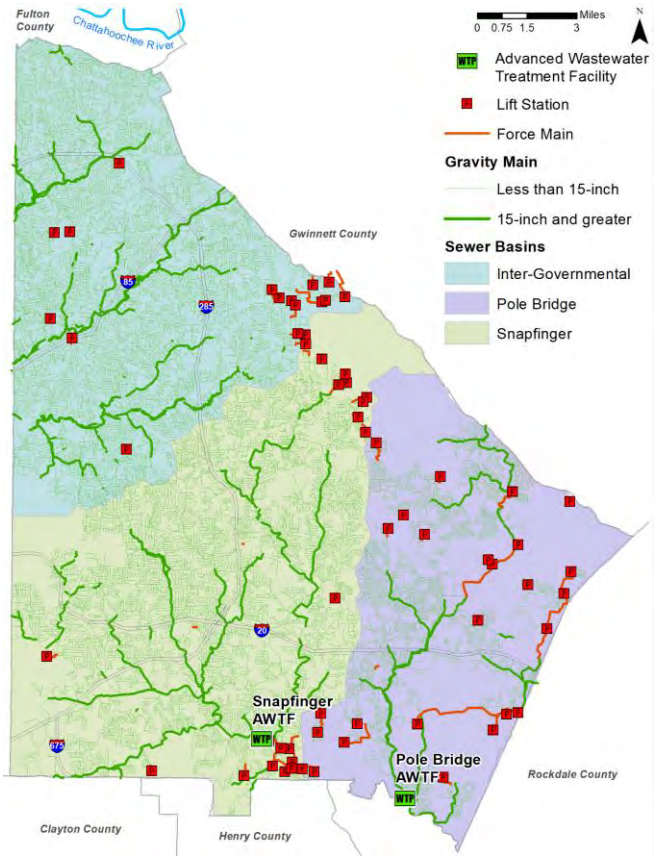
In the northern portion of the County (the Intergovernmental Basin), wastewater treatment services are provided via intergovernmental agreements (IGAs) by COA, Fulton County, and Gwinnett County. The majority of wastewater flows from the Intergovernmental Basin are treated in the COA's R.M. Clayton Water Reclamation Center (WRC). A small percentage of the flows are sent to Fulton County and Gwinnett County. Flows going to Gwinnett County (from Gwinnett County Treatment Area in **Figure 7**) are planned to be rerouted to DeKalb County; project design is anticipated to be completed in 2021

and construction completed prior to 2025. The County also receives flow from Rockdale County on an emergency basis and continuous flows from Clayton County and Henry County.

Wastewater System Components

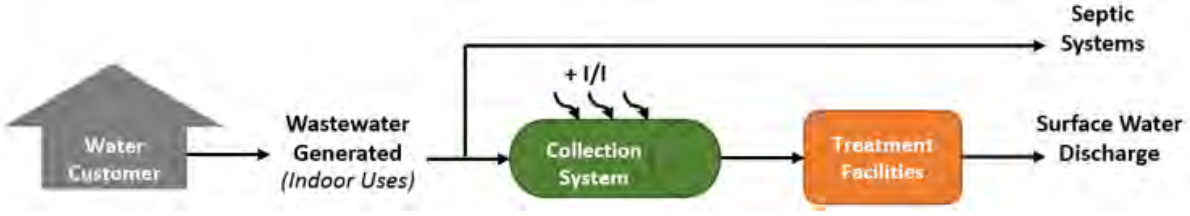
DWM manages a wastewater system that consists 2,650 miles of sewer, 62 lift stations, 61,500 manholes and two AWTFs serving the southern portion of DeKalb County: Pole Bridge and Snapfinger AWTFs, as shown in **Figure 9**. The Pole Bridge AWTF has a permitted capacity of 20 MGD on a maximum monthly average daily flow (MMF) basis (MMF-MGD). The Snapfinger AWTF has an existing (as of 2020) permitted capacity of 36 MMF-MGD. The facility is currently undergoing a Phase 2 Expansion to increase its capacity to 44 MMF-MGD (estimated completion in 2022). Phase 3 will increase its capacity to 56 MMF-MGD (anticipated to begin after Phase 2 completion).

Figure 9: Wastewater System Components



As shown in **Figure 10,** wastewater flows are generated from indoor water use and conveyed from the customer to the treatment facility. In addition to customer flows, water enters the wastewater collection system from groundwater infiltration during dry weather and groundwater and rainfall inflow during wet weather. Groundwater seeps into the sewer system through pipe defects or through loose sewer connections. This infiltration occurs where the local groundwater elevation is higher than the sewer pipe elevation. Water can enter the wastewater collection system from rainfall or inappropriate connections. This inflow tends to peak during wet weather periods and causes greater flow variation than infiltration. The combination of infiltration and inflow is commonly referred to as I/I. The discharge of the treated wastewater from the AWTFs back into rivers (surface water discharge) completes the water cycle.

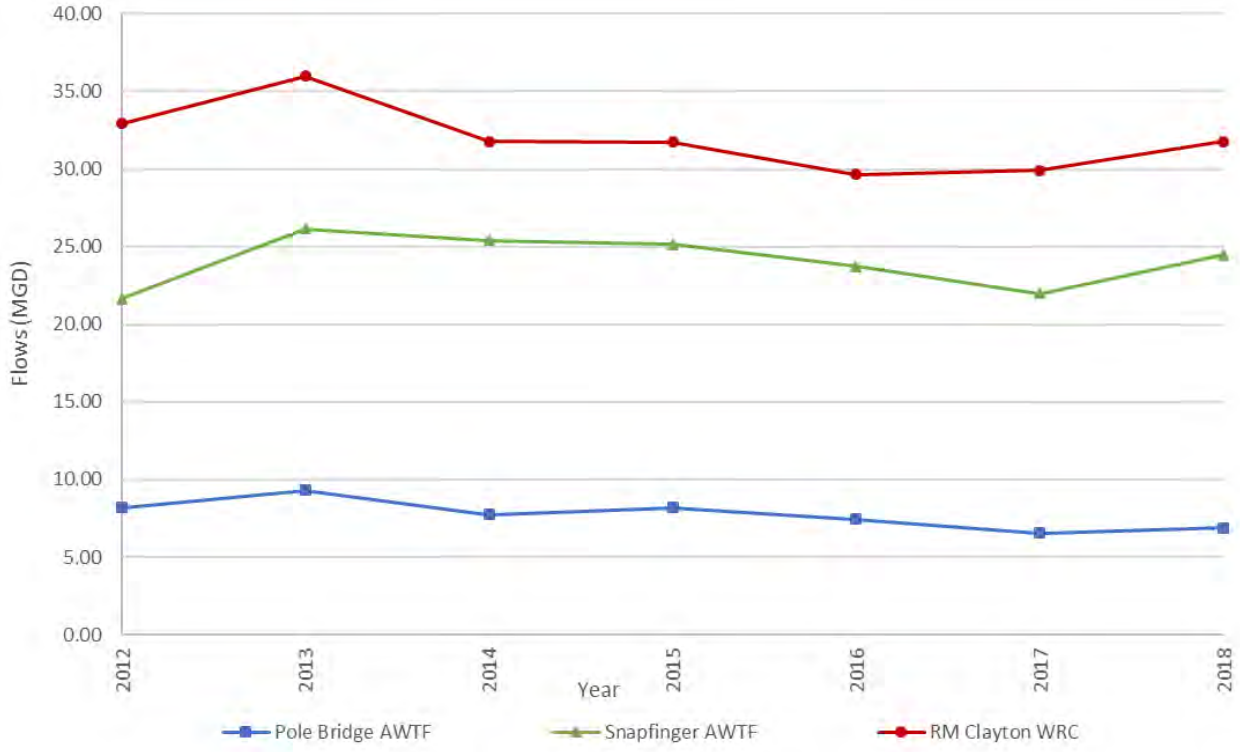
Figure 10: Wastewater System Schematic



Historical Wastewater Generation

During the historical period of 2012 to 2018, the average wastewater flow was 24 MGD to the Snapfinger AWTF, 8 MGD to the Pole Bridge AWTF, and 32 MGD of DeKalb County wastewater was treated at R. M. Clayton WRC. The highest annual average at all three facilities occurred in 2013. The lowest flows occurred for Snapfinger AWTF in 2012, a drought year. Flows were lowest in 2017 at the Pole Bridge AWTF and in 2016 at the R. M. Clayton WRC, during and after the 2016 drought. **Figure 11** shows the annual average monthly flows (2012 to 2018) at the Snapfinger and Pole Bridge AWTFs, as well as flows sent by the County to the COA's R.M. Clayton WRC.

Figure 11: Annual Average Wastewater Flows by Treatment Facility (2012 to 2018)



Notes:

[1] Average wastewater flows for R.M. Clayton WRC were not provided for May 2014, December 2015, and January 2018.

Wastewater Service Intergovernmental Agreements

Table 2 summarizes the wastewater service IGA expiration dates and the service strategy for each area through 2050 for this Master Plan, based on projected flows in the service area and discussions with DWM. Several IGAs will require renewal within the next 10 years. The County has begun meeting with the concerned municipalities and reviewing its options in renewal and renegotiation preparation.

Table 2: Wastewater IGA Service Strategies through 2050

Municipality IGA	Expiration Date	2050 Service Strategy
City of Atlanta	6/30/2029	Continue sending flows to COA through 2050; monitor average and peak flows and update limits and terms before negotiating extension of IGA beyond 2029.
City of Brookhaven	12/17/2062	No planned change in service.
City of Dunwoody	12/01/2058	
Clayton County	11/13/2023	Provide 3 MGD capacity by 2050 as requested.
Fulton County – Ball Mill Creek	02/18/2026	No planned change in service; update and renew IGA as needed.
Fulton County – Marsh Creek	05/15/2028	
Fulton County – Nancy Creek Relief Interceptor	02/07/2029	
Fulton County – Nancy Creek Relief Sewer	06/28/2038	
Fulton County – Northeast Creek	03/23/2026	
Gwinnett County	11/21/2021	Extend current IGA to 2025 while DWM completes the reversal of flows to North Fork Peachtree Creek Sewershed by 12/2025 (design ongoing).
Gwinnett County – Norris Reserve	12/31/2021	Contract has been procured and construction is underway to reverse these flows before the IGA expiration date.
Henry County	01/06/2048	Provide 0.5 MGD capacity by 2050 as requested.
Rockdale County	01/18/2021	No planned change in service; continue providing emergency relief as requested.

Consent Decree

In 2011, the County entered into a Consent Decree (CD) (Civil Action 1:10cv4039-SDG). On September 22, 2021, the County modified the CD with the U.S. Environmental Protection Agency (EPA) and the Georgia Environmental Protection Division (GAEPD) to include a 7.5-year deadline extension for completion of major repairs and upgrades of the sewer system.

As part of the CD, DWM has taken numerous corrective actions and is implementing 12 approved programs to improve the wastewater collection and transmission system. The Wastewater Master Plan was prepared in close coordination with DWM's CD Program Management Team (CDPMT), as the improvements required for CD compliance will improve the conditions and capacities of the County's

sewer system over time. Sewer system models initially created for CD compliance were modified for long-term planning as part of this Master Plan. Sewer system improvements proposed by this Master Plan were shared with the CDPMT to determine implementation timing and priorities.

Community Growth and Projections

Changes in growth and development trends have a major impact on future water and wastewater service delivery strategies.

Although overall growth is anticipated, increased population density and employment is projected to concentrate around the County's incorporated cities and along major transportation corridors (Interstate Highways I-85, I-285, and portions of I-20). The population and employment projections within the County's service area were developed based on projections published in 2015 by the Atlanta Regional Commission (ARC), with modifications based on recent development information supplied by the County's municipalities and Planning and Sustainability Department. The County's population is projected to reach approximately 1 million by 2050; accordingly, the County's population and employment are projected to grow approximately 25 to 30 percent from 2020 to 2050. These projections were the starting point for developing the water demand and wastewater flow and loading projections.

Water Demand Projections

The County's water system was designed based on now outdated projections and much of the aging infrastructure was installed decades ago. The projected growth and continued densification of urban centers results in the need for significant improvements, especially in the distribution system. The water demand projections – which considered development trends, population, and employment growth – are based on:

- Population and employment projections through 2070
- Residential per capita water demands and non-residential per employee water demands calculated using historical DWM billing data (2013-2015)
- An aggressive NRW reduction goal consisting of reducing NRW from 29 percent of total water demand in 2020 to approximately 16 percent in 2050 and 10 percent in 2070 (**Figure 12**)
- PDD to AADD factor of 1.5 derived from recent production records
- Efficiency factors (based on conservation requirements) and uncertainty factors consistent with the District's 2017 Water Resource Management Plan (District Plan)

Figure 12 shows the projected AADD and the decrease in NRW based on the goal set by DWM, while **Figure 13** presents the PDD and the comparison to raw water withdrawal and facility capacity. The water system will need to deliver projected AADDs of 86 MGD by 2050 and 94 MGD by 2070. PDDs are projected to reach 129 MGD in 2050 and 141 MGD in 2070.

