STORM WATER

Decatur Storm Water Master Plan Volume I: Report

City of Decatur

December 2020

Prepared by:

AECOM

Decatur Storm Water Master Plan

December 2020

Prepared by:

AECOM

POLICY WORKS LLC

Table of Contents

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

What is the Purpose of the Storm Water Master Plan?

The City of Decatur envisions its future through planning. The City's plans address housing, transportation, arts, recreation, public services, infrastructure, development, and many other community resources in an effort to address any current concerns and set a path of continuous improvement that will benefit City residents for generations to come. This document – the Storm Water Master Plan (SWMP) – addresses the City's future management of storm water. This plan is focused on improving how the City manages its storm water to address and prevent flooding and improve water quality in the City's streams. This plan evaluates storm water concerns across the City and prioritizes solutions to address these concerns.

Green infrastructure -- like this installation on McDonough Street -- is an important part of Decatur's SWMP.

The major goals of this plan are to improve storm water management in Decatur's neighborhoods, public spaces, and rights-of-way, to mitigate environmental impacts from urban runoff, and to improve the water quality in the City's watersheds. In this plan, you can find an analysis of the City's existing storm water infrastructure, recommendations to improve storm water management, and a prioritized list of recommended storm water infrastructure improvements.

What is storm water infrastructure?
Storm water infrastructure collects and conveys the water that falls as precipitation and flows over land as runoff. It moves this water from the source where it runs off to the stream where it is discharged. Storm water includes traditional engineered structures such as inlets, pipe, ditches, and ponds, but it also includes green infrastructure components that are designed to use vegetation and soils in a manner that slows the flow of runoff and promotes filtration and infiltration. Decatur uses both engineered and green infrastructure in its management of storm water.

Why Are We Updating the Plan Now?

Before this plan, the City last updated its SWMP in 2004. Implementation of the 2004 plan focused on major storm water infrastructure improvements in the downtown areas over the past decade. While the downtown areas have benefited from these improvements, many neighborhoods in Decatur have storm water systems that are inadequate compared to modern storm water standards. In this SWMP update, storm water management in residential areas of the City is a major focus.

Community Engagement was a key component of the SWMP update.

To prepare this update, we assessed the City's current storm water system relative to current land use patterns, which have changed in recent years. Based on that assessment and input from City staff and residents, this updated plan evaluates and prioritizes storm water system needs and recommends policy changes to address those needs and comply with changing federal, state, and regional regulations. This updated plan also seeks to incorporate more green infrastructure into the City's approach to storm water management. Green infrastructure is an approach to storm water management that mimics natural hydrologic processes and uses natural components such as soils and plants to reduce flooding and protect water quality.

Realizing a Vision for Decatur's Storm Water Infrastructure

We usually do not notice our City's storm water infrastructure in our day-to-day lives in the City. It is there, but barely noticeable, and yet it sustains the livability of our City and protects us and our homes, schools, businesses, and community spaces.

Since the 2004 SWMP, the City of Decatur has invested more than $16 million in improvements to the City's storm water infrastructure. Storm water infrastructure associated with private development and dedicated to the City accounted for a substantial additional investment. These improvements were envisioned in the 2004 Storm Water Master Plan and were largely focused on improving storm water management capacity in the downtown area of the City. When you walk around in downtown Decatur, you are walking on top of that infrastructure. If you go to a soccer game at Ebster field, you are standing on top of 2.5-acre underground storm water vault – one of the largest in the region -- that helps to prevent flooding downstream. When you walk past the high school on North McDonough Street, you can see an example of green infrastructure that the City has installed to slow and treat runoff with carefully designed installations of vegetation and soils.

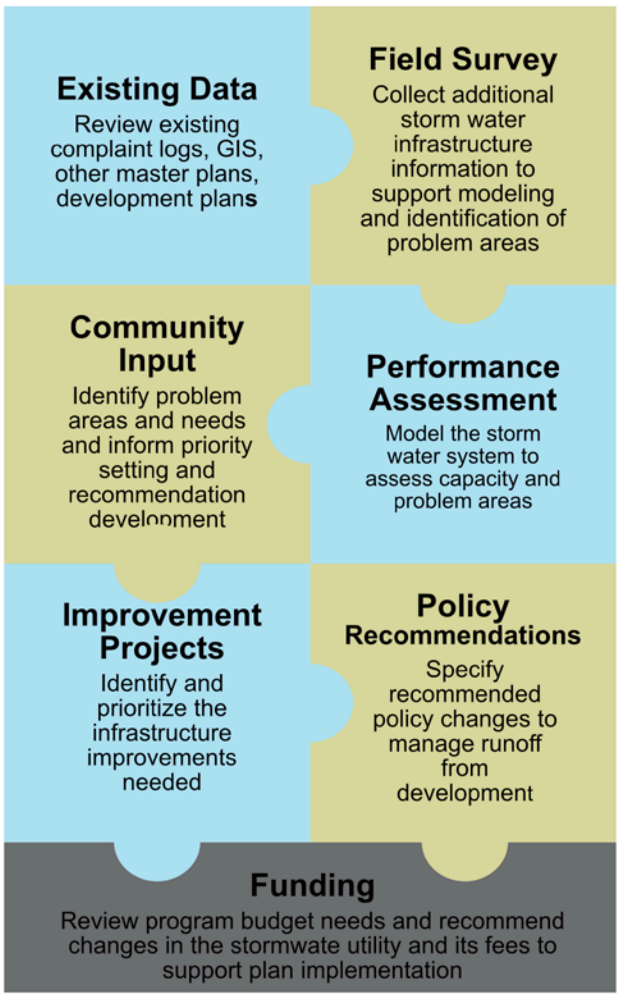
These improvements are not eye-catching and many are not visible on the surface, but if they were not there, their absence would be obvious in flooding and degraded steams. These quiet improvements support our vibrant downtown business district, as well as the schools and community spaces downtown. We benefit from them because of the foresight and planning in the 2004 storm water master plan. By updating that plan, we seek to build on that success.

Pictures: Ebster storm water vault (top left); North McDonough Green Street (top right); Glenlake Park stream restoration (bottom left), downtown drainage system improvements (bottom right)

How Was the SWMP Updated?

In 2018 Decatur kicked off this SWMP update with support from AECOM and Policy Works LLC. The process included review of existing plans and ordinances, survey of storm water infrastructure, GIS database development, storm water system modeling, and identification and prioritization of capital improvement projects. The figure below outlines the major steps in the work that supported the development of this plan update. Each of these components is described in detail in this plan document.


Decatur residents submitted input that guided the development of the SWMP.



Major components of storm water master plan update

The planning effort incorporated a substantial community engagement process through which Decatur's residents had many opportunities to provide input to the plan (see **Appendix C**). The community engagement process included seven community meetings, an on-line map ("WikiMapping") for submittal of location-specific concerns, interviews with stakeholders, a project steering committee, telephone, email, and on-line channels for comment submission outside of meetings.

As of August 2020, over 175 community members have participated in the community engagement process. The main themes from community input focused on flooding in residential areas of the City, green infrastructure, and tree protection. Community members reviewed recommended projects, assisted in developing prioritization criteria, and provided input for the SWMP policy recommendations. A final public meeting will be held in September 2020 during the public review of the draft SWMP.

More than **175** community members have participated in the SWMP update

What Does the SWMP Recommend?

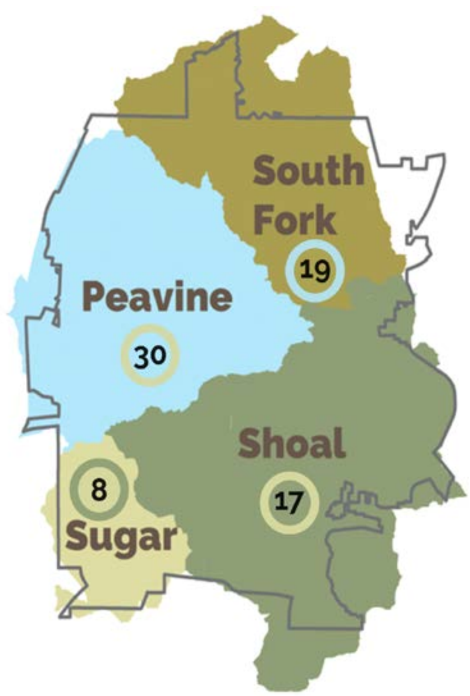
The major areas of focus for the plan's recommendations are:

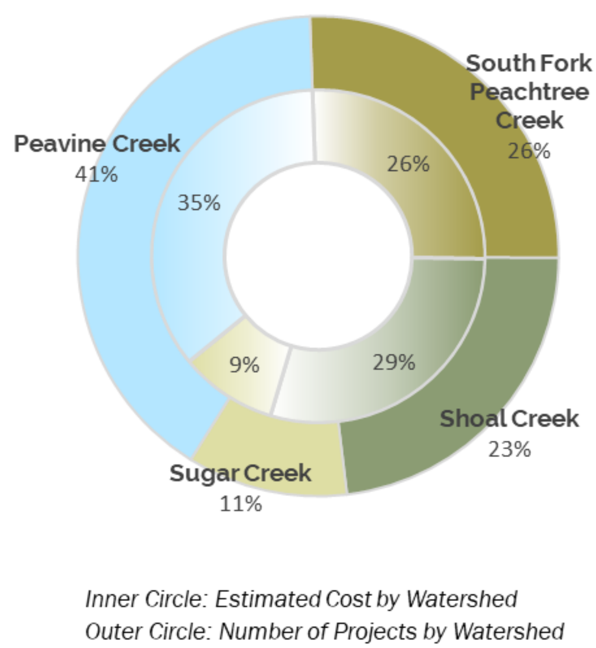
- Prioritized infrastructure improvement projects (see Section 6)
- Policy recommendations (see Section 7)

Infrastructure Improvements

The plan recommends 74 infrastructure improvement projects to be completed over the next 20 years at an estimated total cost of $36 million (in current dollars). The full list of recommended projects can be found in Section 6. Figure ES-1 shows the distribution of these projects across the City's major watersheds as well as the distribution of the estimated project costs across those watersheds. The recommended projects were based on known problem areas identified in City complaint logs and through community input, as well as through modeling of the storm water infrastructure to assess performance during heavy precipitation events. Identified projects were prioritized through criteria based on input from the community and City staff. The criteria included: population impacted, flood impacts to properties and structures, and potential impacts to major thoroughfares and critical facilities. The recommended projects will improve storm water system capacity, address flooding, and resolve areas of insufficient infrastructure. The plan recommends that, where possible, *all* projects be designed to incorporate ***green infrastructure***.

Figure ES-1: Recommended Storm Water Improvement Projects by Watershed





Policy Recommendations

Improving the management of storm water in the City requires more than improvements to infrastructure. The plan update includes recommendations for policy changes needed to address storm water concerns, keep pace with development trends, and adapt the storm water utility to the implementation and budget needs of the updated plan. The plan's policy recommendations are described in detail in **Section 7**. A summary of the recommendations is provided below.

Development Regulations

The updated plan recommends several changes in requirements that affect new development and redevelopment projects, with a specific focus on single-family dwellings.

Runoff Reduction

New development and redevelopment projects should collect and infiltrate the first one inch of storm water runoff on-site. This recommendation is directed toward reducing flooding and improving water quality by decreasing the volume and pollutant content of runoff closer to its source.

Impervious Coverage Threshold

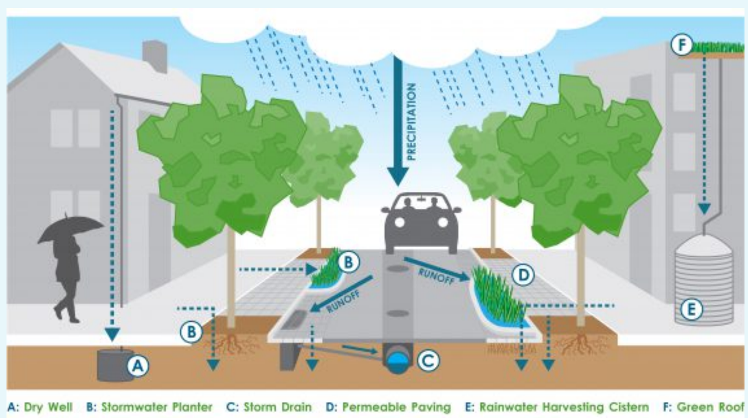
The plan recommends that the threshold for the application of storm water requirements should be reduced for single-family dwelling development and redevelopment projects. This recommendation is intended to address the impacts of changing development patterns across the City through which larger single-family residences are putting a greater burden on the storm water system. To address these impacts, the plan recommends a new lower threshold for the application of storm water requirements for single-family dwellings: *Runoff reduction measures will be required when projects are adding or replacing more than 500 square feet of impervious surface. Under existing regulations, there is currently no requirement for runoff reduction from this type of project.* Detention of runoff will continue to be required when single-family dwelling projects are larger than 4,000 square feet of impervious surface. This is required by current regulations.

For all other project types (besides single-family dwellings), the plan recommends that runoff reduction be applied for *any* new or improved impervious coverage. This new runoff reduction requirement will be in addition to existing detention requirements.

Green Infrastructure

Green Infrastructure means managing small storms in more natural ways by finding ways to collect, convey, and treat storm water through natural or engineered systems that mimic natural processes. Conventional storm water infrastructure usually consists of structures like pipes, conduits, and retention ponds that are designed to quickly move water away from buildings and roads. By contrast, green infrastructure is designed to reduce and treat storm water at its source.

Examples of green infrastructure include bioswales, permeable pavers, rain gardens, green roofs, constructed wetlands, and rainwater collection. Trees can be considered a part of green infrastructure because they intercept rain, increase infiltration, and reduce the rate of runoff. Green infrastructure reduces runoff, removes pollutants, improves infiltration, and recharges groundwater. Additionally, it can improve wildlife habitat and provide aesthetic benefits. The recommendations in this plan favor increased use of green infrastructure.



Ref: City of Atlanta

Compliance Options

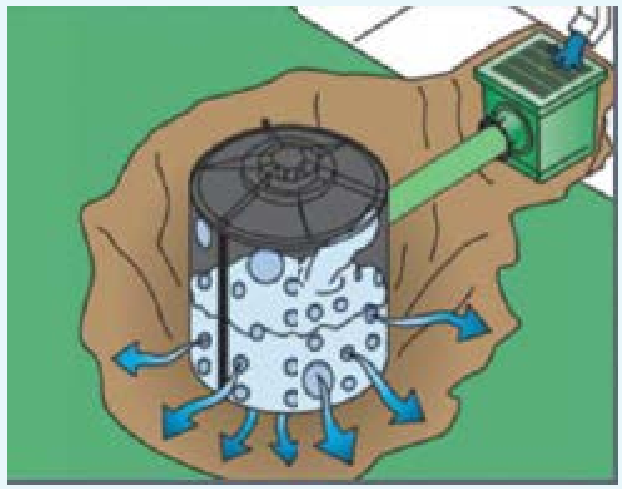
For the new recommended requirements affecting single-family dwelling development and redevelopment projects, the regulations should also provide a menu of options for compliance that support homeowners in finding solutions that are most appropriate for their sites and can be implemented without significant compliance burdens. The menu of options will include green infrastructure choices. **Figure ES-2** illustrates several of the recommended compliance options.

Figure ES-2: Recommended Options for Compliance with Storm Water Regulations

Runoff Reduction Compliance Options

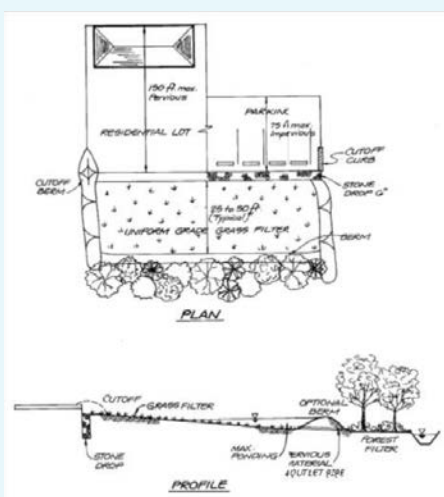
Onsite infiltration can be accomplished with a variety of site design techniques…

Rain Gardens/Bioretention



Dry Wells

Bioswales



Vegetated Filter Strips

Permeable Pavements

Green Infrastructure and Trees

The updated plan recommends several policy changes that establish a preference for green infrastructure and the protection of trees for the storm water benefits trees provide.

Storm Water and Trees

While trees are often valued for their beauty and shade, they also make an important contribution to controlling storm water runoff. Tree canopies intercept rain and promote evaporation and infiltration of water that would otherwise create runoff. Tree roots absorb water and create soil conditions that promote water infiltration.

The recommendations of this plan increase runoff requirements when trees are removed by a project to account for the loss of their storm water benefits. To promote tree conservation, the plan also recommends a storm water utility fee credit for parcels that have more than 45% tree canopy coverage.

Green Infrastructure

In all projects, public and private, green infrastructure should be prioritized to reduce the volume of runoff reaching the storm water system and the City's waterways and provide ancillary environmental and aesthetic benefits to the community. The recommended runoff reduction requirements, as well as the recommended compliance options, emphasize improved infiltration and promote green infrastructure practices. Green infrastructure across the City will increase through implementation of this plan's recommended storm water requirements.

Trees

The value of trees in storm water management should be recognized, and trees should be treated as a resource in storm water policy. The plan recommends that the requirements for runoff reduction be increased to mitigate the storm water benefits lost when trees are removed. It also recommends that runoff reduction requirements be increased by one cubic foot per 500 square feet of canopy removed. Additionally, the plan promotes tree conservation through a recommendation for a storm water utility fee credit for parcels where more than 45% of tree canopy is preserved.

Storm Water Utility

The updated SWMP recommends several changes in the City's storm water utility to address current development trends and raise revenue adequate to implement the SWMP. It also recommends several storm water utility fee credits to support implementation of storm water best management practices and the protection of tree canopy.

Tiered Schedule of Fees

The SWMP recommends that the City's storm water utility fee structure be updated to address the overall increase in home size as well as the growing range of homes sizes across the City. The recommended fee structure includes tiers that set the utility fees on a parcel's level of storm water impacts (determined by impervious coverage) for residential properties:

Tier	Impervious Coverage	Fee
Tier 1	0 to 2,499 square feet (0.4 ERU)	$114/year
Tier 2	2,500 to 3,999 square feet (0.7 ERU)	$200/year
Tier 3	4,000 to 4,999 square feet (1.0 ERU)	$285/year
Tier 4	5,000 square feet or more (1.4 ERU)	$399/year

The current storm water utility fee is $100 for all residential properties. Non-residential storm water utility fees are currently based on impervious coverage and assessed in terms of Equivalent Residential Units (ERUs). The updated SWMP recommends adjustment of the current ERU from 2,800 square feet to 4,000 square feet; and that each ERU be billed at $285/year.

Credits

The updated plan recommends several new credits toward a property owner's storm water utility fee to encourage the voluntary adoption of practices that help to manage the City's storm water. These credits are discounts to the property's storm water utility fee when property owners (residential and nonresidential) can demonstrate that they have practices in place that improve storm water quality and quantity. The proposed credit system includes four types of credits that can be added together for a maximum 40% credit for practices that address:

- Water Quality (10% credit) – Demonstrating on-site techniques to improve storm water quality, including:
  - Reducing runoff from all storms of less than 1-inch of precipitation,
  - Treating runoff on-site with practices that reduce total suspended solids from impervious areas by 80% or more, or
  - Maintaining tree canopy of the parcel of more than 45%
- Stream Channel Protection (10% credit) – Providing detention of the 1-year storm (3.36 inches) and releasing it slowly to reduce downstream channel damage
- Overbank Flood Protection (10% credit) – Providing detention or peak runoff management to help reduce flooding during a 25-year/24-hour rain fall event (5.95 inches)
- Extreme Flood Protection (10% credit) – Providing extended detention or peak runoff management to help reduce flooding during a 100-year/24-hour rain fall event (7.5 inches)

The intent of these credits is to support private investment in storm water management capacity that benefits the public good. More details on the credits can be found in Section 7.2.1.

Infrastructure Design and Ownership

The updated SWMP recommends the adoption of updated standards by the City for new public storm water infrastructure. This standard is referred to as the Level of Service policy. The plan recommends that new City infrastructure should be built with capacity to manage a critical storm rain event (2.2 inches of rain over 6 hours) and the State standard for Level of Service (25-year/24-hour storm or 5.95 inches).

The updated SWMP also addresses the ownership of storm water infrastructure and recommends changes in how City policy addresses what is known as the Extent of Service for storm water infrastructure. Many parcels in the City have privately-owned storm water infrastructure, and some of this infrastructure provides public benefits. The plan recommends that the City develop a mechanism for public acquisition of privately-owned infrastructure when it serves a public benefit and meets certain minimum standards. Public acquisition is recommended where such infrastructure is in good condition, located on a single-family property, carrying more than 50% public runoff from multiple properties, and is associated with an area of public concern. The plan recommends that acquisition be administered via voluntarily donated easements that allow for access to maintain the infrastructure. More details on this policy recommendation can be found in Section 5 and Appendix I.

Where to Next?

By committing to implementation of this plan, the City invests in its future. The plan is directed toward mitigating flooding and drainage problems and improving water quality and quality of life in the City. This plan aligns with the one of the four primary organizing principles of the 2010 Decatur Strategic Plan: Serve as Good Stewards of the Environment and Community Resources. It also implements the vision of the City's Environmental Sustainability Plan to create a community relationship with the environment that will protect and enhance natural resources and ensure that future generations will be able to share in the benefits of those resources. This SWMP is intended to serve as a tool to guide the City's storm water projects, programs, and policies for the next 20 years. It should be updated in 2040, or sooner if necessary, to address substantial changes in conditions not foreseen in this plan.

1. INTRODUCTION AND PROJECT OBJECTIVES

The City of Decatur, Georgia, (City) is located approximately six miles east of Atlanta and is the second-oldest incorporated community in the Metro-Atlanta area. It is one of the most densely populated cities in Georgia with a population of approximately 25,000 and an area of approximately 4.6 square miles.

Decatur adopted a Storm Water Management Ordinance in 1972 and has updated and revised this ordinance as the growth and needs of the City have changed. The ordinance established the storm water management program, which helps manage and protect City's watersheds, encourages environmentally responsible development, and enforces compliance with the State and Federal regulations regarding protection of water quality. To provide a means of funding the services rendered under the Storm Water Management Program, the City established a Storm Water Utility in 1999. The Storm Water Management Program was established to provide the City with a mechanism through which it could offer more efficient and effective flood and storm drainage services to its residents. The program is also considered to be the primary mechanism through which the City would address the requirements of National Pollutant Discharge Elimination System (NPDES) permitting and Total Maximum Daily Pollutant Load (TMDL) criteria for the tributary streams receiving runoff from the City.

In 2004, the City developed a Storm Water Master Plan (SWMP) that guided integrated watershed management to address storm water runoff quality and quantity, floodplain protection, and the necessary infrastructure improvements. The 2004 SWMP not only addressed compliance with the minimum Regional, State, and Federal requirements of the National Pollutant Discharge Elimination system, but also laid out a clear vision of existing conditions and the City's future management of storm water. The Master Plan provided an inventory and assessment of the City's existing storm drainage system, an evaluation of system performance during storms and recommendations for improvements to address flooding and drainage in order to improve the quality and reduce the quantity of storm water runoff. This 2020 SWMP update builds on the framework of the 2004 SWMP, analyzes the existing infrastructure and capacity issues and constraints, defines policy recommendations to improve storm water management, and details and prioritizes capital improvements for storm water infrastructure.

1.1 Project Objectives

In 2018, Decatur kicked off this SWMP update with support from AECOM and Policy Works LLC. The 21-month process included review of existing plans and ordinances, survey data collection, GIS database development, storm water system modeling, public involvement, and identification and prioritization of improvement projects. The City's vision is to adopt a sustainable method for managing and controlling storm water that emphasizes quality planned development with Green Infrastructure (GI) best practices along with traditional storm water methods and balances environmental benefits, public safety, and protection of property.

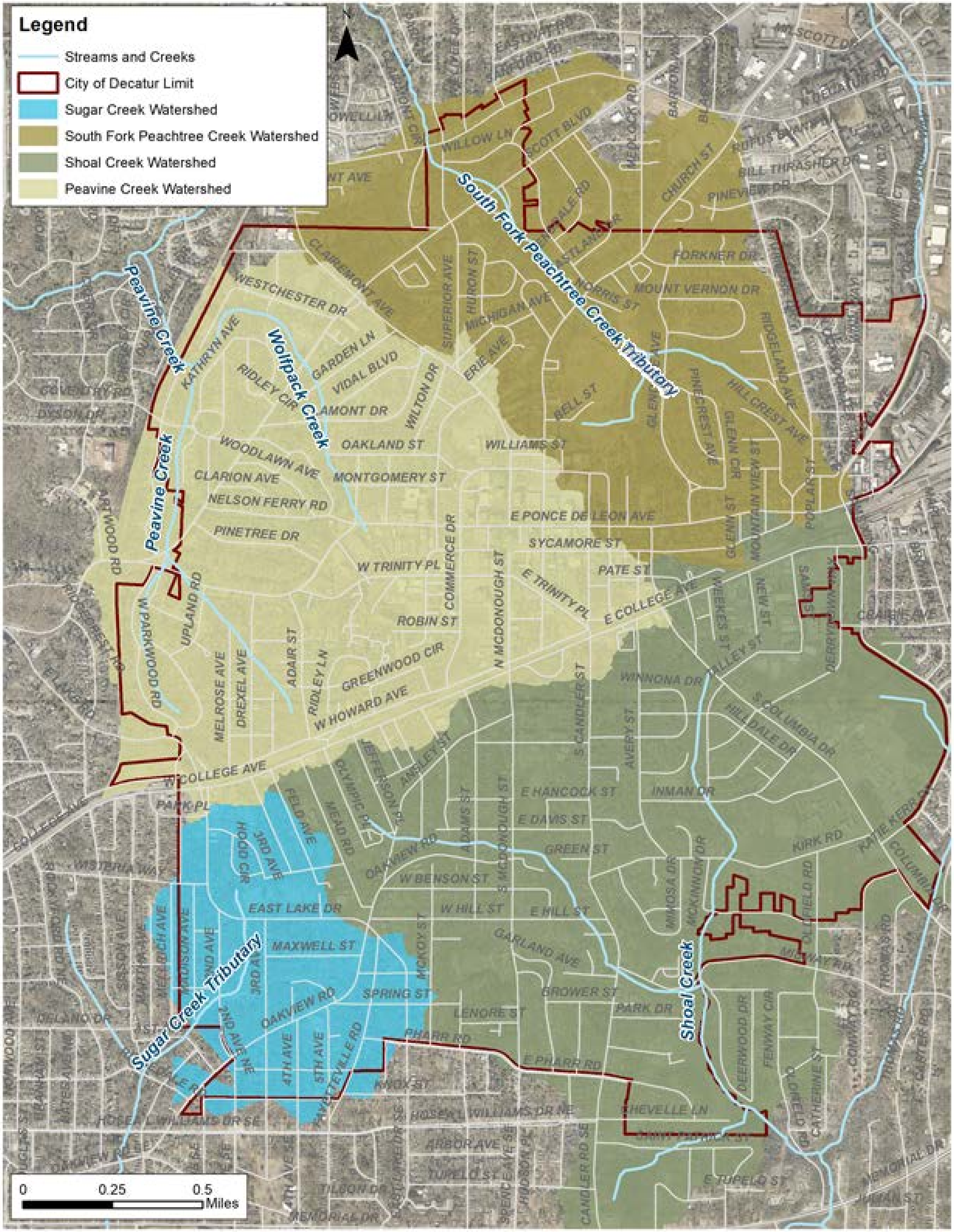
The primary goal of the City's SWMP is to address opportunities to improve storm water management in neighborhoods, public spaces, rights-of-way, and regional watersheds while mitigating environmental impacts from urban runoff and improving water quality on a watershed basis.

1.2 Study Area

The overall project boundary is comprised of four major watersheds within the City. The watersheds are identified as Shoal Creek, Sugar Creek, South Fork and Peavine Creek, as shown in Figure 1-1. The overall project boundary encompasses a total area of approximately 4.6 square miles and is entirely located within Dekalb County.

The City made major storm water infrastructure improvements in downtown Decatur over the past two decades. Commercial areas generally have curb and gutter drainage with connected underground storm water pipes. Residential areas generally have limited storm water infrastructure. Infrastructure in most residential areas is generally older than in other parts of the City. Throughout the City, particularly in the residential areas, ponding and flooding are observed in many locations during extreme storm events.

Figure 1-1: Watersheds



1.2.1 Topography

The City is located on the sub-continental divide (which generally falls along the CSX railroad line), which means that storm water runoff from the City flows into two distinct directions. The northern portion of the City drains to the Gulf of Mexico, and the southern portion of the City drains to the Atlantic Ocean. The City is further divided into four smaller, primary watersheds. South Fork Peachtree and Peavine Creek drain to the north and connect to the Chattahoochee River, while Shoal Creek and Sugar Creek drain to the south and are part of the South River Watershed. The elevation ranges from a maximum of 1074 feet along the ridgeline to a minimum of 894 feet at the north City boundary and 906 feet to the south. It should be noted that although Decatur represents a small percentage of the total watershed associated with its four major receiving streams, its location within the headwaters of these watersheds places it in a unique position to affect the water quantity and quality of storm water that drains through the City and into its receiving waters as all streams within the City are formed solely from rain that falls within City boundaries.