Figure 12: Projected Annual Average Daily Demand, Revenue Water and NRW

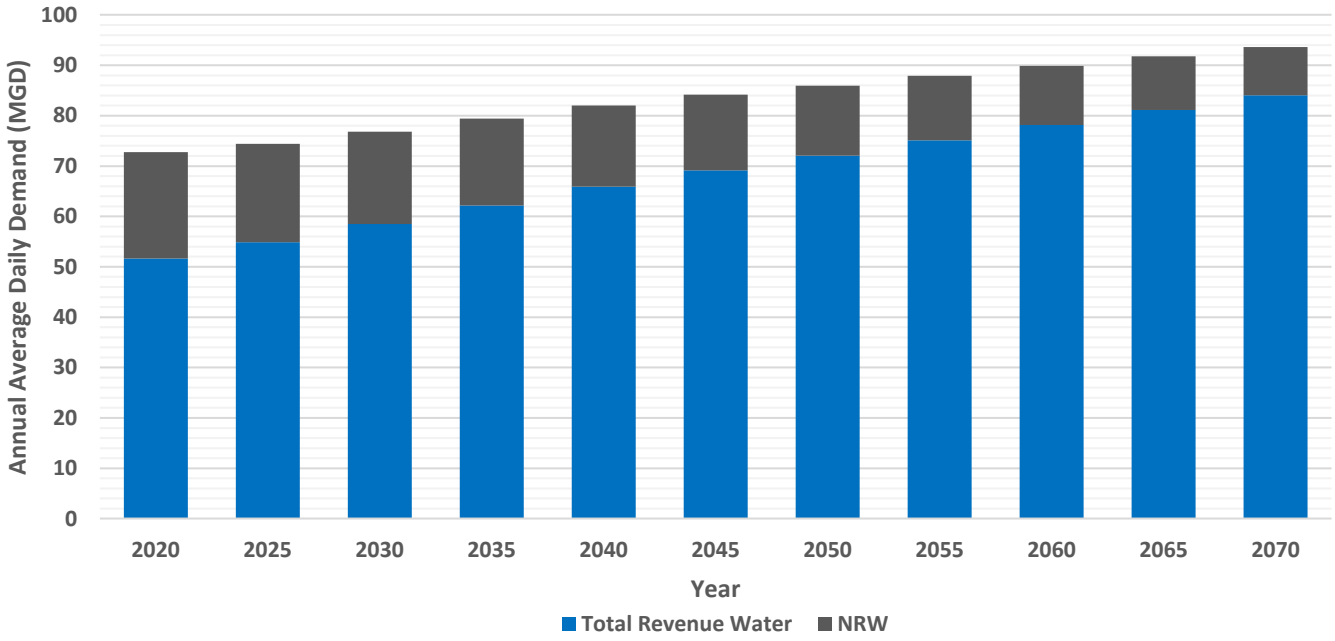
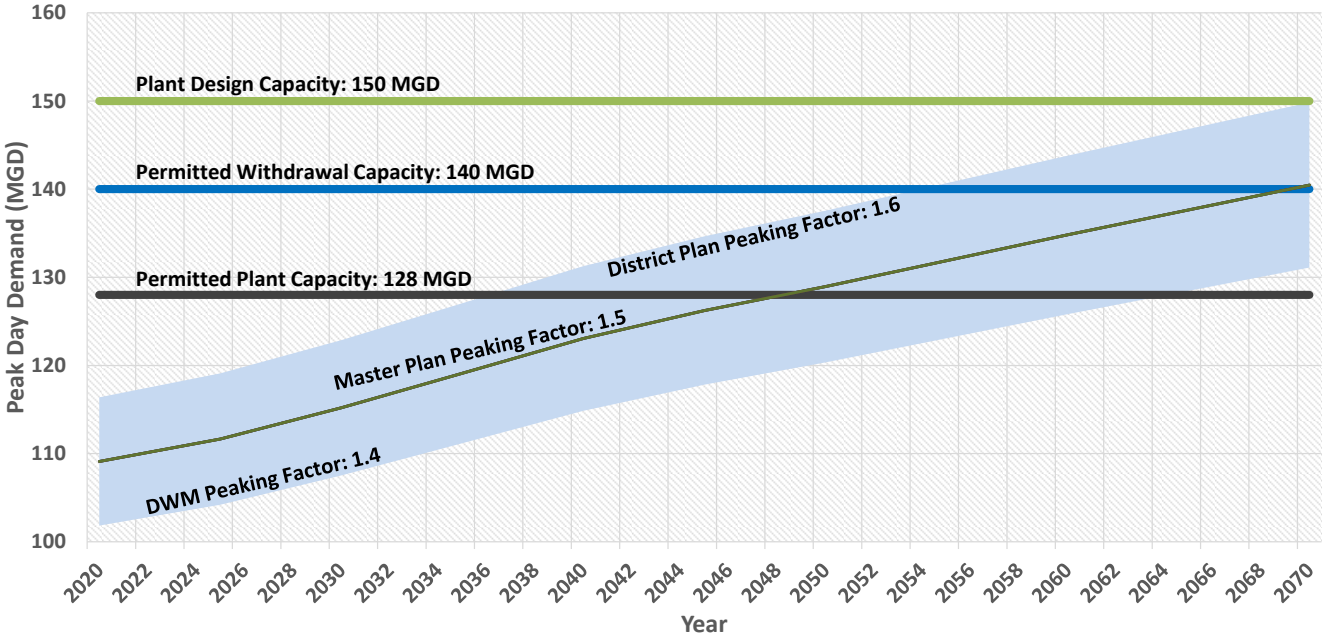


Figure 13: Projected Peak Daily Demand Range



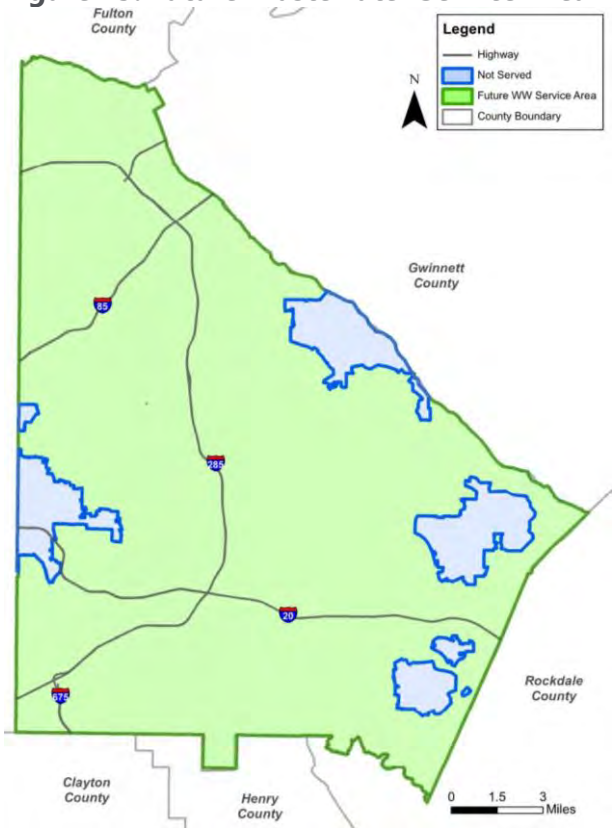
Wastewater Flow and Loading Projections

The projected 2050 wastewater flows were developed considering the following factors:

- Population and employment projections through 2070
- Residential per capita wastewater generation rates and non-residential per employee wastewater generation rates specific to each basin
- I/I reduction specific to each basin based on ongoing and planned maintenance/ rehabilitation/repair programs to be implemented through the 2050 planning horizon
- Septic tank to sewer conversion through 2070 through the implementation of a Septic Tank Elimination Program (STEP)
- Expansion of the wastewater service area to the currently unserved areas of the County, except areas currently in the COA city limit, park and natural reserves, and areas unsuitable or costly for the construction of conventional sewers. **Figures 14** and **15** show the existing and future wastewater service areas assumed for the Wastewater Master Plan
- Maximum monthly, maximum weekly and peak hourly factors based on historic flow data
- Efficiency factors and uncertainty factors consistent with the District Plan

Figure 14: Existing Wastewater Service Area

Figure 15: Future Wastewater Service Area



Based on the factors discussed above, the wastewater flow projections were prepared through 2050 for capital improvements planning and extended through 2070 for the evaluation of long-term service strategies. Key data for capital improvements planning include the following:

- The AADF of the system is projected to reach 89 MGD by 2050 (**Figure 16**)
- The projected 2050 wastewater treatment capacity need for the County will reach approximately 110 MGD-MMF (**Figure 16**). This need is to be met by the County's two AWTFs and reserved capacity at the COA's R.M. Clayton WRC assuming renewal of the DeKalb-COA IGA in 2029
- The projected 2050 AADF and MMF for the Intergovernmental-COA Service Area are not anticipated to exceed the flow limits (50 and 59.23 MGD, respectively) in the existing IGA. However, the maximum daily flow is projected to exceed the peak wet weather flow limit (116.5 MGD) in the existing IGA close to year 2030. DWM should monitor the peak flow closely in the next few years and consider updating this limit during the assumed 2029 IGA negotiations based on flow monitoring data collected at the service area boundary
- The projected AADF for the Snapfinger-COA Service Area (Intrenchment Creek Sewershed) is not anticipated to change significantly through 2050 and remains in the range of 2.1 to 2.3 MGD
- The projected 2050 MMF for the IGA-Fulton Service Area is not anticipated to exceed the MMF limit of 1.9 MGD in the existing IGA
- For the Pole Bridge AWTF, the current permitted capacity (20 MMF-MGD and 25 MWF-MGD) will be sufficient to treat the projected 2050 and 2070 flows in the basin
- The permitted capacities of the Snapfinger AWTF after the Phase 2 Expansion (44 MMF-MGD and 66 MWF-MGD) and Phase 3 Expansion (54 MMF-MGD and 73 MWF-MGD) will be sufficient to treat the projected flows in this basin through 2070
- The combined MMF for the Snapfinger and Pole Bridge AWTFs is projected to reach approximately 55 MGD in 2050 (**Figure 17**), which does not exceed the interbasin transfer (IBT) limit of 56 MGD

Wastewater loading projections for key contaminants were prepared based on recent AWTF monitoring records to assess the adequacy of the treatment processes. In addition, projected sludge quantities were prepared for a long-term management alternatives evaluation. The evaluations are discussed in the **Wastewater System Evaluation** subsection.

Figure 16: Total DeKalb County Wastewater Flow Projections

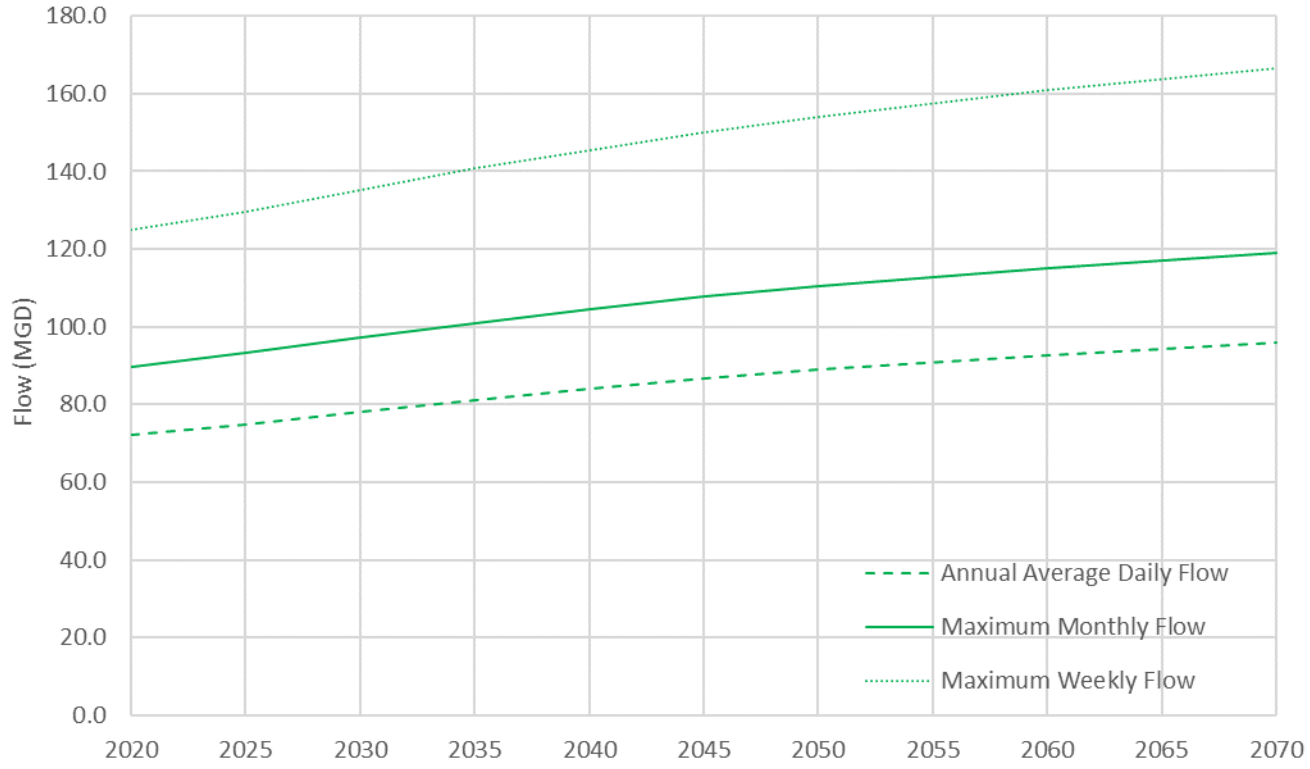
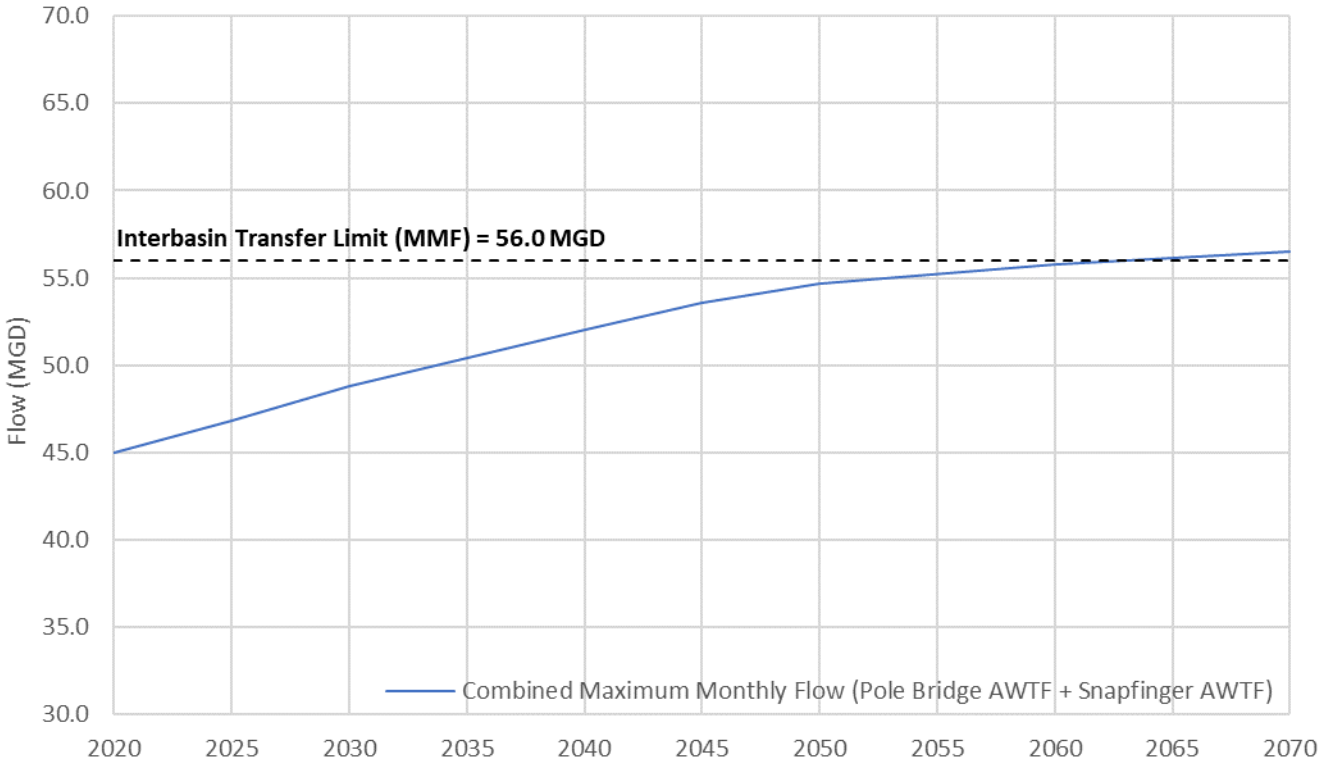


Figure 17: Pole Bridge and Snapfinger AWTFs Wastewater Flow Projections



DeKalb County's water supply source is the Chattahoochee River. The treated effluent discharge from the two AWTFs to the South River (Ocmulgee River Basin) constitutes an interbasin transfer (IBT) from the Chattahoochee River Basin to the Ocmulgee River Basin. The maximum monthly limit for the IBT is regulated by the GAEPD and the Metro North Georgia Water Planning District.

Water System Evaluation and CIP

The water system evaluation, conducted as part of the Water Master Plan, focused on four themes:

- **Water Conservation**: Aggressive goals and actions to reduce NRW
- **Capacity Assurance**: Major infrastructure projects to improve water transmission, storage, and pressure/energy management
- **System Resiliency**: Recommended projects to reduce and minimize service disruptions and improve customer satisfaction
- **Asset Renewal**: Risk-based evaluation to address aging water main replacement and assessment priorities

An essential component of the evaluation was the creation of a comprehensive county-wide water system model that has served as a tool for in-depth engineering analysis. The model allows the County to conduct "what if" scenarios to examine the impact of system changes, such as demand growth, on customer service and determine the long-term improvements needed to meet future growth. The model also can be used to investigate current system issues, such as customer pressure complaints, as well as identify and optimize potential solutions for those issues.

Water Conservation

The County is committed to implementation of the water conservation requirements developed by the Metro North Georgia Water Planning District, the regional planning agency responsible for water policy and development of the District Plan. Since the adoption of the first District Plan in 2003, the County has adopted conservation pricing, established a toilet rebate program, been performing annual water loss audits, and has implemented a robust public education and outreach program. The County encourages conservation through distribution of low flow retrofits and educational material to customers, as well as in-house conservation measures. As a result of this conservation effort, the per capita water demand has decreased significantly since 2000 and is reflected in the decrease in annual average water production levels since 2000 as shown previously in **Figure 6**.

In addition to promoting conservation, the County has been making ongoing efforts to reduce NRW:

- In 2019, the County adopted ordinances that require sub-unit meters in new multi-family buildings, meters on private fire service lines, and new car washes to recycle water.
- DWM also commenced the "New Day" program in 2019 - replacement of 102,000 meters in three years with Advanced Metering Infrastructure installations. In addition, the County is transitioning to a new billing system in 2020 that is expected to adhere with the District requirements (WSWC-3). The sub-unit metering and New Day program will reduce the NRW caused by meter inaccuracies.
- A satellite leak detection program was implemented in 2019 that will more efficiently pinpoint priority leak locations for targeted acoustic leak detection and repairs to follow.

The 2017 District Plan requires that local governments and local water and sewer providers comply with action items to help meet future water demands. The County's current transition to a new billing system is expected to adhere with the Water Supply and Water Conservation action item WSWC-3.

The DeKalb Water Master Plan includes recommendations for NRW reduction that support the following District Plan action items:

- WSWC-4: Private Fire Lines Metering Requirement
- WSWC-11: State Water Conservation and Drought Response Requirements
- WSWC-15: Water Loss Control and Reduction

Achieving an aggressive NRW goal will require implementation of a comprehensive water loss reduction program. In addition, NRW reduction progress must be documented for renewal of the water withdrawal permit expiring in November 2021.

Water Supply Resiliency

The water supply level of service (LOS) goal is to provide the projected AADD and PDD throughout the 50-year planning horizon with the combination of permitted water withdrawal from the Chattahoochee River and on-site raw water storage at the SCWTP.

With a permitted withdrawal of 140 MGD from the Chattahoochee River, the County's water supply source can provide long-term water supply for the County through 2070. The current litigation status of the Tri-State Water Wars suggests that the County will be able to retain the permitted withdrawal from the Chattahoochee River as long as (1) there is no change in Georgia's water supply allocation from the ACF Basin (Apalachicola, Chattahoochee and Flint River Basins), and (2) the County continues to promote conservation and manage its PDD by maintaining a peak day to annual average factor at or below the current level.

While this is good news for the County, challenges still exist such as climate change, urbanization, major transmission main breaks, and potential security threats. The County's current emergency buffer against unexpected interruptions in raw water supply is its three on-site reservoirs with 1 billion gallons of

combined storage. The SCWTP can be isolated from the existing raw water transmission system and the on-site reservoirs can provide up to 12 days of storage at the projected 2050 AADD and up to 11 days at the projected 2070 AADD.

The Water Master Plan includes an evaluation of five alternative water supply sources to increase the resiliency of the County's current source. Four of these alternatives involve new pumped-storage reservoirs with safe yields ranging from 12.7 MGD to 29.4 MGD; the fifth alternative would store water pumped from the Chattahoochee River for treatment at the SCWTP, should the river supply become temporarily unavailable. The fifth alternative could potentially provide up to 130 days of storage at the projected 2050 AADD of 86 MGD, or 119 days at the projected 2070 AADD of 94 MGD.

The conceptual water supply source feasibility analysis was limited to the evaluation of water supply availability (safe yield). Further evaluations would be required if the County wishes to explore the reservoirs identified in this analysis for water storage to enhance water supply resiliency. Other potential water supply source alternatives were also examined, such as interconnects with other utilities, groundwater, and water reuse. However, none of these were considered to have significant quantities available or be efficient enough to warrant further consideration.

Water Supply and Treatment Facilities

The County facilities used to obtain and treat water before distribution include the Chattahoochee River raw water pump station (RWPS), three raw water transmission mains (96-inch, 60-inch and 30-inch in diameter), and the SCWTP. The Chattahoochee River RWPS and the 96-inch transmission main began operation in 2011; the SCWTP was upgraded and the new plant began operation in 2007. The SCWTP is a state-of-the-art treatment facility with ozonation and biological filtration that can treat potential emerging contaminants in the future.

Similar to the water supply LOS goal, the LOS goal for the raw water pumping and transmission infrastructure and the water treatment facility is to convey the PDD throughout the 50-year planning horizon. The facilities are relatively new and generally have been designed with sufficient capacities to meet the projected 2050 and 2070 demands. The water supply and treatment facility evaluation focused on how the overall system resiliency can be improved over the next 30 to 50 years. The following summarizes the key evaluation results and projects identified to address deficiencies.

Raw Water Pump Station and Transmission

The Chattahoochee River RWPS can deliver a range of flow depending on the combination of the raw water pumps and transmission mains being used. Currently, the RWPS is designed to convey a PDD of approximately 180 MGD with one wet well out of service, assuming only the 96-inch transmission main is being actively used to deliver water to the SCWTP. Key recommendations for the raw water pumping and transmission infrastructure include:

- Emergency Drought Response Implementation Plan
- Short-Term Drought Response Implementation Plan
- 60-inch and 96-inch Raw Water Main Condition Assessment
- 30-inch Raw Water Main Replacement

Water Treatment Plant

The SCWTP has a peak day design capacity of 150 MGD and is permitted to treat 128 MGD. The design capacity is sufficient to treat the projected PDD through 2050. However, the SCWTP's operating permit (issued by GAEPD) may need to be increased prior to 2050 to meet the projected 2050 PDD of 129.0 MGD. The County has sufficient time to determine a course of action based on projected PDD in future updates of the Water Master Plan.