1.2.2 Land Use

The City of Decatur's land use generally consists of a commercial and institutional core in downtown Decatur, with single-family residential homes filling out the rest of City. Land use trends in the City were mapped and are summarized in the figures and data below comparing 2004 land use, 2018 land use (based on zoning), and the City's projected 2030 future land use from the 2010 Strategic Plan. Note some of the land use categories vary map to map. In 2004 the City was largely low density residential (80% in 2004). However, in recent years, development land use has trended toward Mixed Use and Medium to High Density residential developments. Low density residential is projected to make up only 63% of the City in the 2030 future condition. The commercial core of the City is also anticipated to continue to migrate from commercial to mixed use developments. (See **Figures 1-2** through **1-4** and **Tables 1-1** through **1-3**)

While low density, single-family residential areas still make up the majority of land use in Decatur, the City has experienced some changes in the development of those areas. There has been a notable increase in renovations and reconstructions, often resulting in larger impervious footprints. Individually these residential changes typically result in small runoff increases that are exempt from mitigation required by the City's current Unified Development Ordinance (UDO). However, they may be resulting in neighborhood or community impacts through the collective accumulation of many small increases.

In recent years, there have been several key developments in the downtown area that have brought additional large commercial, mixed-use, and multifamily developments to the City. While these developments have visually changed the landscape, they have not largely increased impervious surfaces within the City because many of the projects focused on redevelopment of areas that were already substantially impervious. Additionally, since these projects were re-developed under current City storm water development requirements, they were required to study site hydrology and assure that peak flows were reduced as a result of their development. These developments have likely improved storm water management in the downtown core through the addition of storm water quantity controls, mainly in the form of storm water detention.

Figure 1-2: 2004 Land Use Map

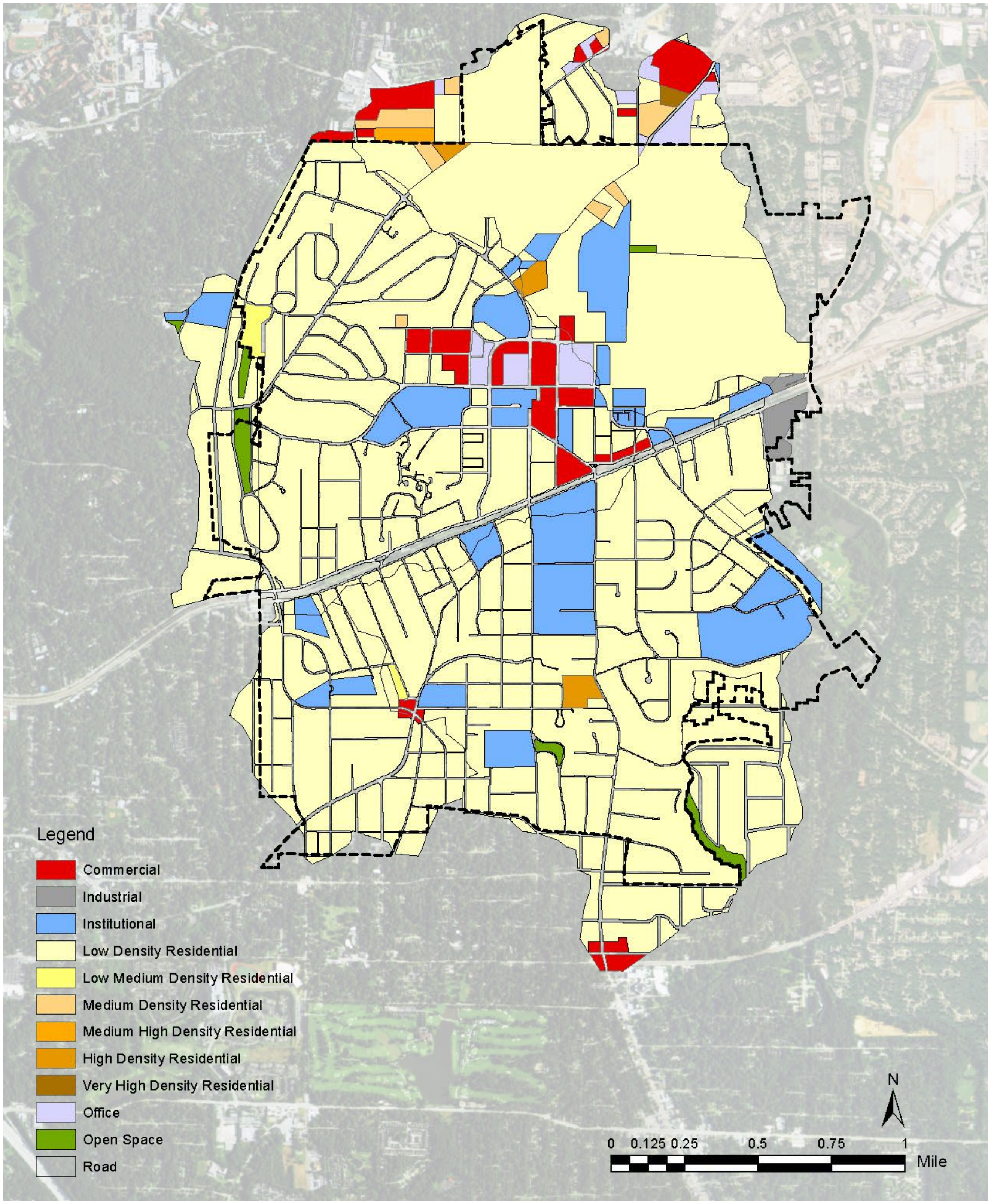


Table 1-1: 2004 Decatur Land Use

Land Use Type	Area Percentage
Commercial	3.41%
Industrial	0.52%
Institutional	10.35%
Low Density Residential	80.09%
Low Medium Density Residential	0.35%
Medium Density Residential	0.92%
Medium High Density Residential	0.21%
High Density Residential	0.57%
Very High Density Residential	0.10%
Office	1.44%
Open Space	0.80%
Road	1.23%
Total	**100.00%**

Figure 1-3: 2018 Land Use Map

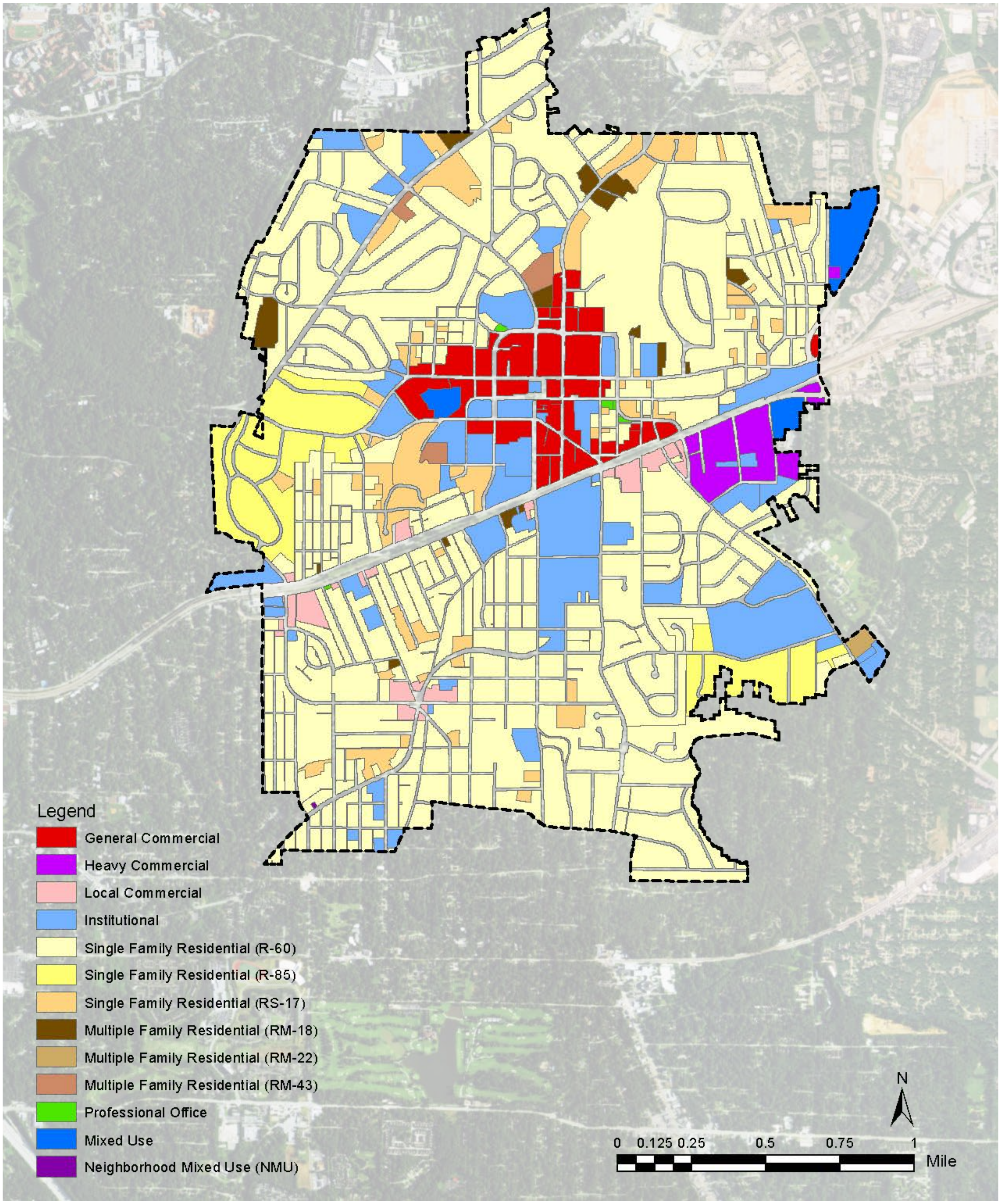


Table 1-2: 2018 Decatur Land Use

Land Use Type	Area Percentage
General Commercial	5.06%
Heavy Commercial	1.87%
Local Commercial	1.48%
Institutional	12.67%
Single-family Residential (R-60)	62.72%
Single-family Residential (R-85)	6.39%
Single-family Residential (RS-17)	6.29%
Multiple Family Residential (RM-18)	1.23%
Multiple Family Residential (RM-22)	0.17%
Multiple Family Residential (RM-43)	0.54%
Professional Office	0.09%
Mixed Use	1.49%
Neighborhood Mixed Use (NMU)	0.01%
Total	**100.00%**

Note: These totals do not include the newly annexed Legacy Park are since zoning was not yet available for this area at time of analysis

Figure 1-4: Future Land Use Map

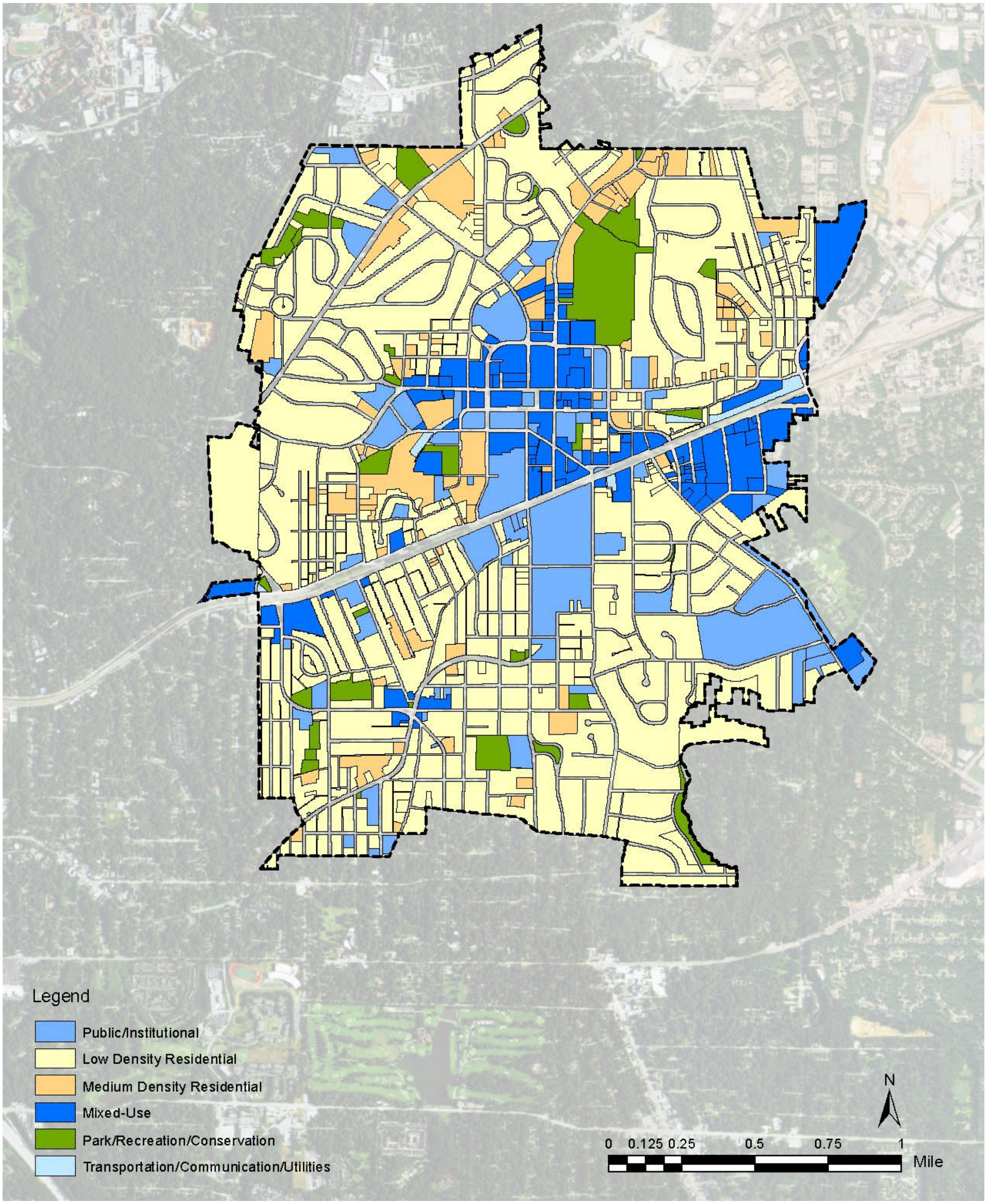


Table 1-3: Decatur Future Land Use (2030)

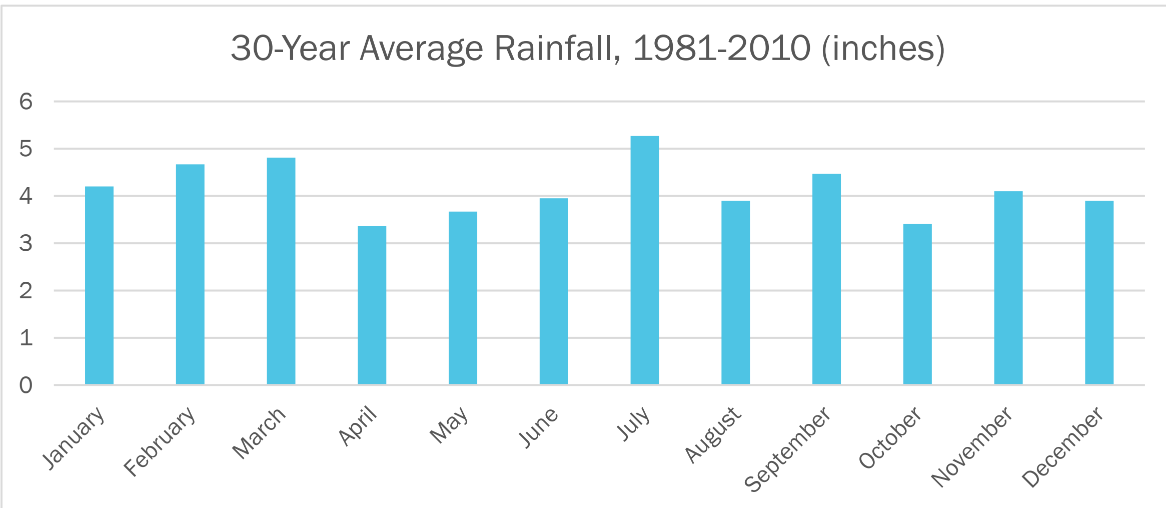
Land Use Type	Area Percentage
Public/Institutional	12.35%
Low Density Residential	63.32%
Medium Density Residential	8.38%
Mixed-Use	9.97%
Park/Recreation/Conservation	5.51%
Transportation/Communication/Utilities	0.48%
Total	**100.00%**

Note: Reference 2016 Comprehensive Plan. These totals do not include the newly annexed Legacy Park are since Future Land use was not yet available for this area at time of analysis.

1.2.3 Rainfall

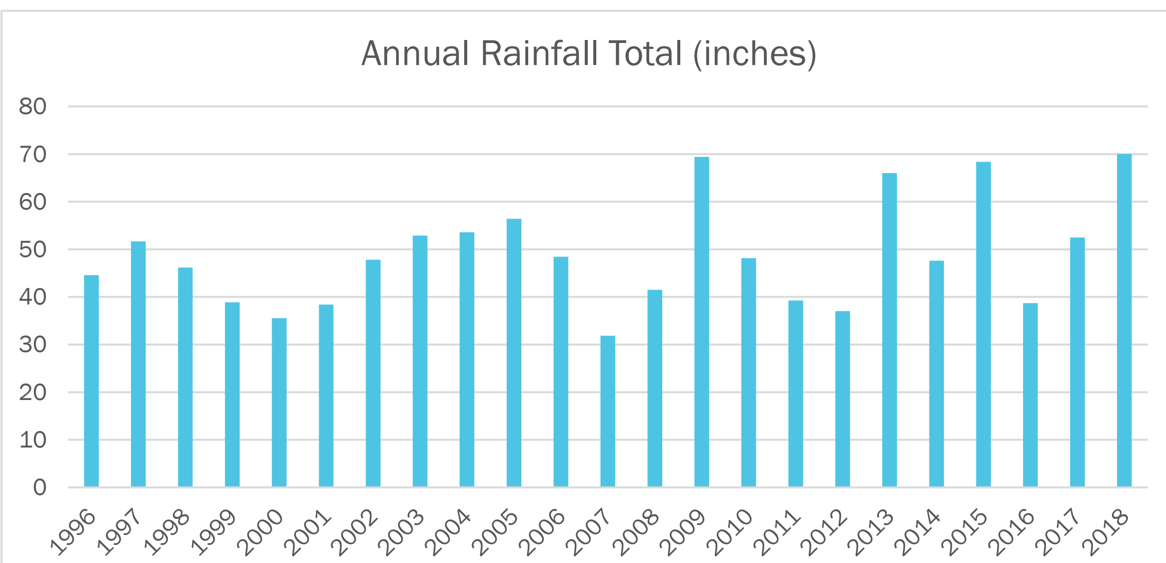
The metropolitan Atlanta area receives an average of around 50 inches of rain each year. The closest NOAA weather station to Decatur is in Peachtree City, Georgia. Rainfall trends at this station are mapped in **Figures 1-5 and 1-6**. While an average daily storm is less than 0.5-inches, the storm water system must be sized to handle peak events of larger intensity and/or duration. The particular storm events analyzed for this project are discussed in **Section 3.2.5**.

Figure 1-5: Average Monthly Rainfall



Ref: NOAA Weather Scorecard Peachtree City, GA (https://www.weather.gov/ffc/rainfall_scorecard)

Figure 1-6: Annual Rainfall Totals, 1996 - 2018



Ref: NOAA Weather Scorecard Peachtree City, GA (https://www.weather.gov/ffc/rainfall_scorecard)

2. BASELINE DATA AND COMMUNITY INPUT

2.1 General Data Collection and Review

The SWMP update process began with a detailed assessment of existing conditions. This assessment included:

- Meeting with City staff and project stakeholders;
- Collecting relevant base data, facility inventories, maps, aerial imagery, plans, ordinances, budgets, and billing information;
- Inspecting the storm drainage system as necessary to identify all attributes of new, replaced, or removed infrastructure, including material and age;
- Analyzing the existing GIS inventory to determine the extent of data collection and modification needed to enable accurate hydraulic modeling;
- Conducting a detailed assessment of the current community characteristics and how they have evolved since the 2004 SWMP;
- Evaluating the City's plans and ordinance changes since the adoption of the SWMP that have relevance to storm water management; and
- Assessing the status of recommendations made in the 2004 SWMP.

2.2 Existing Drainage Studies, Manuals, Reports, and Master Plans

2.2.1 2004 SWMP

The 2004 SWMP successfully set the stage for sound storm water management that benefits the citizens of Decatur and improves it environmental conditions. The 2004 SWMP addressed compliance with the minimum Regional, State, and Federal requirements of the NPDES regulatory program, described existing storm water conditions in the City, and presented a vision for the City's future storm water management. The Master Plan provided an inventory and assessment of the City's existing storm drainage system, an evaluation of system performance during storms, and recommendations to aid and address flooding and drainage in order to improve the quality and reduce the quantity of storm water runoff. The Master Plan further defined recommendations through a prioritization of categorized storm water capital improvements.

The 2004 SWMP included several recommendations, summarized below with an update on the current status of each item:

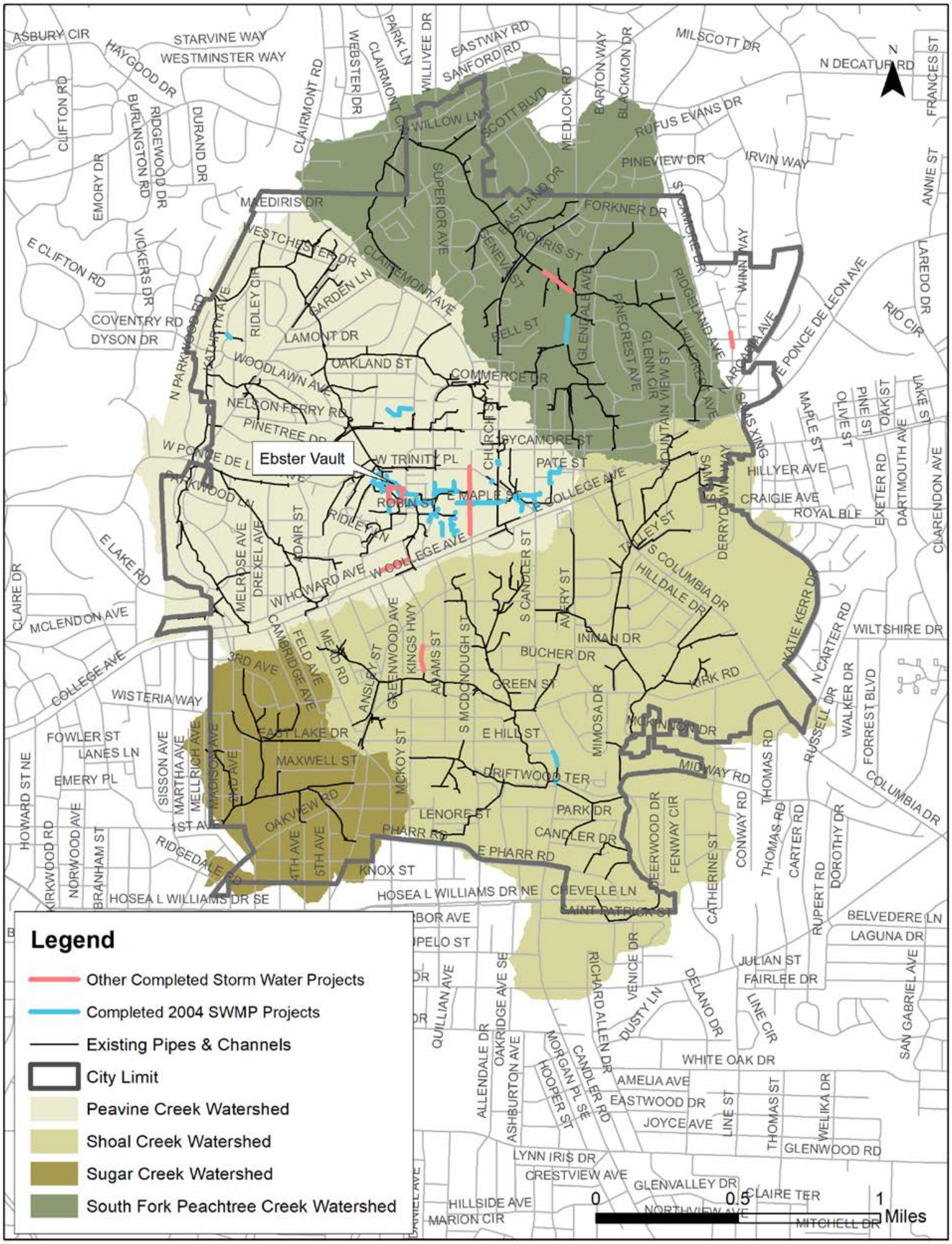
- Implementation of a prioritized list for Category 1 (top priority) capital improvements for storm water infrastructure.
  + *The City has successfully constructed four of the six Category 1 (top priority) projects identified in the 2004 SWMP. Twelve other projects recommended in the 2004 SWMP, but not prioritized as Category 1 improvements, have also been completed (see **Table 2-1** and **Figure 2-1**).*
  + *Additional storm water improvements have been completed across the City including Lockwood Terrace, Howard Avenue, Kings Highway, North McDonough Street, and the Ebster storm water detention vault (see **Figure 2-1**).*

Table 2-1: Completed 2004 SWMP Projects

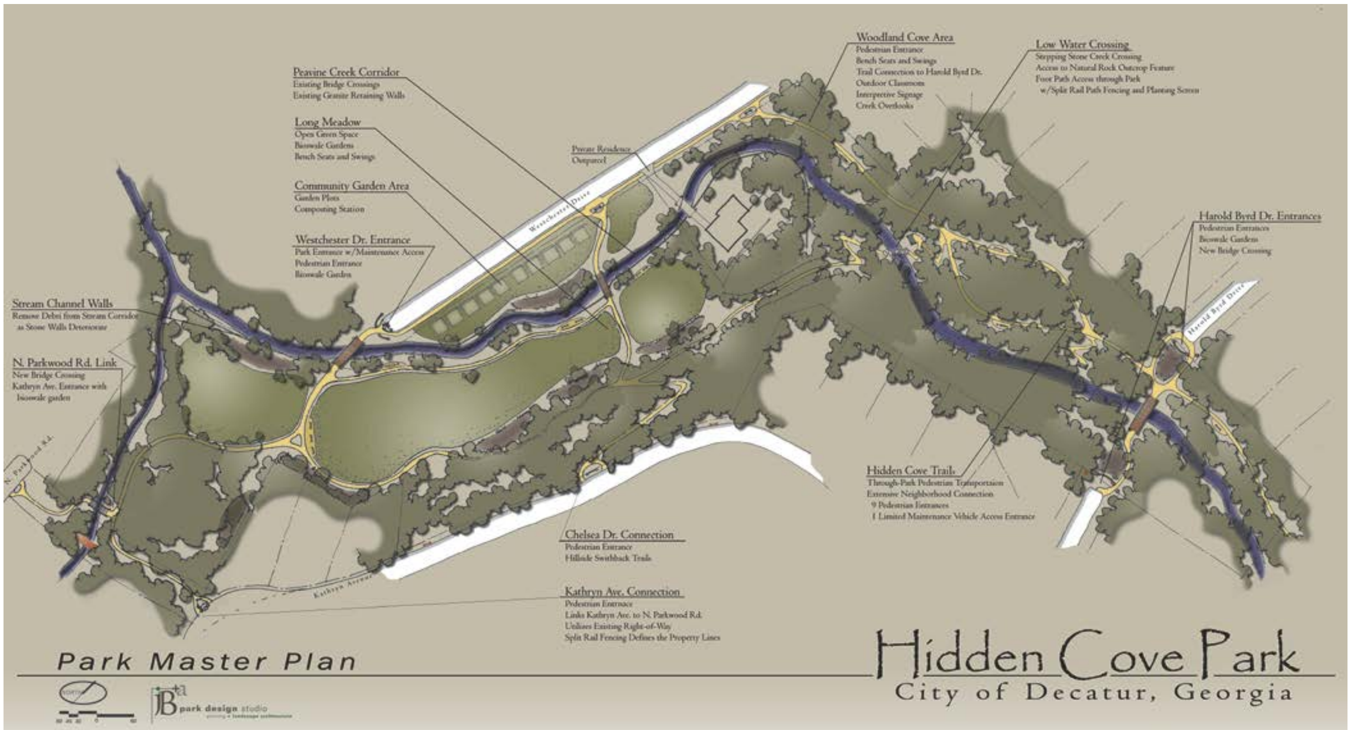
Streets	Description	Priority Level	Watershed
Candler to Church	Main trunk line - crosses under Trinity - 675'	1	Peavine Creek
Church to police station	Northern Main trunk line - crosses Commerce and Clairmont- 2140'	1	Peavine Creek
Church to police station	Southern Main trunk line - crosses Commerce and Clairmont - 2160'	1	Peavine Creek
Police station to Trinity - E. of Water	Main trunk line - crosses under Trinity East of Water - 375'	1	Peavine Creek
Commerce / Pate / Barry / Candler	Series of pipes - end of line - 865'	2	Peavine Creek
Decatur Cemetery	Series of pipe - 665'; continuation from line 137; flows into open channel; some segments under road (155')	2	South Fork Peachtree Creek
Candler / Howard	Small network of about three pipes through intersection and under roads - 325' - end of line	3	Peavine Creek
Church from College to Ponce	Long series of pipe flowing into main from North and South - plus one small segment east of Church - 3650'	3	Peavine Creek
Segments coming into North main trunk line between Church and Node 666	Excluding series of pipes that starts at Greenwood and runs along Electric and come in from the South of the Northern main trunk line - 1230'	3	Peavine Creek
Segments coming into South main trunk line between Church and Node 666	Excluding series that comes from Howard and Pattillo, all pipe segments that come into the South main trunk line and the segments that approach Node 666 from the West - 2330'	3	Peavine Creek
Starts at Robin / White and ends at main trunk line at Trinity	Series of pipe - only one segment has trouble with 5-year - near end of line - 975'	4	Peavine Creek