With many projects already planned or ongoing to address upgrade needs for the SCWTP, the Water Master Plan focuses on the planning of improvements that will have the most significant long-term impacts to enhance the reliability and resiliency of the plant and overall water system. Key projects to address facilities at the SCWTP include:

- Finished Water Storage and High Service Pumping Upgrade
- Power Supply Resiliency
- Ozone Generator Replacement

Water Distribution System

As part of the CIP Program Management Service, a full-pipe water distribution system model was constructed and calibrated for master planning and operational investigation purposes. LOS and performance goals were established as part of the Water Master Plan. Modeling analyses were performed using 2050 demand conditions for CIP planning and 2070 demand conditions for long-term service strategy evaluations. The system was evaluated for:

- LOS criteria (system pressure, fire flow, pump station capacity/resiliency and reliability, and system storage)
- Performance evaluation criteria (including velocity, headloss, and water age)
- Resiliency in the case of major transmission failure, major pump or pump station failure, or loss of supply
- Capability to provide storage for emergencies (such as major transmission main breaks, fire flow demands, and power outages)

Water System Service Strategy

The Water Master Plan evaluated six long-term service strategies, each with an increasing level of resiliency built into the system and an increasing level of operational complexity. The service strategies were built upon service concepts developed at the general policy level and for each major component of the water system for supply, treatment, transmission, and distribution. The service concepts were screened based on their consistency with County vision and policy, as well as the County's goals and objectives for water service delivery. The hydraulic model was used to evaluate the feasibility of the strategies with 2070 demand conditions for long-term planning.

Significant investment and commitment are needed to increase reliability, resiliency, and energy efficiency of the system regardless of the strategies. Ranking of the service strategies, based on a series of evaluation factors, is shown in **Table 3**. The County selected Service Strategy 1B for planning the 2050 CIP after considering both cost and non-cost factors listed in **Table 3**. Service Strategy 1B satisfies the County's desire to meet future demand, improve efficiency, and enhance resiliency with a cost-effective solution for the 2050 planning horizon.

Table 3: Potential Water Service Strategy Comparison Results

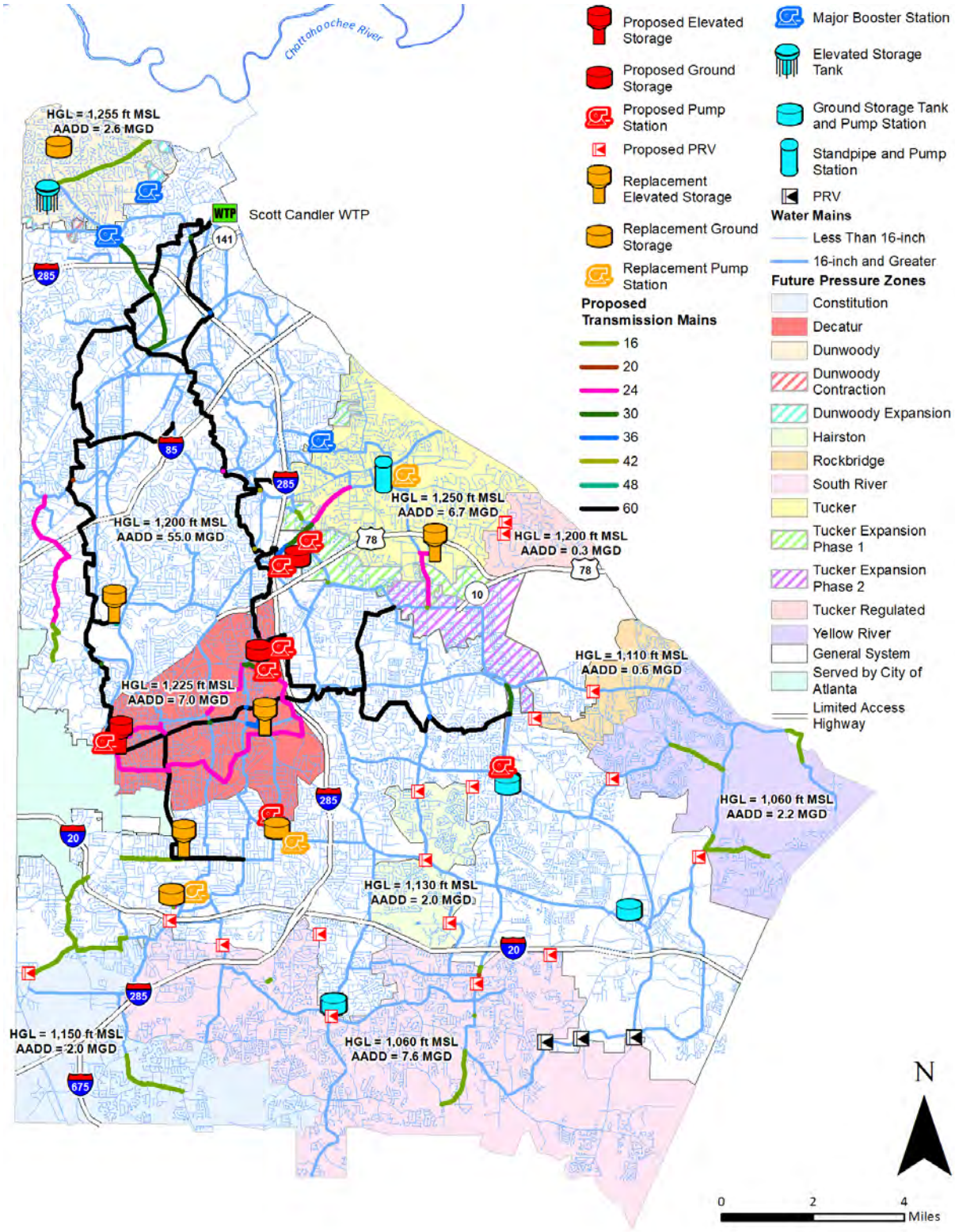
Evaluation Factors	1A	1B	2A	2B	3A	3B	Category Weight
Increases Reliability	◑	◑	◕	◕	●	●	10
Resolves LOS Deficiencies	●	●	●	●	●	●	10
Addresses Performance Criteria	◕	●	●	●	●	●	10
Improves Energy Efficiency	◑	◑	◕	◕	●	●	10
Ease of System Operations	●	●	◑	◑	○	○	10
Supports Resiliency	◔	◑	◑	◕	◕	●	10
Time to Implement	◑	◑	◔	○	◔	○	10
Cost to Implement	◑	◑	◔	○	◔	○	20
Score (100 = Best Possible)	69	73	67	62	69	64	

Notes:

[1] Scoring key: ○ = 1, ◔ = 2, ◑ = 3, ◕ = 4, ● = 5, where 1=lowest, 5=highest

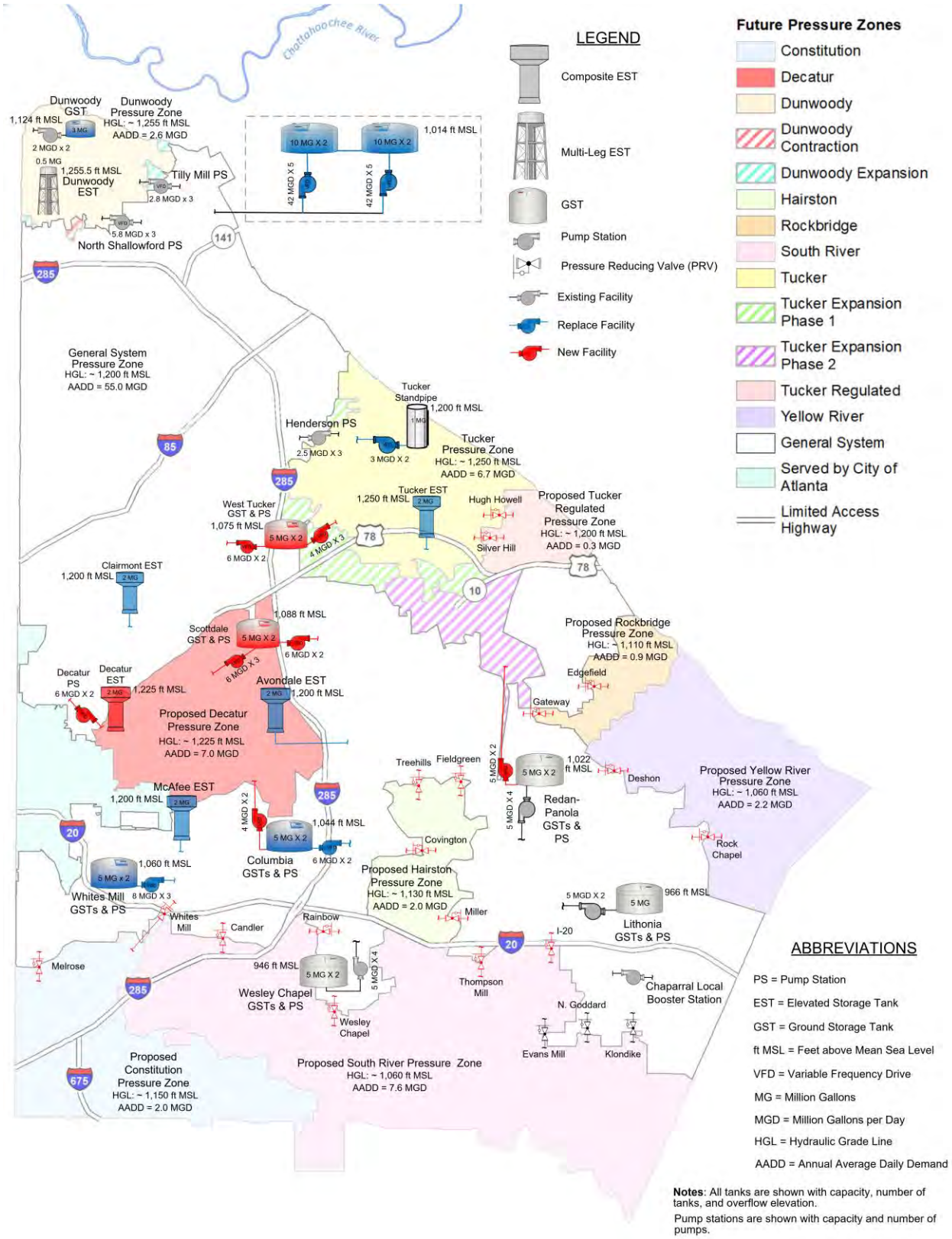
An overview of the recommended distribution system improvements for the 2050 planning horizon associated with Service Strategy 1B (i.e., preferred service strategy) is shown in **Figure 18**, while **Figure 19** provides a schematic of the proposed system operation.

Figure 18: Overview of Preferred Water Service Strategy



Abbreviations:
HGL=Hydraulic Grade Line, AADD=Annual Average Daily Demand

Figure 19: Operational Schematic for Preferred Water Service Strategy



Water Distribution System Improvements

Table 4 provides a summary of the recommended improvements for the 2050 planning horizon by category. The recommended improvement projects are shown in more detail in **Figure 20** (transmission main projects), **Figure 21** (pressure zone projects), **Figure 22** (distribution pipe, elevated storage tank, ground storage tank, pump station, resiliency, and valve projects), **Figure 23** (local hydraulic projects) and **Figure 24** (risk-based water main replacement through 2030).

The recommended distribution system improvements are designed to:

- Increase transmission main capacity and resiliency
- Improve pressure management
- Increase system storage and replacement of aging storage tanks
- Increase pumping capacity and improvement/replacement of aging pump stations
- Improve system maintenance, including an annual water main replacement program

The results from the evaluation show that **the most significant challenge facing the County regarding the distribution system is the lack of transmission capacity and the hydraulic restrictions in the current transmission network**. Additionally, there is a lack of resiliency in the transmission network; if either of the two major 48-inch transmission mains are taken offline (in the event of an emergency) during peak demand conditions, the County could have issues with maintaining adequate minimum pressures. In the past, lack of transmission capacity during repairs of the 48-inch transmission mains have resulted in the need to issue boil water advisories.

Improvements to pressure management can significantly help other aspects of system performance. Specifically, customer satisfaction and fire flow availability can be improved by increasing pressure in low pressure areas, and leaks and main breaks can be decreased by reducing pressures in areas experiencing excessively high pressures.