Streets	Description	Priority Level	Watershed
Decatur Cemetery	Series of pipe - 505'; flows into line 138; some segments under road (50'); end of pipe	4	South Fork Peachtree Creek
Candler near Buchanan	End of line - series of pipe - approximately 260'	5	Shoal Creek
Candler / Midway / Driftwood	Open channel and pipe that outflows into channel - 145'	5	Shoal Creek
Along Trinity North of Howard	Small series of pipes - end of line - 360'	5	Peavine Creek
Land area between Ponce, Ponce, Fairview & Montgomery	Small network of pipes - end of line - 592'	5	Peavine Creek

Figure 2-1: Storm Water Projects Completed Since 2004 SWMP



- Pursuit of grant funding for stream bank restoration projects in coordination with capital improvement projects.
  - + *The City implemented this recommendation though stream restoration projects completed at Glenlake Park and the adjacent Decatur Cemetery.*
- Dedication of up to $100,000 per year for Category 5 capital improvements (maintenance-type improvements that were initially intended to be handled with City staff) that would remedy isolated issues, but not impact overall system performance.
  - + *Since 2004, maintenance activities and funding for projects of this type have been increased to meet community requests for higher levels of service. Capital repairs have been performed by hired contractors where necessary to ensure continued functionality of the storm water system. Full implementation of this recommendation would require more funding than provided for in the 2004 SWMP.*
- Establishment of a storm water bank, funded by the development community, to pay for the acquisition of property and construction of storm water projects.
  - + *The City found an alternate approach to be more feasible. It has directly partnered with the development community and institutions such as Decatur Housing Authority and City of Decatur Schools to implement storm water improvements jointly. These partnerships have improved several conveyances that serve the larger community, contributed to the regional Ebster storm water management facility, and substantially mitigated runoff generated by surrounding developments.*
- The formation of a storm water advisory board to help the City Commissioners develop policies and capital improvement priorities.
  - + *The Environmental Sustainability Board (ESB) currently fills this role. The ESB has been a strong advocate for improved storm water management and the adoption of green infrastructure. The Board has collaborated with the City to create the City's Environmental Sustainability Plan and other green initiatives, and it has served as the steering committee for the SWMP update.*
- Dedication of funding to facilitate the purchase of properties subject to substantial or repetitive flooding.
  - + *Since 2004, the City has purchased 7 repetitive flood loss properties. These acquisitions were supported by FEMA pre-disaster mitigation grant funding. These properties have been converted to protected greenspace and will remain undeveloped in perpetuity. An example of these acquisitions includes the area of Hidden Cove Park.*



Hidden Cove Park, above, is a result of some of the greenspace acquisition performed by the City since the 2004 Master Plan.

- Consideration of increasing the annual storm water utility fee from $60 to $75 per Equivalent Residential Unit (ERU) to help generate additional revenue to implement an aggressive storm water improvements program.
  - *The City increased the SWU fee from $60 to $75/ERU in 2005, as recommended in the 2004 SWMP. In 2017, the fee was increased to $100/ERU.*

2.2.2 Other Plans

As part of this plan update, an assessment was completed of City plans, current community characteristics, and how they have evolved since the 2004 SWMP. A summary of storm water references/recommendations from other plans is included in Table 2-2.

Table 2-2: Storm Water in other City Plans

Streets	Storm Water References/Recommendations
2016 Comprehensive Plan	Stated that the City of Decatur is consistent with Metro North Georgia Water Planning District Watershed Management Plan and environmental planning criteria
Decatur 2010 Strategic Plan	Principle C: Serve as Good Stewards of the Environment and Community Resources under GOAL 13: Protect and Restore Natural Resources, Support Environmental Health, and Increase Ecological Awareness. Task 13B is to create an updated storm water management plan.

	Additionally, stakeholders in the round table discussions held during the development of the strategic plan suggested the application of green infrastructure BMP's, including rain barrels, porous paving, rain gardens, and green roofs. Strategic Plan recommendations related to storm water included: create an updated storm water management plan, continue to maintain and upgrade the storm water system, and pursue opportunities where public amenities can be shared for the development of storm water detention and retention systems
2007 Community Transportation Plan (CTP)	Recommends: • installation of bicycle friendly storm water grates • implementation of a routine maintenance program to replace unsafe storm drain grates and gutter cracks
2012 Decatur Environmental Sustainability Plan	Suggests educating property owners about storm water management

The City of Decatur should continue to explore opportunities to incorporate storm water infrastructure in non-storm capital projects in order to address an increased need for storm water quantity management and quality treatment and provides for furtherance of a sustainable and attractive sense of place. This approach is in line with several key City Principles from the 2010 Strategic plan, including:

- Manage growth while retaining character,
- Serve as good stewards of the environment and community resources, and
- Support a safe, healthy, lifelong community.

2.3 Ordinance and Level of Service Review

As part of the SWMP update, an assessment and evaluation of development and post-construction storm water management ordinances and Level of Service (LOS) policies from similar municipalities, both regional and national, was completed. A summary of the ordinance and LOS review performed for this project is included as Appendix A.

2.4 GIS Data Collection and Review

At project commencement, a series of GIS data sets containing the mapped storm water system (as documented in 2018) was provided to AECOM by the City of Decatur. These included the following GIS shapefiles for the City:

- Watersheds and subbasins
- Detained parcels (parcels with known storm water detention BMPs)
- Flow paths
- Storm system junction points (areas with inlets into the system and locations where pipes connect)
- Storm drainage lines
- Storm drainage outfall points

AECOM assessed these datasets to determine where additional infrastructure survey would be needed to support analysis of the City's storm water system. The City's datasets showed 3,942 linear features (Storm Lines) and 4,220 junctions (Storm Junction Points). The inventory contained structures labeled as Active, Removed, and Abandoned. Removed and Abandoned structures were assumed not in operation. Per discussions with the City, the only previous physical storm water survey of structures was compiled in 2004. Subsequent inventory updates have been manually added or removed (digitized from plans) based on completed public or private storm water projects.

The GIS data provided by the City was reviewed and supplemented with data obtained from plan reviews and the 2004 SWMP model. A summary of this data review is included in Appendix B.

2.5 Field Survey and Organization

Based on its analysis of the storm water inventory, AECOM completed additional field survey for the City as part of the SWMP update. Survey fell into two categories:

- New survey of City-owned infrastructure in areas of change
- Re-survey of critical areas based on data gaps identified in QA/QC

For the new survey, areas of change were identified through:

- Comparison of 2004 and 2018 storm water GIS data
- Review of the "user input" attributes that identified digitized attributes (areas manually updated since the initial survey due to known structure changes) vs surveyed ones
- Review of systems in close proximity to structures listed as removed or abandoned in comparison to 2004 inventory data

This process identified 103 new City-owned structures for field survey and 600 structures for re-survey. Re-survey site selection was informed by City staff knowledge of storm water concerns and areas with higher likelihood of affecting surrounding drainage systems. Survey was performed in the right-of-way only; thus, privately-owned storm water infrastructure was not included. AECOM's team surveyed each of these 703 structures and updated the City's storm water inventory and associated attributes.

2.6 Storm Water Utility Review

The team conducted a review of the storm water utility to assess the existing program budget and the potential need for utility system modification.

In 1998, the City of Decatur initiated the process of establishing its storm water utility. It commissioned a Storm Water Funding Feasibility Study by Ogden Environmental and Energy Services in April 1999. This study recommended development of a storm water utility with the use of supplemental funding from: Plan Review and Inspection Fees, System Development Charges, and General Obligation and Revenue Bond Financing.

The City Storm Water Utility (SWU) was ultimately developed as a result of this study with an Equivalent Residential Unit (ERU) funding base. The ERU was established at a size of 2,900 square feet of impervious surface, based on a 1999 survey of square foot residential impervious areas. A timeline for the SWU is presented below:

- 1999 – SWU was created and each ERU was charged $50/year.
- 2005 – SWU fee was increased based on recommendation from the 2004 SWMP and each ERU was charged $75/year.
- 2017 – SWU fee was increased and each ERU is now charged $100/year.

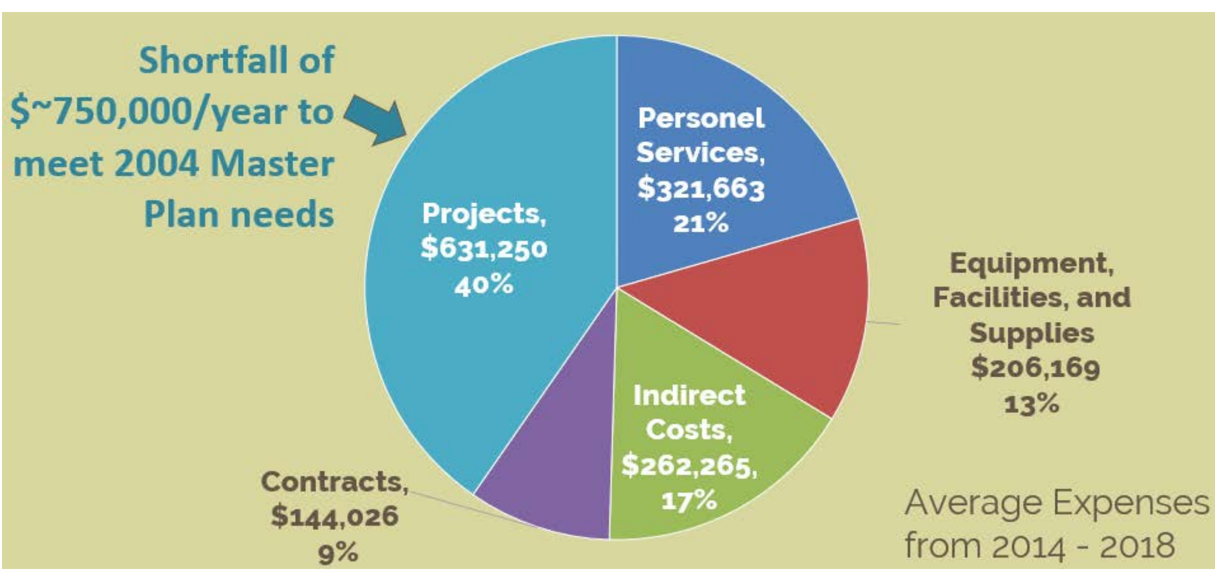
Although there have been ERU adjustments since SWU implementation in 1999, there have been no adjustments to the ERU basis. The City has observed increases in residential imperviousness and updated utility assessment was requested as part of this SWMP.

In 2018, the City collected $1.2 million in storm water utility fees. These fees pay for:

- City storm water personnel
- Storm water facilities and equipment, supplies, and maintenance
- Indirect costs
- Professional engineering services and other contracts (e.g., this study)
- Capital expenses such as construction projects, vehicles, specialized equipment, and street milling.

A distribution of average storm water utility expenditures can be found in **Figure 2-1**. The 2004 SWMP recommended $27 million in storm water project improvements across the City, which equated to $1.4 million in annual capital expenses over a 20-year implementation period for the master plan (without adjusting for inflation). It should be noted that currently only about 45% of this amount is collected and allocated to projects each year based on the averages shown in **Figure 2-1**.

Figure 2-2: Storm Water Utility Expenditures (2014-2018)



All storm water fees are charged based on Equivalent Residential Units (ERU). Currently all single-family residences currently pay one ERU. The existing ERU is equal to 2,900 square feet of impervious area and has not changed since the utility was established in 1999.

2.6.1 ERU Assessment

An assessment of impervious surfaces across the City was performed for this SWMP. This assessment was completed in GIS based off two datasets provided by DeKalb County:

- Georeferenced aerial photography (2017)
- Building footprint shapefiles (2018)

These datasets were reviewed and updated across the City to add additional impervious surfaces that were not accounted for within the building footprints including driveways, sidewalks, and other miscellaneous structures. After the impervious cover for the City was updated, it was associated with the overlaying tax parcels for billing purposes.

To complete the ERU assessment, the impervious cover needed to be divided into single-family residential and non-single-family residential impervious cover. The City of Decatur Zoning shapefile (2018) was used to apply land use designations to the parcel files. It is important to note that the zoning shapefile and the parcel shapefiles did not necessarily share common boundaries, so the zoning that was covered by the majority of the parcel was assumed to be the dictating zoning for the parcel for billing purposes.

Once zoning was added to the dataset, it was split into single-family residential, multiple-family residential, and non-residential parcels for land cover assessment. Street rights-of-way were added to the impervious cover database through an analysis of areas in the City that were not covered by a parcel. The City bills itself for City-owned public streets (and rights-of-way), and this revenue is realized through transfers from the General Fund to the SWU fund.

Once the GIS analysis was complete, the ERU data was exported from GIS into an Excel spreadsheet for further analysis. A breakdown of the impervious areas in the City is detailed in **Table 2-3**.

Approximately 2.4 million square feet of impervious surface is located in GDOT rights-of-way and is owned and operated by that agency. There is no payment of SWU fees for these impervious areas.

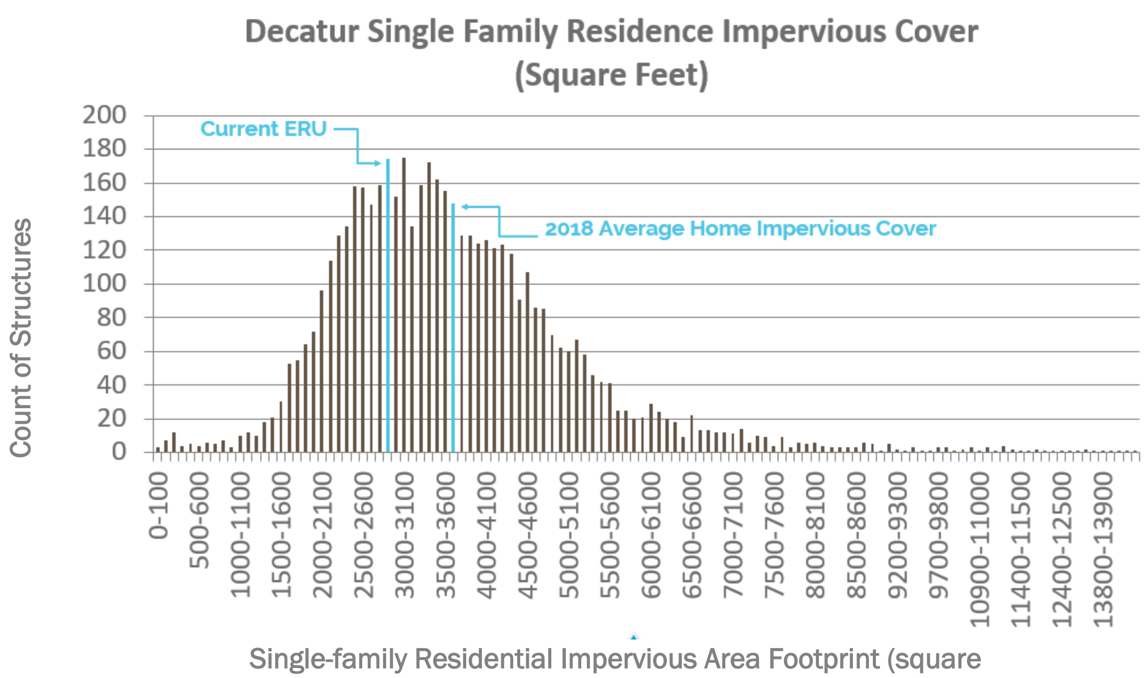
Table 2-3: Total Impervious Cover by Land Use

Summary	Total Imperviousness	Percentage
Single-family Residential	18,507,000	35%
Non-Residential	16,688,000	31%
Multi-Family residential	611,000	1%
Roadways - City	15,042,000	28%
Roadways - GDOT	2,395,000	4%
Totals	**53,243,000**	**100%**

The 2018 assessment of impervious surfaces found that impervious cover increased 32% Citywide since 1999. The average impervious area for single-family homes in Decatur has increased by 27% during the same period (estimated based on house footprint plus driveway).

In order to establish an updated ERU, an assessment of residential property characteristics was performed. As the name implies, the equivalent residential unit (ERU) size is generally set at the average impervious cover amount for a typical single-family residential property in a jurisdiction. Based on the 2018 data assessment, the average impervious cover for a single-family residential property has increased from 2,900 square feet to 3,673 square feet. The change in average impervious cover for single-family residential properties over time in Decatur is shown in **Figure 2-2**. **Section 7.2** of this plan includes recommendations for revisions and adjustments to the storm water utility, including the ERU, based on changes in impervious cover and input from stakeholders.

Figure 2-3: Single-family Residence Impervious Cover Distribution



2.7 Community Engagement

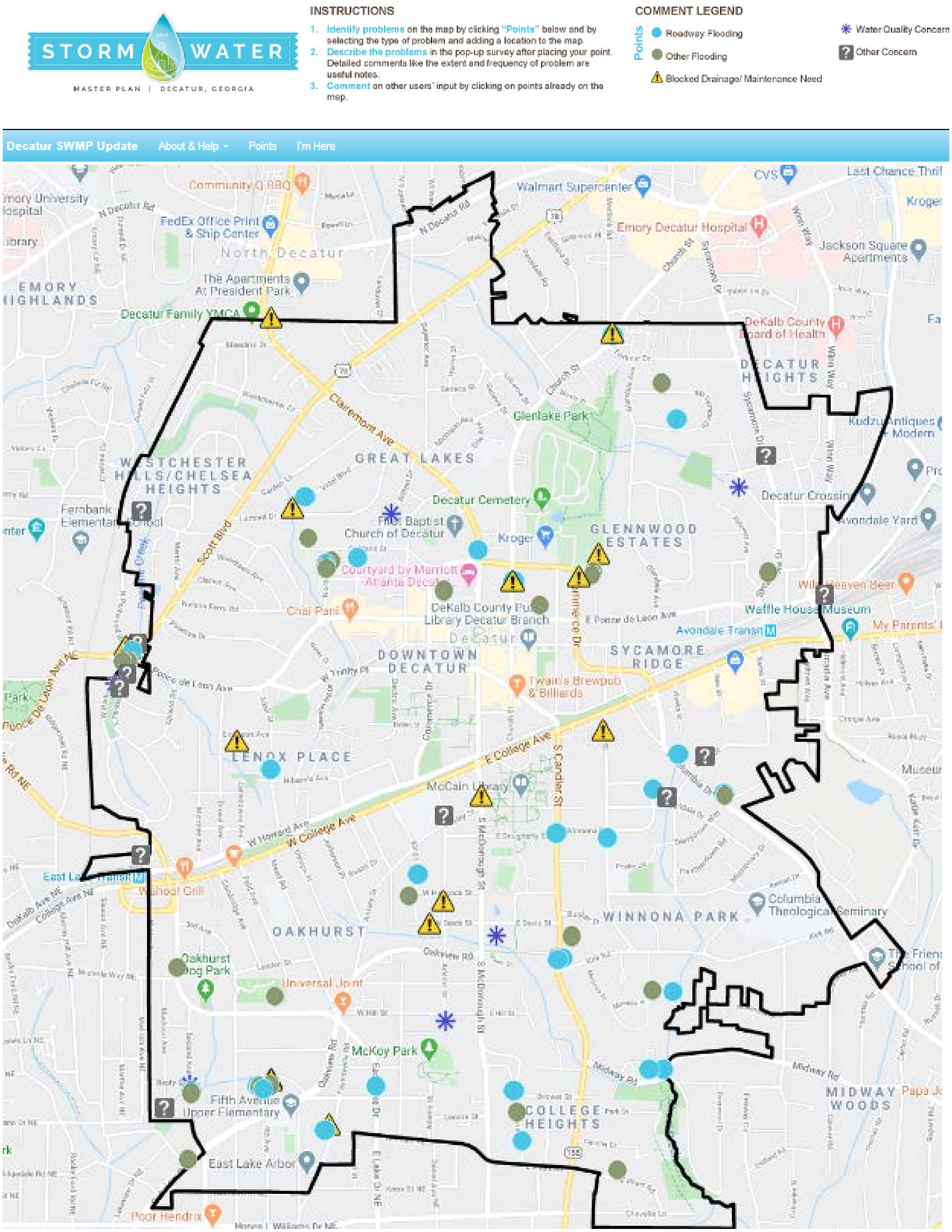
AECOM and the City and team conducted extensive community engagement for the SWMP including:

- 14 interviews with key stakeholders at the project initiation to identify major areas of concern and channels for outreach and communication
- Seven meetings with the ESB
- Four public meetings
- Three storm water academy meetings

- A project website on Decatur Next for communications about project meetings, review of the draft SWMP, and discussion of storm water concerns
- A WikiMapping site for on-line submittal of location-specific storm water concerns
- Collection of comments via e-mail and phone

Cumulative attendance at the public meetings and storm water academy meetings was 163 community members. After accounting for attendees that came to more than one meeting, the total number of people that attended at least one public meeting or academy meeting was 112. Over 12% attended 3 or more of the six meetings. Additionally, 44 residents submitted comments by phone, e-mail, or through Decatur Next, and 89 residents submitted comments about locations of concern through the project WikiMapping website (**Figure 2-4**).

Figure 2-4: Online WikiMapping Results



Summary of Public Meetings and Storm Water Academy Meetings

Public Meeting 1 – September 26, 2018 - This meeting had a high level of attendance, and it served as the public kick-off meeting for the project. The meeting included an opening plenary session with a question and answer period and an open-house session with information and comment stations. The open house stations focused on four topic areas:

- Storm Water in My Neighborhood – map of City storm water network that residents could mark with concerns
- Green Infrastructure – information on and examples of green infrastructure practices for storm water management
- Changing Decatur – data and examples showing how development and impervious cover across City is changing
- Get Involved – information on future meetings, WikiMapping website link, and mailing list

At each open house station, the project team answered questions and talked with meeting participants. At each station, meeting participants were prompted for input with questions to respond to using post-it notes and comment cards.

Academy 1 – October 18, 2018 - This meeting was conducted as a walking tour in Oakhurst. The objective of the tour was to show the participants several different types of storm water infrastructure and storm water concerns and to discuss storm water management at each site with the participants.

Academy 2 – January 23, 2019 - This meeting focused on the discussion of potential changes in storm water regulations in the City including lowering impervious thresholds at which storm water mitigation is required during development/redevelopment and enhancing mitigation requirements for single-family residential developments.

Public Meeting 2 – May 1, 2019 - This meeting was an open house with two stations:

- Ownership and Maintenance of Storm Water Infrastructure: This station presented information on the current ownership of storm water infrastructure in Decatur, a map of public and private storm water infrastructure, a map of storm water concerns that have been reported in the City, and a case study example demonstrating the challenges related to mixed ownership of storm water infrastructure.
- Paying for Storm Water Improvements: This station presented information on the current budget for the City's storm water program, how storm water utility fees are assessed, and impervious cover trends for single-family dwellings over the past 20 years.

At each station, project team members discussed these topics with the participants and sought their input and recommendations. Participants also completed a written comment form that prompted them for input on specific questions relevant at this stage of the project.

Academy 3 – July 30, 2019 - The objectives for this meeting were to: 1) share preliminary model results with participants and take their comments on how the results matched their understanding of storm water conditions in the City and 2) gather input from participants on how to prioritize storm water infrastructure projects in the SWMP.

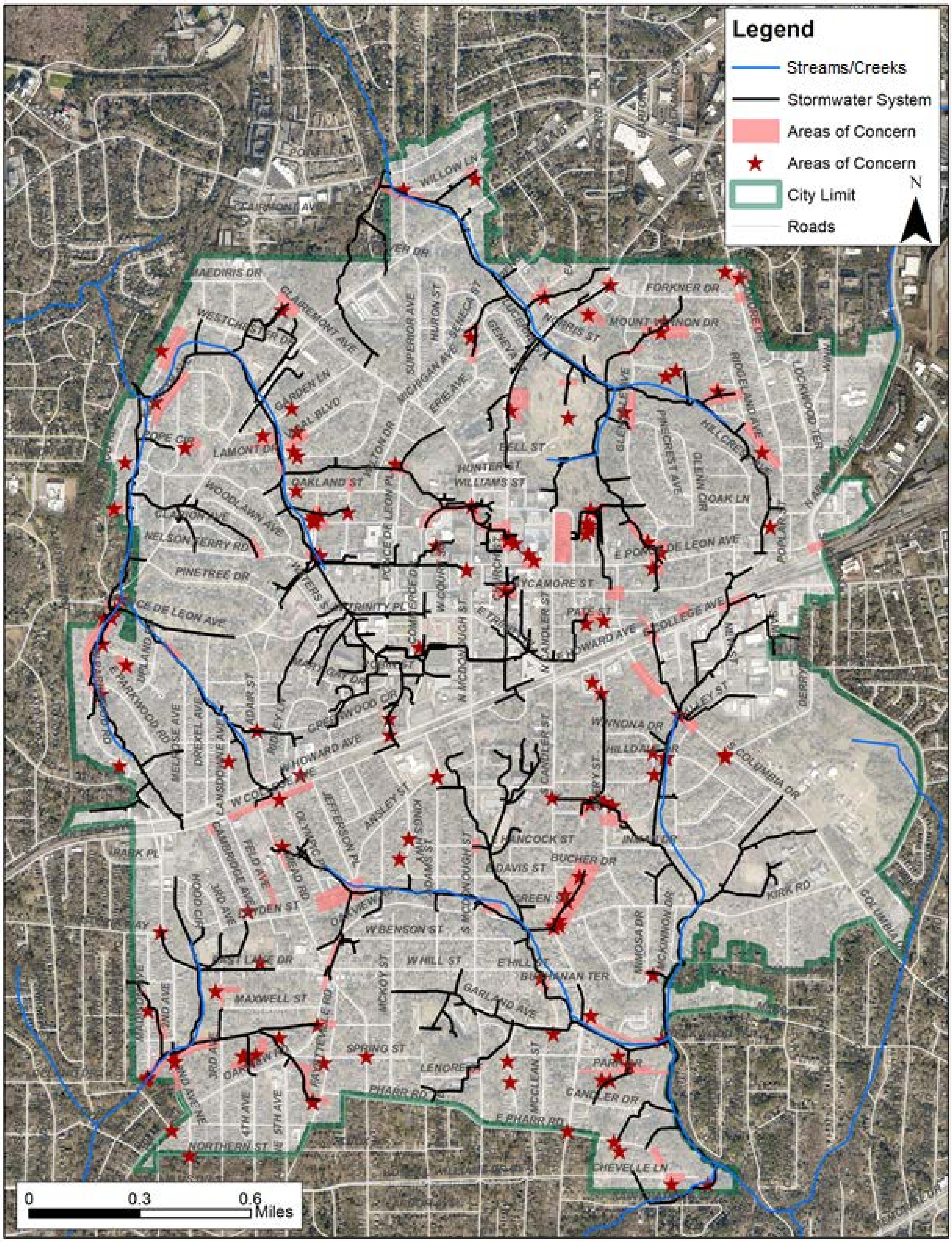
Public Meeting 3 -- October 16, 2019 - This meeting began with a presentation to update attendees on the status of the SWMP update. The presentation was followed by an open house to engage attendees. Open house stations included:

- Proposed Projects and Prioritization
- Funding
- Draft Policy Recommendations

A summary of the outreach efforts and public input received can be found in the Community Engagement Report included as **Appendix C.** In general, the main themes from public feedback focused on increased use of green infrastructure, protection for trees, and addressing runoff in residential areas of the City. Attendees generally supported higher storm water utility fee in order to provide additional funds for storm water improvements in the City. Many of the comments received identified location-specific storm water concerns. These locations, shown in **Figure 2-4**, were used in the analysis of storm water infrastructure. Public input also provided guidance on how to establish priorities for storm water improvement projects.

Public Meeting 4 – September 16, 2020 – This meeting will be held to present the final plan for public comment.

Figure 2-5: Summarized Public Concerns Recorded During the 2020 SWMP

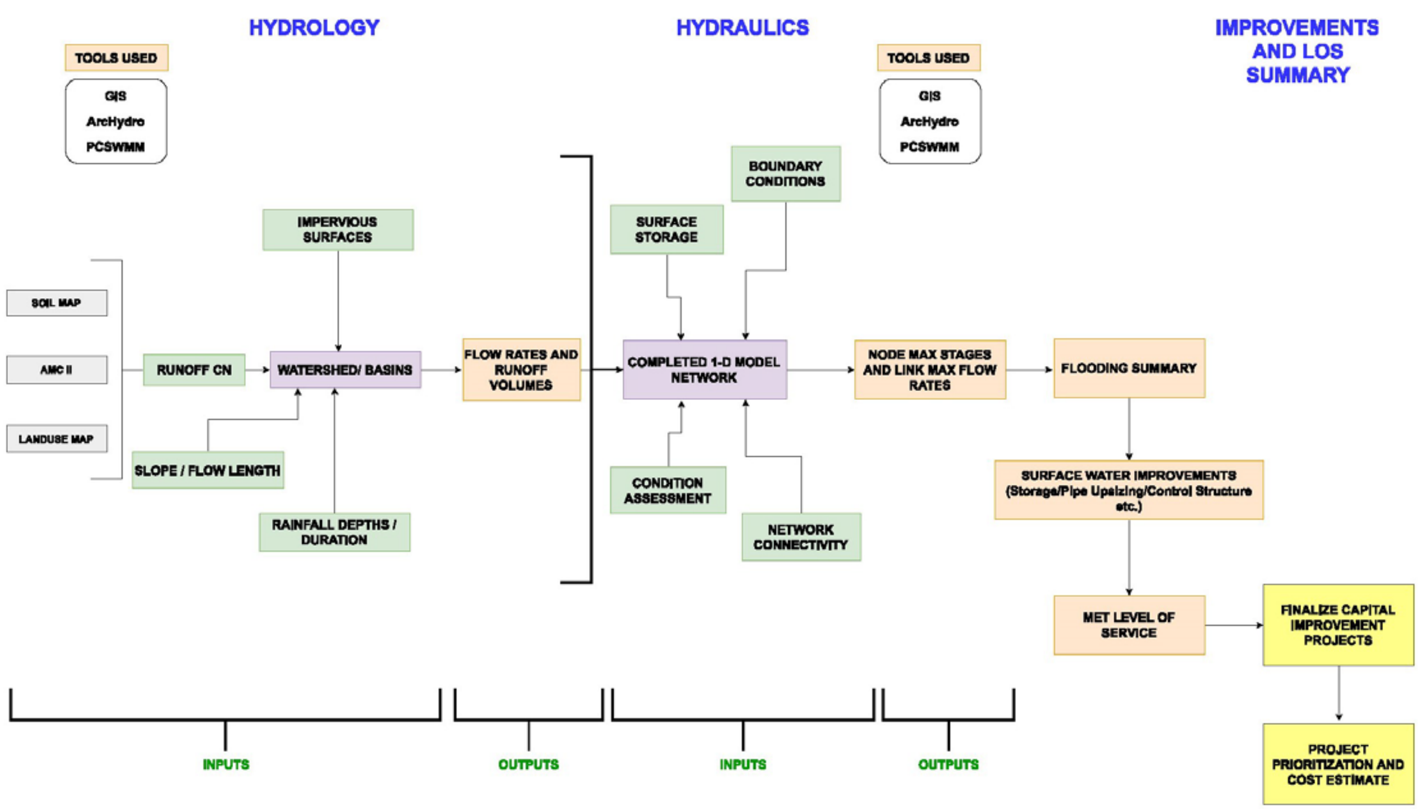


3. WATERSHED STORM WATER MODELING

To understand the performance of the City's SW infrastructure, we developed a model that included both hydrologic and hydraulic components. The hydrologic model (**Section 3.2**) is used to understand how rainfall turns into storm water. The hydraulic model (**Section 3.3**) is used to understand how the storm water system (pipes and ditches) convey the storm water through the City. The results of the model show where improvements are needed in the City's storm water infrastructure. It is important to note that the model was not the only consideration in determining where improvements were needed. Citizen concerns and complains as well as the inlet capacity assessment (described in **Section 5.3**). The model was also used to assess the performance of the City's infrastructure with the recommended improvements.