In general, the system storage and pump station improvements shown in **Table 4** were developed to meet the LOS and performance criteria and increase both pumping and storage capacity to provide additional system resiliency. In addition, emphasis was placed on better use of both existing and proposed storage by:

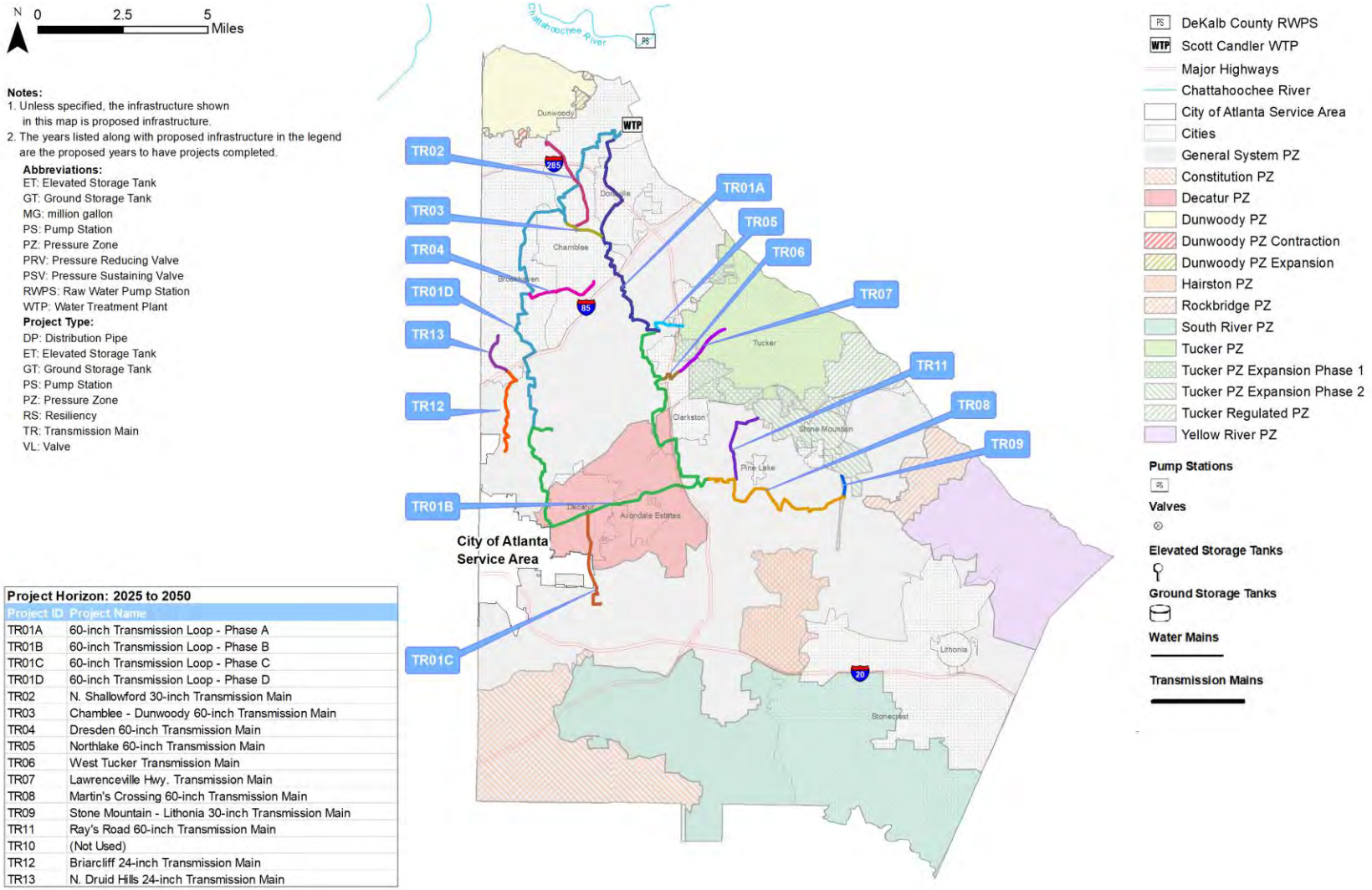
- Creating an operational plan that allows both existing and proposed ground storage to supply multiple pressure zones
- Increasing overflow elevations of the elevated storage tanks in the General System Pressure Zone to provide better system performance and customer service

The recommended annual water main replacement and other system maintenance programs will have some of the greatest impacts on customer service and satisfaction by reducing the number of water main breaks and improving system pressures and fire flow availability. These programs will be some of the most visible to County residents and will have a significant impact on the day-to-day performance of the water system.

Table 4: 2050 Water Distribution System Recommendations Summary

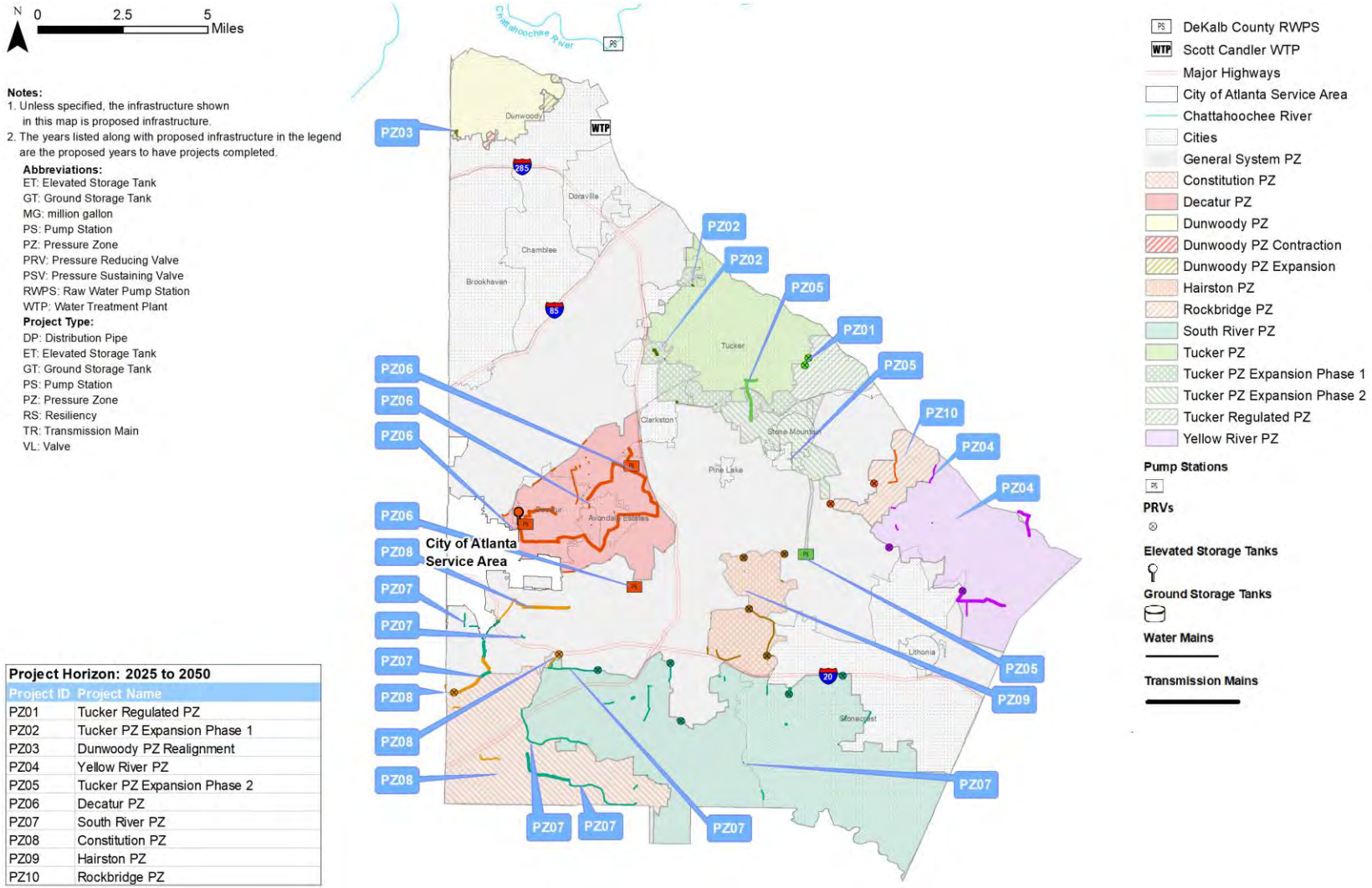
Recommendations	General Description
Pressure Zones	
General System	Increase hydraulic grade line (HGL) from 1,170 ft MSL to 1,200 ft MSL
	Relocate portion of Dunwoody to General System Pressure Zone
Tucker Pressure Zone	Relocate portion of General System to Tucker Pressure Zone
Dunwoody Pressure Zone	Relocate portion of General System to Dunwoody Pressure Zone
	Relocate Ridgeview Pressure Zone to Dunwoody Pressure Zone
Chaparral Local Booster Pump Zone	Add nearby customers, improve pressure stabilization, and improve fire flow
New Decatur Pressure Zone	Create from General System Pressure Zone (1,225 ft MSL)
New Tucker Regulated Pressure Zone	Create from Tucker Pressure Zone (1,200 ft MSL)
New Constitution Pressure Zone	Create from General Pressure Zone (1,150 ft MSL)
New Hairston Pressure Zone	Create from General System Pressure Zone (1,130 ft MSL)
New Rockbridge Pressure Zone	Create from General System Pressure Zone (1,110 ft MSL)
New South River Pressure Zone	Expand Arabia Mountain Pressure Zone (1,060 ft MSL)
New Yellow River Pressure Zone	Create from General System Pressure Zone (1,060 ft MSL)
Water Main Improvements	
Water Mains for Major Capital Improvements	• 60-inch transmission main: approximately 58 miles • 30/36-inch transmission main: approximately 8 miles • 20/24-inch transmission main: approximately 19 miles • 16-inch transmission main: approximately 17 miles • 8/12-inch water main: approximately 34 miles
Local Hydraulic Improvement Water Mains	• Approximately 300 miles of 8-inch, 12-inch, and 16-inch mains (new and replacement mains) address 72 percent of fire flow deficiencies
Replacement/Rehabilitation Program	• Large diameter transmission main rehabilitation assessment program • Small diameter risk-based distribution main replacement program (to coordinate with local hydraulic improvement water mains)
Storage Improvements	
Ground Storage Tanks	• New West Tucker Site: 2 New 5 MG Tanks • New Scottdale Site: 2 New 5 MG Tanks • Dunwoody: 1 Replacement 3 MG Tank • Whites Mill: 2 Replacement 5 MG Tanks • Columbia: 2 Replacement 5 MG Tanks
Elevated Tanks	• New Tanks: Decatur (2 MG) • Replacement Tanks: Avondale, Clairmont, McAfee, Tucker (2 MG)
Fill Control Valves	• Flow and upstream pressure control for each ground storage tank site with SCADA control and instrumentation improvements allowing operators to remotely control fill rates
Pump Station Improvements	
General System Pressure Zone	• New West Tucker Pump Station No. 1 • New Scottdale Pump Station No. 1 • Replace Whites Mill Pump Station • Replace Columbia Pump Station No. 1 (includes adding standby power) • Add standby power to Lithonia Pump Station
Decatur Pressure Zone	• New Decatur Pump Station • New Scottdale Pump Station No. 2 • New Columbia Pump Station No. 2
Dunwoody Pressure Zone	• Eliminate Ridgeview Pump Station
Tucker Pressure Zone	• New West Tucker Pump Station No. 2 • New Redan-Panola Pump Station No. 2 • Replace Tucker Pump Station • Eliminate Midvale Pump Station • Eliminate Steel Drive Pump Station
Other Improvements	
Modify Existing Tank Operation	Eliminate excessive freeboard, meet 25% turnover. Improves storage utilization, water age
Valve Exercising Program	Identify valve position and operational status. Improves energy efficiency, fire flow, water age

Figure 20: Proposed Transmission Main (TR) Project Overview



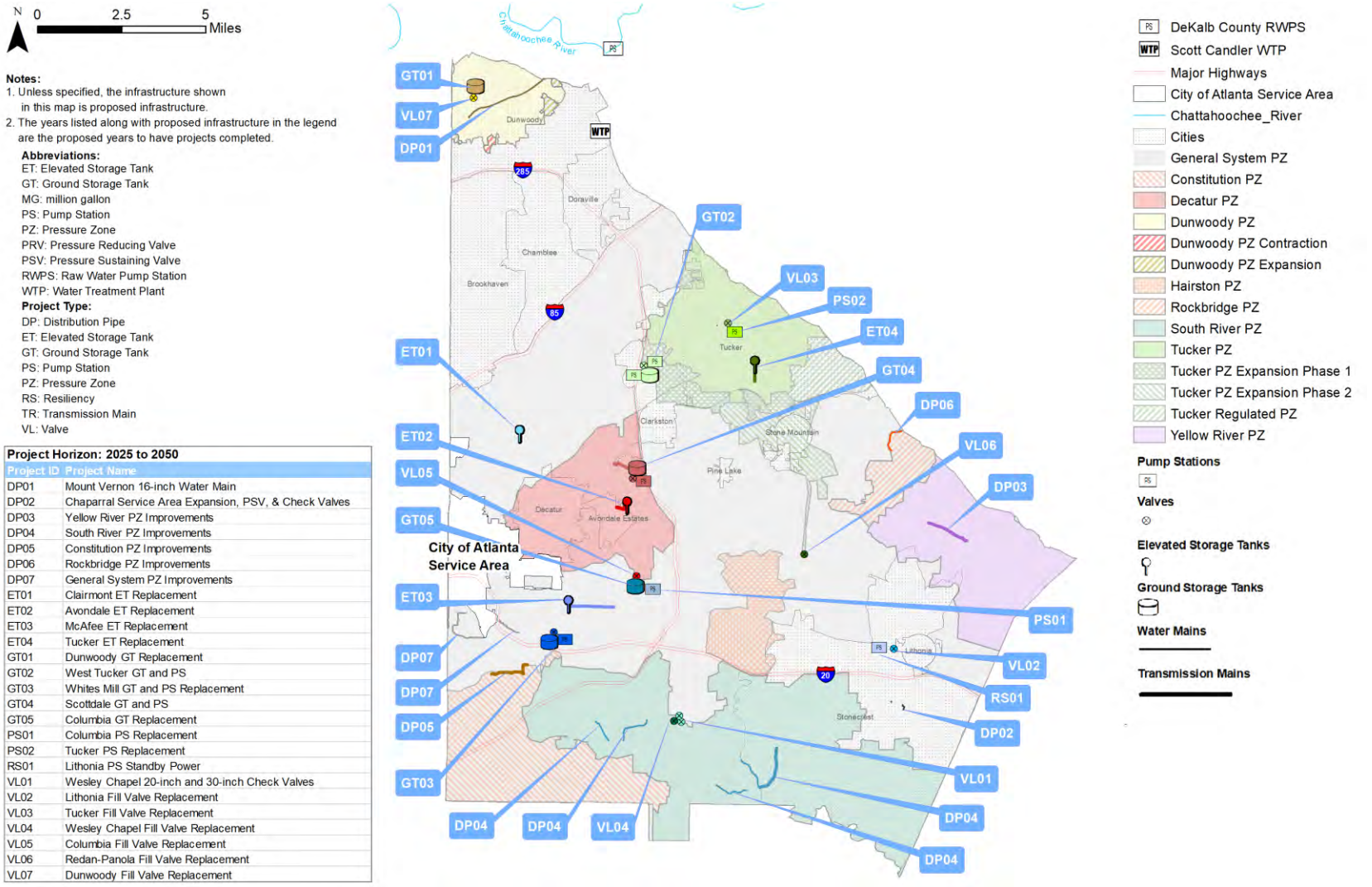
Project Horizon: 2025 to 2050	
Project ID	Project Name
TR01A	60-inch Transmission Loop - Phase A
TR01B	60-inch Transmission Loop - Phase B
TR01C	60-inch Transmission Loop - Phase C
TR01D	60-inch Transmission Loop - Phase D
TR02	N. Shallowford 30-inch Transmission Main
TR03	Chamblee - Dunwoody 60-inch Transmission Main
TR04	Dresden 60-inch Transmission Main
TR05	Northlake 60-inch Transmission Main
TR06	West Tucker Transmission Main
TR07	Lawrenceville Hwy. Transmission Main
TR08	Martin's Crossing 60-inch Transmission Main
TR09	Stone Mountain - Lithonia 30-inch Transmission Main
TR11	Ray's Road 60-inch Transmission Main
TR10	(Not Used)
TR12	Briarcliff 24-inch Transmission Main
TR13	N. Druid Hills 24-inch Transmission Main

Figure 21: Proposed Pressure Zone (PZ) Project Overview



Project Horizon: 2025 to 2050	
Project ID	Project Name
PZ01	Tucker Regulated PZ
PZ02	Tucker PZ Expansion Phase 1
PZ03	Dunwoody PZ Realignment
PZ04	Yellow River PZ
PZ05	Tucker PZ Expansion Phase 2
PZ06	Decatur PZ
PZ07	South River PZ
PZ08	Constitution PZ
PZ09	Hairston PZ
PZ10	Rockbridge PZ

Figure 22: Proposed Miscellaneous (DP, ET, GT, PZ, RS, and VL) Project Overview



Project Horizon: 2025 to 2050

Project ID	Project Name
DP01	Mount Vernon 16-inch Water Main
DP02	Chaparral Service Area Expansion, PSV, & Check Valves
DP03	Yellow River PZ Improvements
DP04	South River PZ Improvements
DP05	Constitution PZ Improvements
DP06	Rockbridge PZ Improvements
DP07	General System PZ Improvements
ET01	Clairmont ET Replacement
ET02	Avondale ET Replacement
ET03	McAfee ET Replacement
ET04	Tucker ET Replacement
GT01	Dunwoody GT Replacement
GT02	West Tucker GT and PS
GT03	Whites Mill GT and PS Replacement
GT04	Scottdale GT and PS
GT05	Columbia GT Replacement
PS01	Columbia PS Replacement
PS02	Tucker PS Replacement
RS01	Lithonia PS Standby Power
VL01	Wesley Chapel 20-inch and 30-inch Check Valves
VL02	Lithonia Fill Valve Replacement
VL03	Tucker Fill Valve Replacement
VL04	Wesley Chapel Fill Valve Replacement
VL05	Columbia Fill Valve Replacement
VL06	Redan-Panola Fill Valve Replacement
VL07	Dunwoody Fill Valve Replacement

Figure 23: Proposed Local Hydraulic Improvements Overview

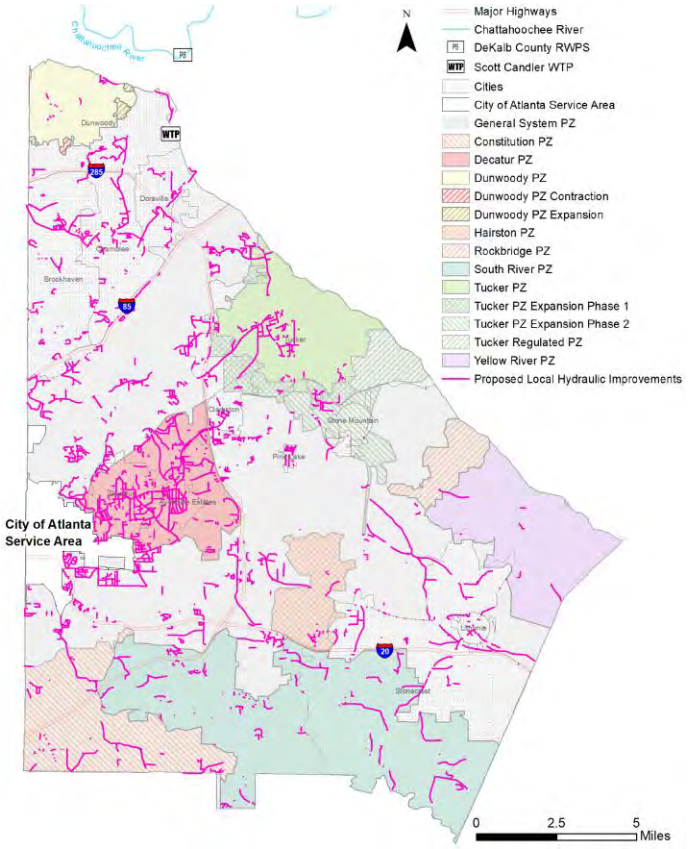
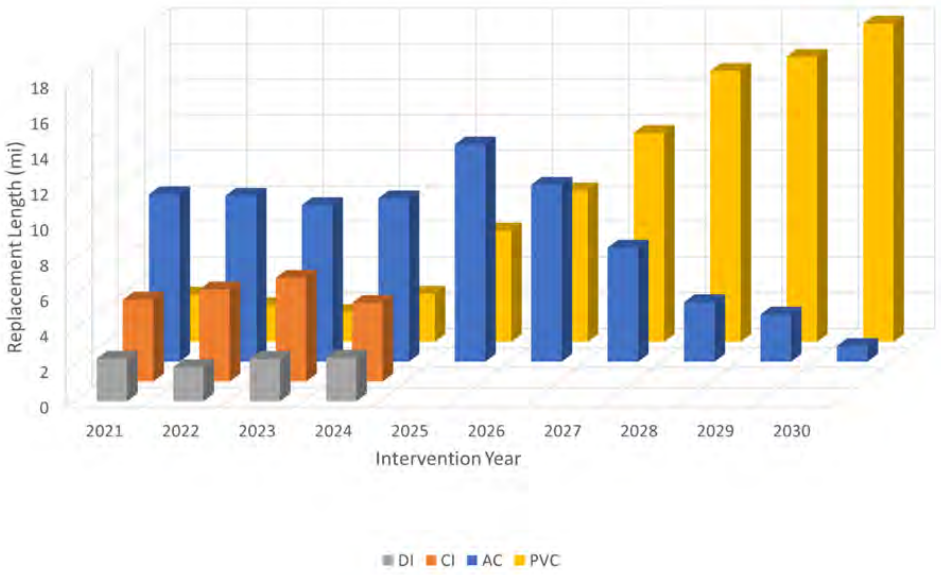


Figure 24: Proposed Risk-Based Small Diameter Water Main Replacement (Through 2030)



Summary of Recommended Water System Improvements

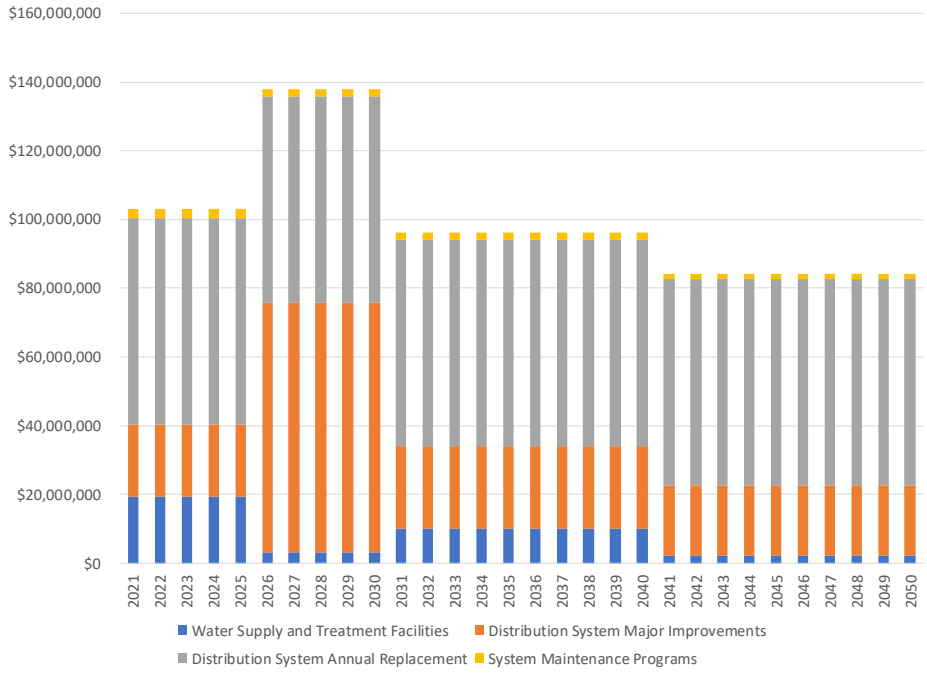
Table 5 summarizes the projected capital spending through 2050 by planning horizons. Estimated planning level costs for budgeting purposes include estimated capital costs for both water supply and treatment facilities and distribution system improvements over the next 30 years. Distribution system investments include both major capital improvements and an annual water main replacement program.

Table 5: Estimated Water System Capital Costs by Planning Horizon (Million Dollars)

Implementation	Water Supply and Treatment	Distribution System		System Maintenance Programs	Total	Annual Spending
		Major Capital Improvements	Annual Water Main Replacement			
2021 – 2025	$97.6	$104.6	$300.0	$13.0	$515.2	$103.0
2026 – 2030	$15.4	$363.2	$300.0	$11.6	$690.2	$138.0
2031 – 2040	$101.7	$238.2	$600.0	$22.6	$962.5	$96.3
2041 – 2050	$22.5	$203.6	$600.0	$15.4	$841.5	$84.2
Total	**$237.2**	**$909.6**	**$1,800.0**	**$62.6**	**$3,009.4**	**$100.3**

Figure 25 provides an illustration of the potential annual capital spending through 2050. The annual water main replacement represents a significant commitment by the County to replace aging mains which will improve customer service, reduce water loss, and protect public health and safety. Implementation of the proposed capital improvement projects to improve the transmission and storage capacity and to enhance resiliency of the entire system will support the County's vision for sustainable growth and a resilient community into the future.