A one-dimensional working hydrologic/hydraulic model was developed using Computational Hydraulics International (CHI) PCSWMM Software. The processes that feed into the storm water model are shown in **Figure 3-1**, each of these process components are described in further detail throughout the following Section.

Figure 3-1: Storm Water Modeling Process Chart



At the conclusion of this project, the model will be used as a storm water analysis tool for the City to provide solutions to storm water management issues/questions as they arise.

3.1 Modeling Software

AECOM is familiar with a variety of Hydrologic & Hydraulic modeling platforms, thus was able to utilize the one that best met the City's needs. Based on AECOM's experience, and knowledge of what other regional municipalities use for system analysis, PC-SWMM, developed by Computational Hydraulics International (CHI) was recommended for Task 4: Hydrologic & Hydraulic Analysis. PC-SWMM is user friendly and extremely comprehensive; PC-SWMM includes stand-alone GIS and time series management for all aspects of the work. PC-SWMM software supports Water Quantity Hydrologic and Hydraulic Modeling, Water Quality Modeling and Green Infrastructure BMPs. Some information from the 2004 model remains unchanged and allowed for incorporation into the 2020 model. To verify that the data is unchanged, the following was conducted:

1. Verify subbasin delineations using DeKalb County 2010 topographic contours (LiDAR data).
2. Compare land use coverage per subbasin using the City's 2017 zoning layer.
3. Compare areas of system change delineated in the above survey scope.

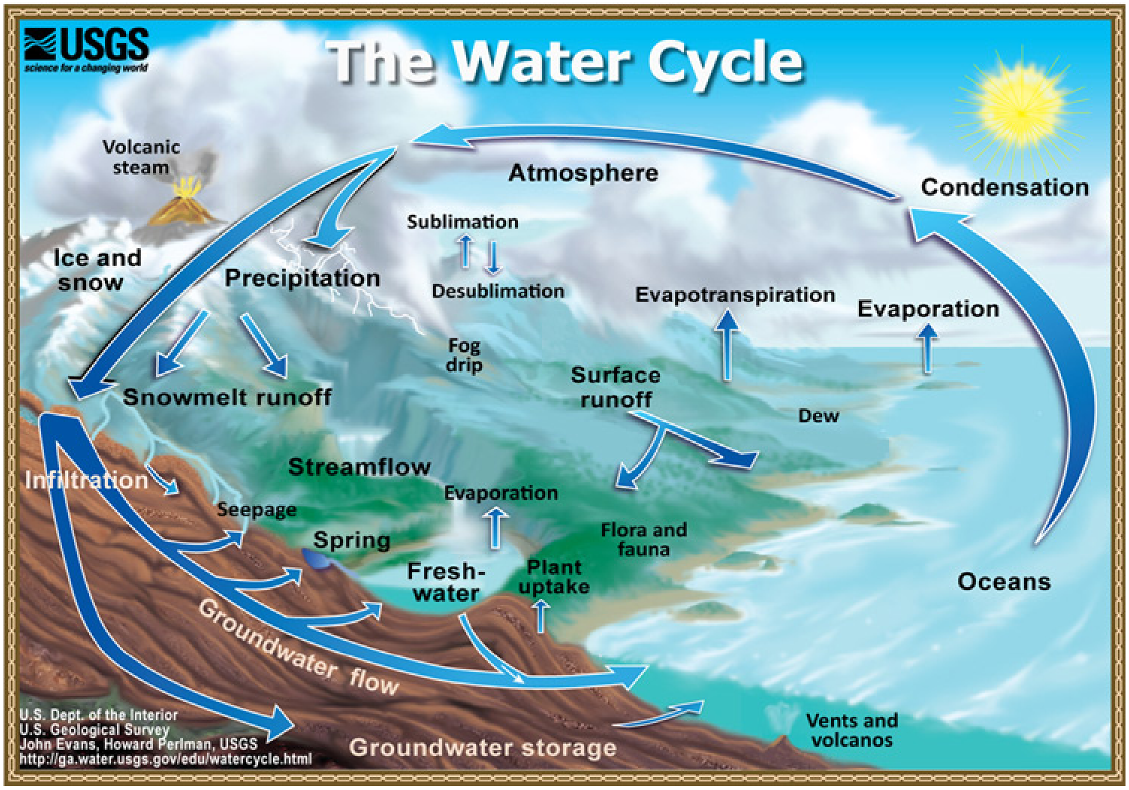
Subbasins within each watershed were delineated and basin parameters were determined for the same and incorporated into for the purpose of modeling.

3.2 Water Quantity Model – Hydrology

Hydrologic Model Development:

A hydrologic component of the model simulates how rainfall hits the ground surface and estimates how much should run off under various storm events. The full hydrologic cycle (Figure 3-2) need to be considered to factor in infiltration and estimate surface runoff.

Figure 3-2: The Hydrologic Cycle



Development of the hydrologic model included the following tasks:

- Delineation of subbasins
- Delineation of impervious areas and assignment of Manning's coefficients
- Determination of NRCS runoff Curve Numbers
- Development of overland sheet flow length and subbasin slope
- Delineation of design storms frequency and rainfall depth and distribution

3.2.1 Delineation of Subbasins

Subbasins are small neighborhood drainage areas. For the SWMP, subbasins were delineated using ESRI© Arc Hydro tools version 10.6. The delineation was initially performed using DeKalb County's (County) 2010 LIDAR and further refined using the storm water inventory and information gathered from City staff. Subbasins were mainly delineated based on natural hydrologic boundaries such as ridges, channels, and other waterways, as well as constructed boundaries such as roadways. A total of 481 subbasins were delineated for a total contributing area of approximately 3,370 acres. The subbasins within each watershed, as shown in **Figure 3-3** through **Figure 3-6**, vary in size from approximately 0.5 acre to 100 acres with an average of 5 acres. Subbasin names and their corresponding areas are listed in **Appendix D.**