Figure 25: Projected Annual Water System Capital Spending by Project Type



Wastewater System Evaluation and CIP

The wastewater system evaluation, performed as part of the Wastewater Master Plan, focused on three themes:

- **Capacity and Safety Assurance**: Major infrastructure projects to improve wastewater treatment and collection
- **Asset Renewal**: Age-based asset renewal of wastewater treatment facilities and lift stations
- **System Resiliency and Optimization**: Recommended projects to reduce and minimize service disruptions, improve customer satisfaction, and improve process efficiency for wastewater treatment facilities

The proposed collection system projects in this Master Plan are limited by the hydraulic models used for the master planning evaluation, which predate the latest dynamic models and modification to the CD. Since the completion of the Master Plan analyses, both the hydraulic models and key modeling assumptions, such as surcharge levels and design storm, have changed. As such the final projects adopted by DWM may differ substantially from the projects recommended in this Master Plan.

Wastewater Collection System

The wastewater collection system was evaluated based on the sewersheds in the Intergovernmental-COA Service Area and the basins in the DeKalb County Service Area.

These sewersheds are categorized into two sections based on the watershed (river basin) they are located in:

- Ocmulgee River Basin: includes the Pole Bridge and Snapfinger Basins and Intrenchment Creek Sewershed
- Chattahoochee River Basin: includes the Nancy Creek, North Fork Peachtree Creek (NFPC) and South Fork Peachtree Creek (SFPC) Sewersheds

The Intergovernmental-Gwinnett Service Area (in the Ocmulgee River Basin) and the Intergovernmental-Fulton Service Area (in the Chattahoochee River Basin) were not included in the modeling. Flows currently conveyed to Gwinnett County are planned to be rerouted back to DeKalb County. The small quantity of flows being sent to Fulton County for treatment will continue to Fulton County, as long as the IGA is renewed based on available capacity in Fulton County.

Evaluation Criteria

This Master Plan primarily focused on the capacity evaluation of sewer mains with a diameter of 15 inches and larger because the CDPMT identified improvement projects for sewer mains with a diameter smaller than 15 inches. The evaluation criteria for the wastewater collection system include meeting the following LOS goals:

- Prevention of overflows under all flow conditions
- Depth of flow to diameter ratio of less than or equal to 1.0 under the projected peak wet weather flow conditions for new pipe installation
- Water level less than 4 feet below the manhole rim under peak flow conditions (accounts for additional capacity contingencies; the draft CD extension finalized in October 2020 allows the predicted flow level to reach 2 feet below manhole rim)
- Gravity sewer velocities in the range of 2 feet per second (ft/s) to 9 ft/s and force main velocities in the range 3 ft/s to 6 ft/s
- Lift station firm capacity sufficient for peak wet weather flow
- Standby power or equipment for emergency operation

Wastewater flow forecasts for the evaluation were prepared on the sewershed level and include base sanitary flows, I/I and septic flow. Conducting simulations with the projected flows helped identify capacity limitations in the system, which were the basis for evaluating the proposed improvements. The proposed improvements were sized for 2020 wet weather flow conditions, as well as 2050 wet weather flow conditions. The rehabilitation and replacement of lift stations within the evaluated basins/sewersheds was also identified based on the lift station ages in the current year (2020). **Table 6** summarizes the wastewater system components in the evaluated basins/sewersheds.

Table 6: Wastewater Collection System Components by Sewershed or Basin Evaluated

Sewershed/Basin	Area (sq. mi.)	Number of Lift Stations	Number of Manholes	Miles of Gravity Sewer and Force Main	Wastewater Treatment Facility
Pole Bridge Basin (11 sewersheds)	72	24	10,890	428	Pole Bridge AWTF
Snapfinger Basin (12 sewersheds)	110	23	26,450	1,026	Snapfinger AWTF
Intrenchment Creek Sewershed	11	0	1,980	83 (no force main)	Primary treatment - COA's Intrenchment Creek WRC Secondary treatment and discharge - COA's South River WRC[1]
Nancy Creek Sewershed	19	3	7,300	254	COA's R.M. Clayton WRC[3]
NFPC Sewershed	32	2	12,200	437	
SFPC Sewershed (including the Peavine Creek Sewershed)[2]	29	8	9,800	362	

Notes:

[1] The COA is in the process of decommissioning the Intrenchment Creek WRC, which is anticipated to be completed in 2022; after 2022, all flows will be treated at the South River WRC.

[2] The SFPC Sewershed receives wastewater flows from the Peavine Creek Sewershed; therefore, these two sewersheds were considered one service area for the evaluation.

[3] Flows from the Intergovernmental Basin are treated at the R.M. Clayton WRC under an IGA, which expires in 2029.

Table 7 summarizes the results from the collection system evaluations performed. For the Snapfinger Basin, and Nancy Creek, NFPC and SFPC Sewershed simulations, I/I reduction over the 30-year master planning period (2020 to 2050) was assumed to be 20 percent since there is a significant amount of planned infrastructure rehabilitation and replacement during this period. No I/I reduction was assumed for the Pole Bridge Basin as the collection system in this basin is relatively new, compared to the Snapfinger and Intergovernmental Basins, and does not require a significant amount of rehabilitation and replacement in the 30-year planning period. For the Intrenchment Creek, Nancy Creek, NFPC and SFPC Sewersheds, the 2050 simulation results in lower surcharges than the 2020 simulation, as the assumed reduction in I/I results in lesser 2050 peak wet weather flows, even with increased base sanitary flows and septic flows.

Table 7: Wastewater Collection System Evaluation Results

Sewershed/ Basin	2020 Simulation			2050 Simulation		
	Projected Average Flow (MGD)	Overflows	Surcharge[1]	Projected Average Flow (MGD)	Overflows	Surcharge[1]
Pole Bridge Basin	8.4	4	5 miles of pipe	11.1	4	5 miles of pipe
Snapfinger Basin	27.2	227	51 miles of pipe	32.4	241	56 miles of pipe
Intrenchment Creek Sewershed	2.1	21	55 manholes	2.3	14	47 manholes
Nancy Creek Sewershed	11.3	16	25 miles of pipe	15.2	9	21 miles of pipe
North Fork Peachtree Creek Sewershed	13.0	11	19 manholes	16.0	8	15 manholes
South Fork Peachtree Creek Sewershed	16.2	20	98 manholes	19.3	7	59 manholes

Notes:
[1] Based on the type of model used for the evaluations, the output, in terms of surcharge conditions, was different. The surcharge for the steady state models was quantified in miles of pipe, whereas for the dynamic models, it was quantified in the number of manholes.

Advanced Wastewater Treatment Facilities

As part of this Master Plan, a high-level capacity and process (wastewater and sludge) evaluation was performed for the two AWTFs owned and operated by DWM. The goal was to identify major capital improvement projects required to meet the 2050 projected flows and loadings and to meet conditions specified in the AWTFs' effluent discharge and operational permits. Wastewater loading projections for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), total phosphorus (TP), ammonia-nitrogen (NH_4-N) and Volatile Suspended Solids (VSS) were developed and evaluated against the design capacities of unit treatment processes to meet the permit effluent limits. The capacities of the AWTFs' solids treatment processes were also evaluated to identify major capital improvement projects required to meet the 2050 projected solids production at the facilities.

Evaluation Criteria

The evaluation criteria were based on existing permits and industry standards. The criteria for the Snapfinger AWTF also included the Phase 2 Expansion specifications. These criteria included meeting the following LOS goals:

- Compliance with permitted effluent flow and load limits
- Firm capacity of hydraulically governed processes/units sufficient for the PHF
- Solids loading to the secondary clarifiers not exceeding maximum monthly and maximum weekly design solids loading rates
- Maintaining the manufacturer-specified range of mixed liquor suspended solids (MLSS) in membrane basins
- Aeration capacity sufficient to meet the standard oxygen transfer rate under maximum monthly and maximum weekly loading conditions
- Solids treatment firm process capacity sufficient for maximum monthly solids production
- Standby power or equipment for emergency operation

The capital improvement projects resulting from this evaluation are intended to address insufficient hydraulic capacity, process capacity, aging equipment/infrastructure replacement, flooding, and safety issues. Opportunities for improving system resilience and efficiency were noted as well.

Pole Bridge AWTF

The following is a summary of the process evaluation for the Pole Bridge AWTF:

- The current permitted capacity of 20 MGD-MMF will be sufficient to treat the projected 2050 flow of 14 MMF-MGD and 2070 flow of 15 MMF-MGD
- The projected maximum monthly raw wastewater TSS loading exceeds the design basis in 2020; therefore, the AWTF's ability to treat the TSS will determine future upgrades
- The higher than typical TSS loading in the raw wastewater results in higher sludge projections than previously anticipated

In this summary, the term "raw wastewater" represents the wastewater collected from the basin that the AWTF serves. The term "influent" represents the combination of raw wastewater, plant drain flows, and other recycled side stream flows based on the wastewater process.

The deficiencies identified based on the wastewater process evaluation included:

- Multiple AWTF components require age-related upgrades
- A portion of the AWTF is located within the 100-year floodplain of the South River
- The currently used disinfectant, chlorine gas, requires special storage, shipping, handling, and documentation
- There is insufficient redundancy in conveying raw wastewater from the influent pumps to the headworks
- Other observations included higher than typical TSS loading, alkalinity limitations, and hydraulic capacity limitations in the secondary and tertiary treatment trains

The following observations were noted based on the sludge process evaluation:

- There is sufficient volume in the primary and secondary digesters to maintain the required retention time through 2050, if land application is reconsidered
- As the sludge is currently landfilled, the current long retention times (as of 2020) being maintained are not required, and various operational adjustments can be performed to reduce power and polymer consumption

Snapfinger AWTF

The following is a summary of the process evaluation for the Snapfinger AWTF:

- The permitted capacities after Phase 2 (44 MMF-MGD) and Phase 3 Expansions (54 MMF-MGD) will be able to treat the 2050 and 2070 projected flows of 41 MMF-MGD and 42 MMF-MGD
- The ability to treat BOD_5, TSS, VSS, and TP loadings will highly influence the planned Phase 3 Expansion need and timing, as the projected maximum monthly raw wastewater loadings have exceeded – or will exceed (by 2035) – the design loading capacities after the Phase 2 Expansion is completed
- The higher than typical TSS loading in the raw wastewater to the AWTF results in higher sludge projections than previously anticipated

The capacity at completion of the ongoing Phase 2 Expansion (44 MGD-MMF) was evaluated against the LOS criteria. The following observations were noted based on the wastewater process evaluation:

- The projected TSS loading rates exceed the Phase 2 and Phase 3 Expansion design loading rates
- Multiple process and hydraulic capacity limitations in the process will be addressed as part of the Phase 3 Expansion

The Phase 3 Expansion project includes an evaluation of the sludge treatment process and condition of the sludge management facilities and implementation of recommendations from the evaluation.

Combined Long-Term and Potential Regional Sludge Management Study

Sludge from the two AWTFs are currently being landfilled, but this may potentially be discontinued in the future for regulatory reasons or cost effectiveness. Long-term sludge management and disposal options, including centralized sludge management (which could encompass suitable sludge or organic matter from other industries or counties), may be a more effective way to process sludge. An alternative analysis on sustainable sludge management practices at both AWTFs is recommended. The District Plan is being updated (anticipated completion in 2022); the updated Plan will include regional sludge quantity projections and may include policy recommendations. DWM should participate in the District discussions and incorporate their recommendations into consideration of long-term sludge management decisions and future Master Plan updates.

Summary of Recommended Wastewater System Improvements

Figure 26 illustrates the locations of the recommended improvements summarized in **Tables 8** and **9** which were based on the evaluations performed for the wastewater collection and treatment systems. These are presented by the location of the projects (sewershed, basin, or AWTF).

Figure 26: Summary of Recommended Wastewater System Improvements through 2050

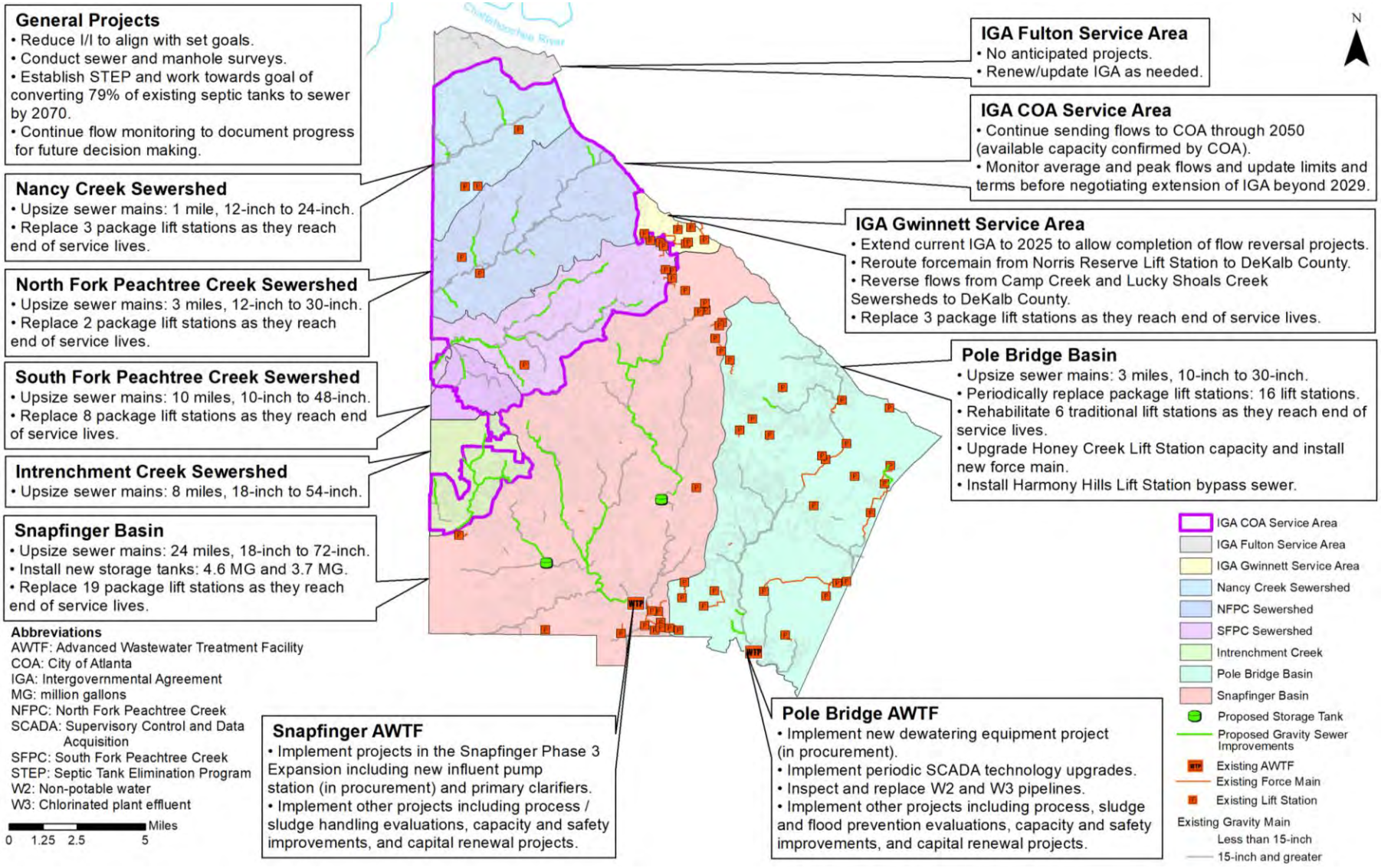


Table 8: Summary of Recommended Wastewater Facilities Improvements

Project Type	General Description	Implementation
Overall System		
System-wide	• I/I reduction and long-term flow monitoring • Continued coordination with CD Program • Sewer and manhole survey and GIS update • Septic Tank Elimination Program	Ongoing
Pole Bridge AWTF		
Evaluations/ Studies	• Flood prevention measures evaluation • Plant hydraulic capacity and process evaluation • Long-term sludge management evaluation • Alternative disinfectant evaluation	• By 2025 • By 2030 • By 2030 • By 2030
Capacity and Safety Improvements	• Hydraulic capacity: second force main from influent pump station to headworks	• By 2030
	• Sludge Treatment: + Biosolids dewatering equipment and facility + Sludge process optimization (O&M) + Long-term sludge treatment implementation	 + In procurement + By 2025 + By 2030
	• Safety: Replacement of chlorine with alternative disinfectant	• By 2040
Capital Renewal	• Releveling clarifier weirs (O&M) • Electric switchgear replacement • Secondary and chemical clarifiers rehabilitation • Gate replacement (in two phases) • W2 and W3 pipeline replacement (in two phases) • Aeration basin aerators upgrade • PLC and SCADA recurring technology upgrades	• By 2025 • By 2025 • By 2025 • Phase A by 2025 Phase B by 2030 • Phase A by 2025 Phase B by 2030 • By 2030 • Every 10 years
Flood Resiliency	• Raw wastewater flow meter installation (O&M), • Flood prevention measures implementation	• By 2025 • By 2030
Snapfinger AWTF		
Evaluations/ Studies	• Sludge dewatering improvements evaluation • Plant hydraulic capacity and process evaluation • Long-term sludge management evaluation	• In procurement • By 2030 • By 2030
Capacity and Safety Improvements	• Hydraulic capacity: influent pump station replacement • Process capacity: + MBR clusters installation + MBR clusters replacements • New primary clarifiers • Sludge treatment capacity: long-term sludge treatment implementation • Safety: UV disinfection installation, demolition of abandoned facilities	• In procurement + Installation by 2030 + Every 10 years • By 2030 • By 2040 • By 2040
Capital Renewal	• Sludge treatment facilities rehabilitation • PLC and SCADA recurring technology upgrades after Phase 3 Expansion	• In procurement • Every 10 years

GIS = Geographic Information System, PLC = Programmable Logic Controller

Table 9: Summary of Recommended Wastewater Collection System Improvements

Project Type	General Description	Implementation
Pole Bridge Basin		
Field Survey	• Survey gravity sewer for proposed sewer upsizing locations to confirm existing pipe inverts and slopes	• By 2025
Sewer Main Upsizing	• Replace 3 miles of gravity sewer with new sewer of sizes ranging from 10-inch to 30-inch	• By 2025
Package Lift Station Replacement	• Replace 16 package lift stations before end of service life	• Every 25 years
Traditional Lift Station Rehabilitation	• Rehabilitate pumps, motors, and instrumentation/controls every 15 years, electrical equipment switchgear every 30 years, pump building and wet well every 50 years from year of installation/previous upgrade for 6 traditional lift stations	• Every 15, 30, or 50 years
Capacity Upgrade[1]	• Upgrade Honey Creek Lift Station firm capacity from 7.5 MGD to 7.8 MGD and replace 3 miles of existing forcemain with 20-inch forcemain	• By 2050
Bypass Sewer	• Install 1 mile of 30-inch sewer to bypass Harmony Hills Lift Station	• By 2050
Snapfinger Basin[2]		
Field Survey	• Survey gravity sewer and manholes for proposed sewer upsizing locations to confirm existing pipe inverts and slopes	• By 2025
Sewer Main Upsizing	• Replace 24 miles of gravity sewer with new sewer: 4 miles of 18/20/24-inch, 11 miles of 30/36-inch, 6 miles of 42/48/54-inch, 4 miles of 60/66/72-inch	• By 2025
Storage Tank	• Add 4.6 MG and 3.7 MG of storage	• By 2025
Package Lift Station Replacement	• Replace 19 package lift stations before end of service life	• Every 25 years
Intrenchment Creek Sewershed		
Sewer Main Upsizing	• Replace 8 miles of gravity sewer with new sewer of sizes ranging from 18-inch to 54-inch.	• By 2025
Nancy Creek Sewershed		
Field Survey	• Survey gravity sewer and manholes for proposed sewer upsizing locations to confirm existing pipe inverts and slopes	• By 2025
Sewer main upsizing	• Replace 1 mile of gravity sewer with new sewer of sizes ranging from 12-inch to 24-inch	• By 2025
Package lift station replacement	• Replace 3 package lift stations as they reach the end of service life	• Every 25 years
NFPC Sewershed		
Field Survey	• Survey gravity sewer and manholes for proposed sewer upsizing locations to confirm existing pipe inverts and slopes	• By 2025
Sewer Main Upsizing	• Replace 3 miles of gravity sewer with new sewer of sizes ranging from 12-inch to 30-inch	• By 2025
Package Lift Station Replacement	• Replace 2 package lift stations as they reach the end of service life	• Every 25 years

Project Type	General Description	Implementation
SFPC Sewershed		
Field Survey	• Survey gravity sewer and manholes for proposed sewer upsizing locations to confirm existing pipe inverts and slopes	• By 2025
Sewer Main Upsizing	• Replace 10 miles of gravity sewer with new sewer: 0.5 miles of 10/16-inch, 5 miles of 18/20/24-inch, 4 miles of 30/36-inch, 0.5 miles of 48-inch	• By 2025
Package Lift Station Replacement	• Replace 8 package lift stations as they reach the end of service life	• Every 25 years
Gwinnett IGA Service Area		
Force Main Rerouting	• Installation of force main from Norris Reserve Lift Station to reroute flows back to DeKalb County (in procurement)	• In procurement
Flow Reversal	• Design-build project to reroute flows from Camp Creek and Lucky Shoals Creek Sewersheds back to DeKalb County	• By 2025
Package Lift Station Replacement	• Replace 3 package lift stations as they reach the end of service life	• Every 25 years

Notes:

[1] The proposed increase in firm capacity at this pump station is minor. The station service area wastewater flows should be reviewed in the future to confirm if wastewater flows continue to indicate the need for an upgrade to station capacity.

[2] Several alternatives were considered for the Snapfinger Basin based on construction cost, timing, ease of construction, impacts to residents, and coordination with CD compliance. After several discussions with DWM, the preferred proposed improvements include both upsizing of trunk sewers and construction of storage tanks to mitigate the effects of wet weather flows (eliminating sanitary sewer overflows).

Table 10 presents the summary of estimated capital spending by planning horizon for both facilities and collection system improvements over the next 30 years, based on the evaluation conducted as part of the Wastewater Master Plan. The costs only include major capital improvements and do not include O&M projects, projects in procurement or small diameter sewer replacement/rehabilitation projects.

The estimated spending is for master planning purposes only and are not final. The projects and costs will be updated based on the CD implementation needs determined by DWM and will be reflected in the final CIP.

Table 10: Estimated Wastewater System Capital Costs by Planning Horizon (Million Dollars)

Implementation	Wastewater Treatment		Wastewater Collection System	Total	Annual Spending
	Pole Bridge AWTF	Snapfinger AWTF			
2021 – 2025	$16.3	-	$371.1	$387.4	$77.5
2026 – 2030	$18.3	$39.7	$14.9	$72.9	$14.6
2031 – 2040	$22.7	$105.2	$36.6	$164.5	$16.5
2041 – 2050	$21.2	$37.2	$66.0	$124.3	$12.4
Total	**$78.5**	**$182.1**	**$488.6**	**$749.2**	**$117.0**

Notes:

[1] The costs do not include the costs of capital improvement projects currently (as of 2020) in procurement, recommended O&M projects, and projects that are not capital improvements. The long-term I/I reduction assumptions and future maintenance and rehabilitation need will need to be revisited based on I/I monitoring results once the wastewater collection system projects have been completed.

[2] The wastewater collection system capital costs include capacity upgrades, replacements of package lift stations and rehabilitation of traditional lift stations. They do not include replacement or rehabilitation of pipelines beyond 2027 or small diameter sewer (smaller than 15 inches) replacement and rehabilitation projects. Assuming 1% of the total miles of small diameter sewer in the entire collection system is replaced or lined each year, the estimated cost for sewer replacement and rehabilitation projects is $20M per year. This is meant to be a placeholder cost for high-level budgeting.

Service Strategies for 2050 and Beyond

In addition to developing a CIP program for implementation through 2050, the Water and Wastewater Master Plans evaluated service strategies beyond 2050 for proactive long-term planning. Early conceptual evaluation is necessary; implementation of a major infrastructure project may potentially take up to 20 years from inception to completion. Considering that the County's population will approach approximately 1 million in 2050, it is important to continue planning for enhanced system resiliency to protect public health, maintain high levels of customer service, and to minimize service disruptions in case of emergencies. Overall, the long-term service strategies will depend on the changes in projected demand/flows; the service strategies beyond 2050 are contingent on growth trends and the priorities of DeKalb County and its IGA partners in the future. These strategies will need to be revisited every five years – or each time the demand/flow projections and the Master Plans are updated – because the projections are based on assumptions that may change in the future and the effectiveness of the programs being implemented.

Future Master Plan Updates

The development of the Water and Wastewater Master Plans is consistent with recommendations in District Plan Section 5.1 Integrated Water Resource Management Action Items:

- Action Item Integrated-2: Local Water Master Plans
- Action Item Integrated-4: Local Wastewater Master Plans
- Other recommended action items as appropriate

The District Plan is updated every 5 years (next update is anticipated in 2022). Similar to the District Plan, the Water and Wastewater Master Plans should be updated every five years to account for updates in water demand/wastewater generation, system needs, community development trends, and advances in technology and should remain consistent with regional and state requirements.

DWM is establishing a framework for review of the proposed CIP projects on an annual basis to consider new projects and allow flexibility in implementation based on changes in urgent issues in the system, policies, or other County priorities. At a minimum, the proposed CIP should be updated as the Master Plan is updated every five years.