Figure 3-3: Sugar Creek Subbasins

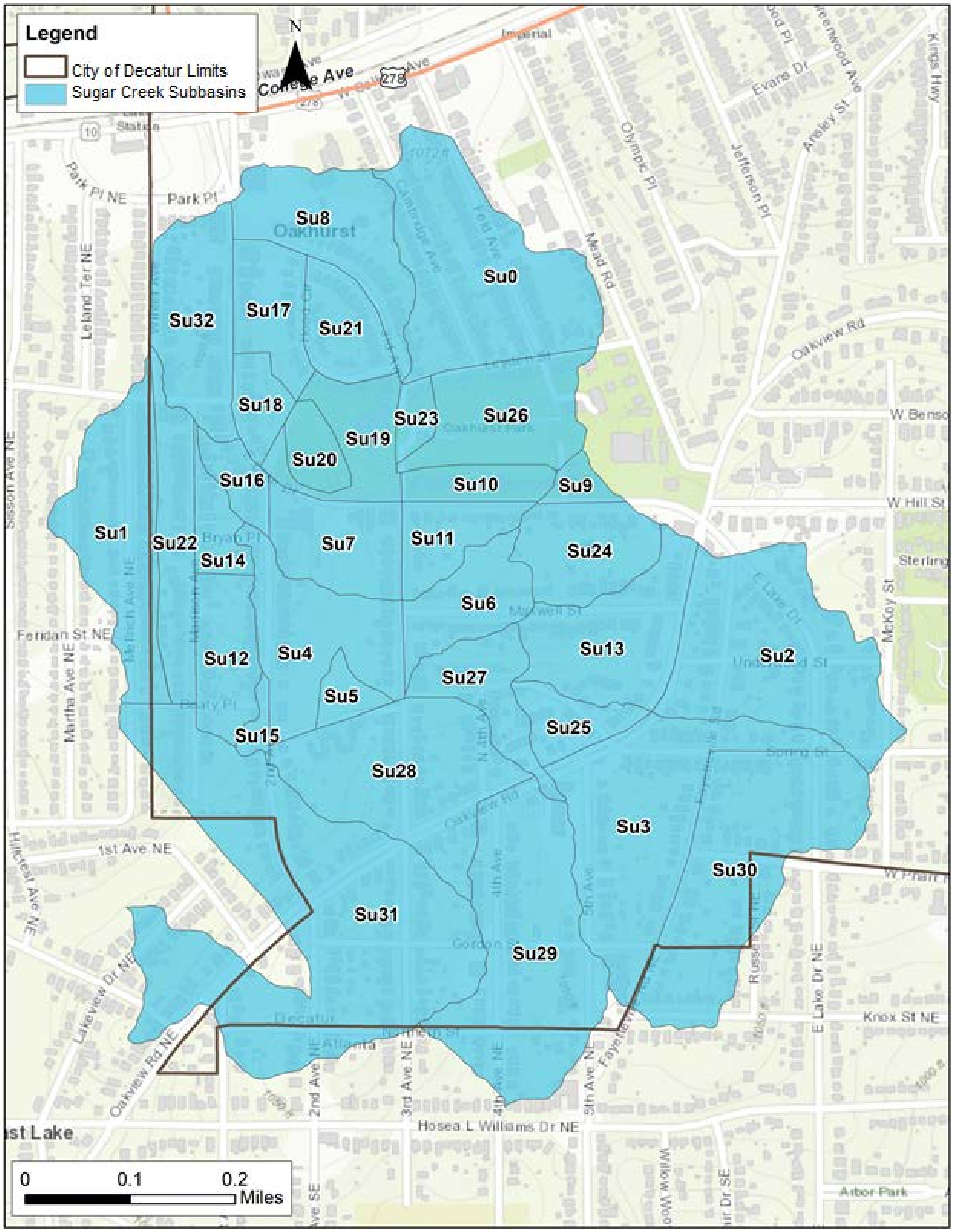


Figure 3-4: South Fork Peachtree Creek Subbasins

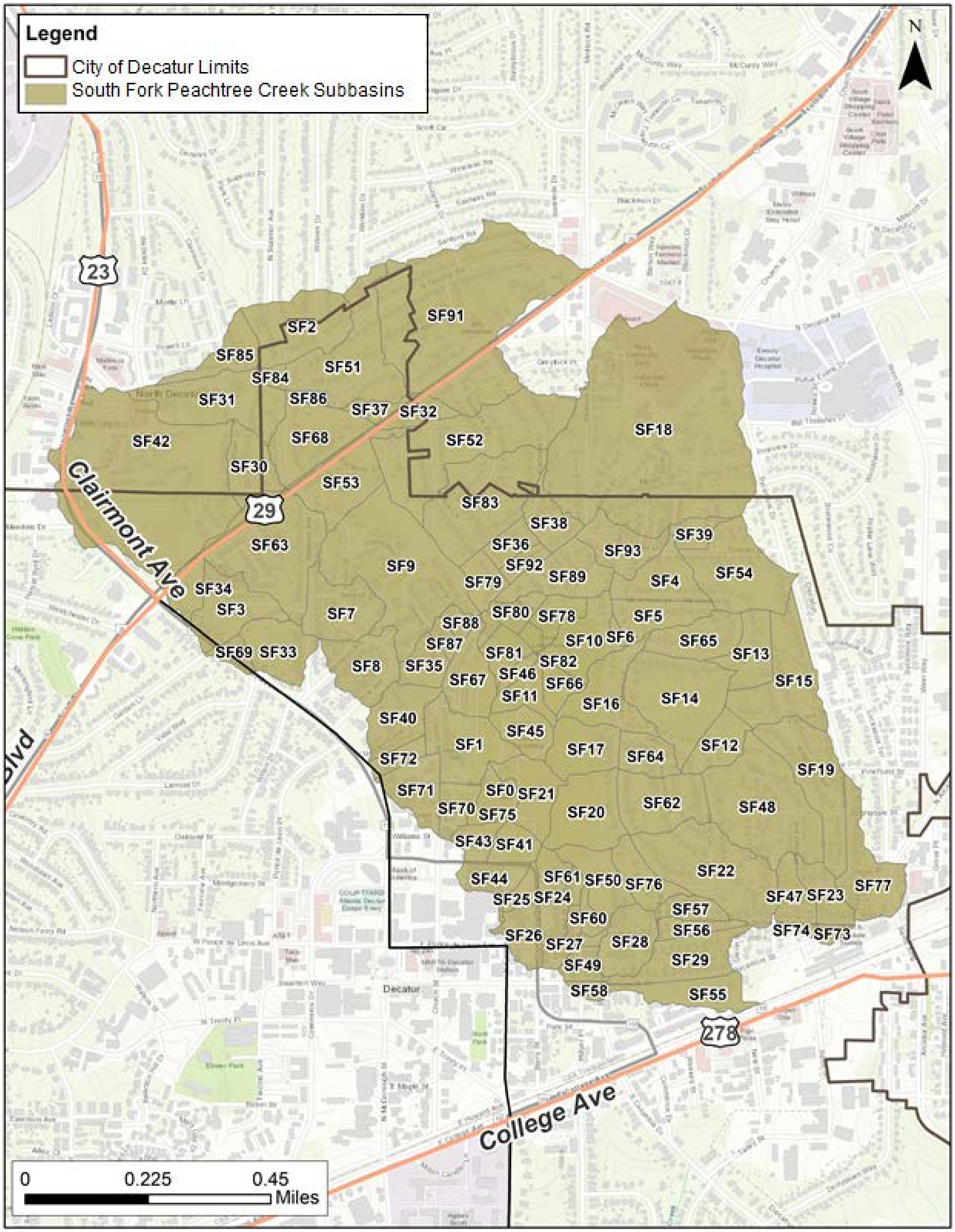


Figure 3-5: Peavine Creek Subbasins

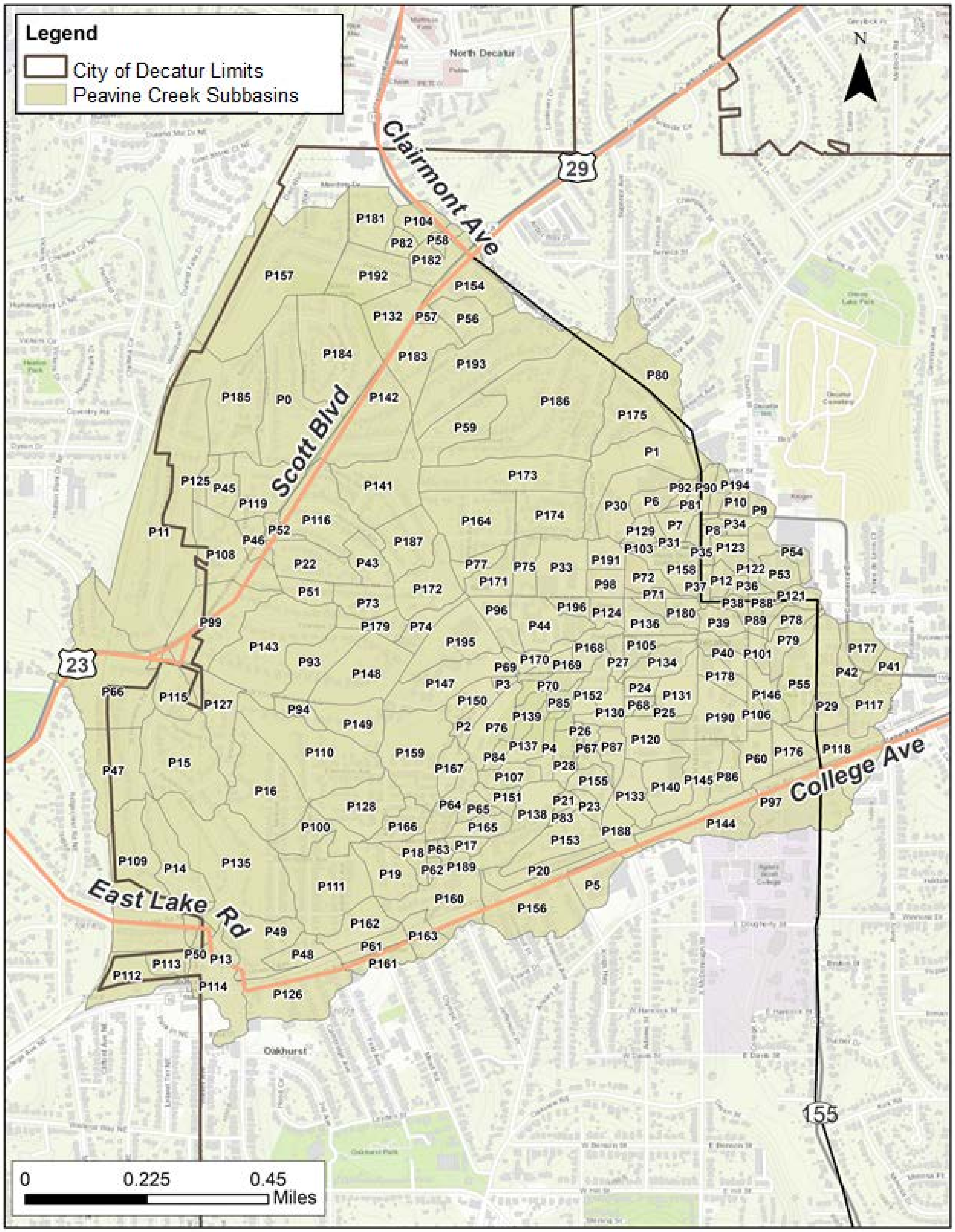
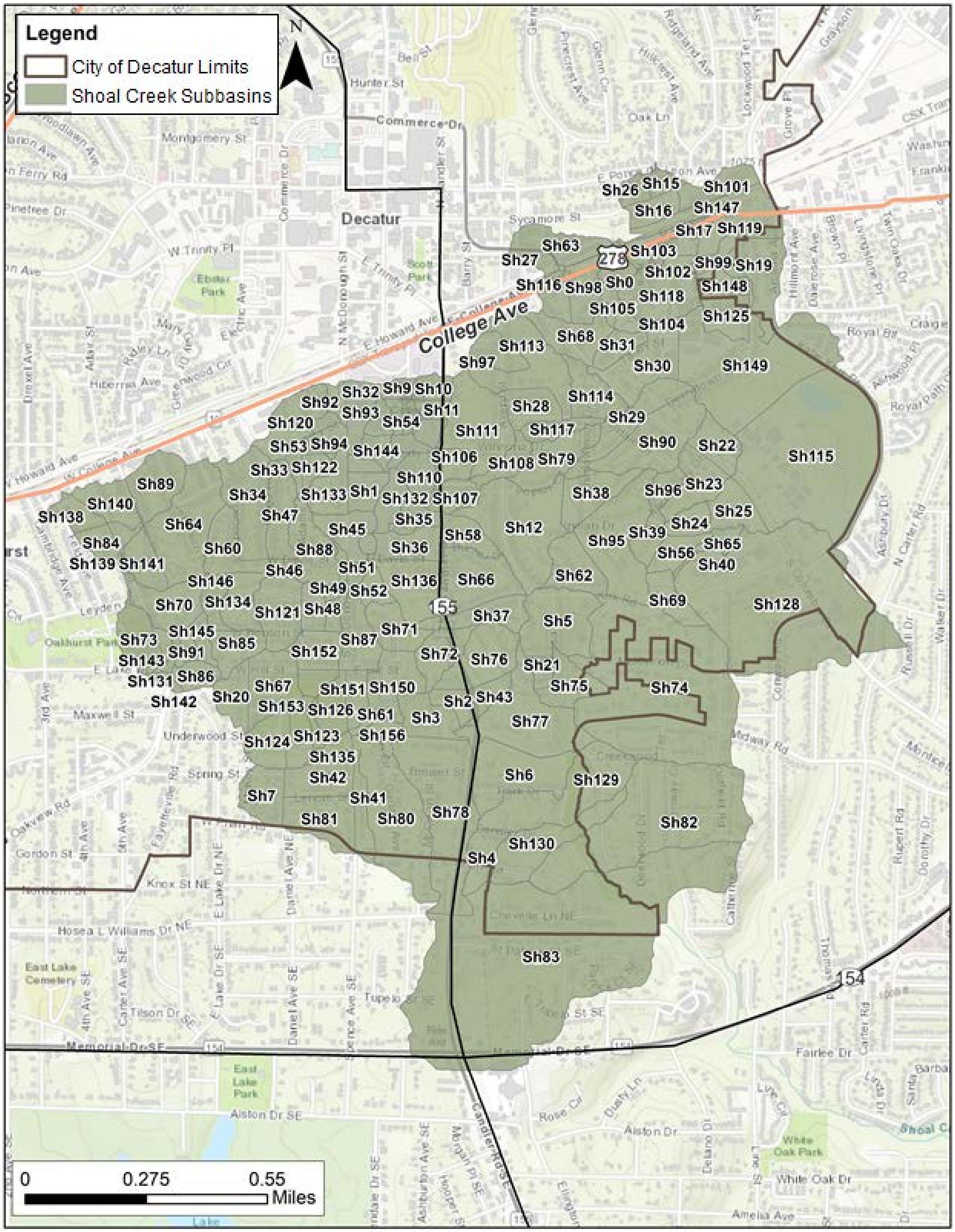


Figure 3-6: Shoal Creek Subbasins



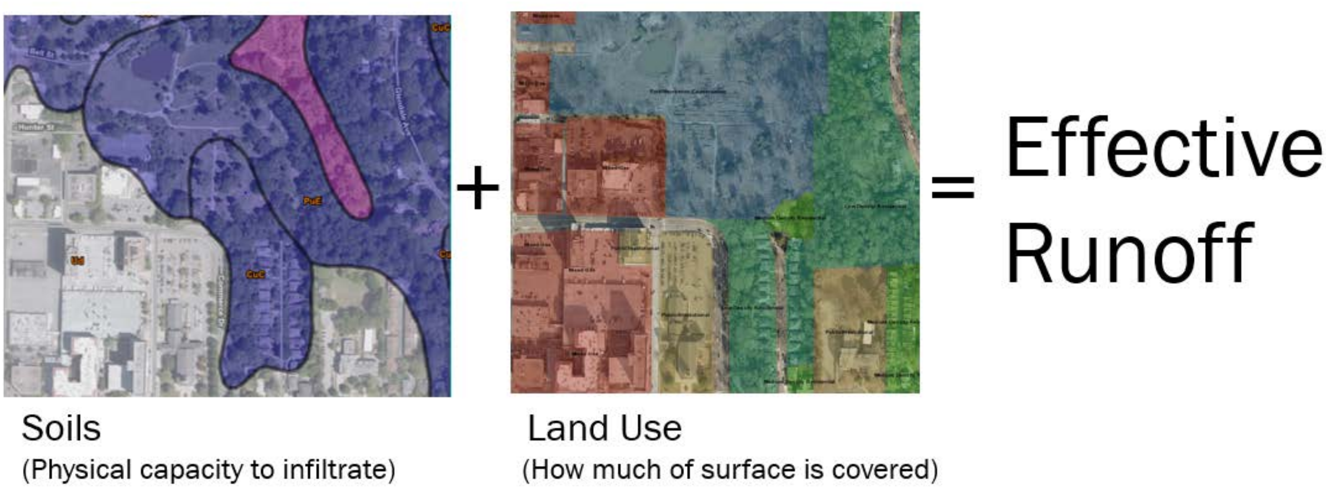
3.2.2 Delineation of Impervious Areas

The amount of storm water generated is proportional to the amount of impervious cover. Impervious percentages were developed using the impervious cover shapefile that was developed as part of AECOM's Storm Water Utility Analysis for the City (see **Section 2.6**). Impervious cover was then distributed based on the delineation of each subbasin. These percentages were used in the model and incorporated with impervious surface Manning's coefficient of 0.012, which helps project the average roughness of the surface which impacts the speed of runoff.

3.2.3 Determination of Runoff Curve Numbers

The USDA National Resources Conservation Service (NRCS) Curve Number methodology estimates precipitation excess (i.e., runoff) as a function of cumulative precipitation, soil cover, land use, and antecedent moisture conditions. Using this methodology, Curve Numbers (CN) are developed for each subbasin to estimate how much of the rain received infiltrates and how much runs off the surface (**Figure 3-7**).

Figure 3-7: CN Tabulation



The CNs were developed for future conditions and calculated based on soil group and land use category. The soil group and land use were categorized based on factors described below. Since impervious areas were incorporated using the digitized impervious surfaces, only areas that were not identified as impervious surfaces were considered for CN analysis.

Soils

Soils data for the City watersheds were provided by the NRCS via its Web Soil Survey (WSS). The WSS provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA NRCS and provides access to the largest natural resource information system in the world. The site is updated and maintained online as the single authoritative source of soil survey information.

The majority of the City watersheds contain soils with a Hydrologic Soil Group (HSG) of B., with smaller percentages of HSG A and D 20% of the City watersheds contain soils identified as "Urban Land" and did not have any HSG identified. Urban Lands are routinely associated with areas of substantial fill and compaction. Based on discussions with City staff, the Urban Land soils were assumed to have HSG of D, indicative of soils with the least infiltration potential and commonly found with compacted fill. The different types of soils and their distribution among the subbasins of the City can be found in **Table 3-1**

Table 3-1: Hydrologic Soil Group Distribution

Basin	Soil Group	Total Acres	Percent per Watershed
Peavine Creek	A	31	3%
	B	674	65%
	D	334	32%
Shoal Creek	A	67	6%
	B	924	81%
	D	155	14%
South Fork Peachtree Creek	A	40	9%
	B	269	63%
	D	117	28%
Sugar Creek	B	237	87%
	D	37	13%

Land Use

A land use and land cover map within the City was created using the future land use and zoning data obtained from the City. See **Section 1.2.2**.

The following land uses and features within the City's subbasins were used for the purpose of developing curve numbers:

- Dirt
- Impervious areas: paved parking lots, roofs, driveways, etc.
- Impervious areas: paved; open ditches (including right-of-way)
- Open space: good condition (grass cover > 75%)/light wooded areas
- Urban district: commercial and business
- Residential: 1/2 acre
- Residential: 1/3 Acre
- Residential: 1/4 acre

- Residential: 1/8 acre or less (townhouses)

Curve Numbers and Antecedent Moisture Condition

Antecedent Moisture Condition (AMC) is defined as the soil moisture before a precipitation event. It indicates the ability for soils to absorb and infiltrate surface runoff.

AMC category II was selected for CN development for Decatur. Soils that do not retain moisture (dry soils) fall under category AMC I and wet soils fall under category AMC III. AMC II is chosen to best represent the existing soil conditions within the City's subbasins as it represents soils that are typical in nature – partially wet, partially dry.

The CN values used in the model were taken directly from NRCS published values for Urban Hydrology for Small Watersheds (as published in the TR-55 method) land uses which represents AMC II. See **Table 3-2.**

Table 3-2: Curve Number Values

Land Use	Hydrologic Soil Group			
	A	B	C	D
Dirt (including right-of-way)	72	82	87	89
Impervious Areas: Paved parking lots, roofs, driveways, etc.	98	98	98	98
Impervious Areas: Paved; open ditches (including right-of-way)	83	89	92	93
Impervious Areas: Paved; curbs and storm sewers	98	98	98	98
Open Space: Good Condition (grass cover > 75%)	39	61	74	80
Residential: 1 Acre	51	68	79	84
Residential: 1/2 acre	54	70	80	85
Residential: 1/3 Acre	57	72	81	86
Residential: 1/4 acre	61	75	83	87
Residential: 1/8 acre or less (town houses)	77	85	90	92
Urban District: Commercial and Business	89	92	94	95
Urban Districts: Industrial	81	88	91	93
Water	100	100	100	100
Woods – grass combination[5]	32	58	72	79
Woods[6]: Good	30	55	70	77

Ref: NRCS published values for TR-55 methodology for Urban Hydrology and Agricultural land uses which represents AMC II

Subbasin, soil data, and land use data were used to develop Curve Numbers for each subbasin. CN for each unique combination of soil type and land use within the subbasin along with their respective areas was calculated. Each subbasin was further divided into several areas with different CNs. The composite CN for the subbasin is calculated as a weighted average of all the CNs within the subbasin. The higher a CN, the more runoff that will be generated from that area. Examples of the CN and runoff relationship are shown in **Figure 3-8. Table 3-3** below summarizes the CN for each subbasin.

Figure 3-8: Example Curve Number and Runoff Estimation

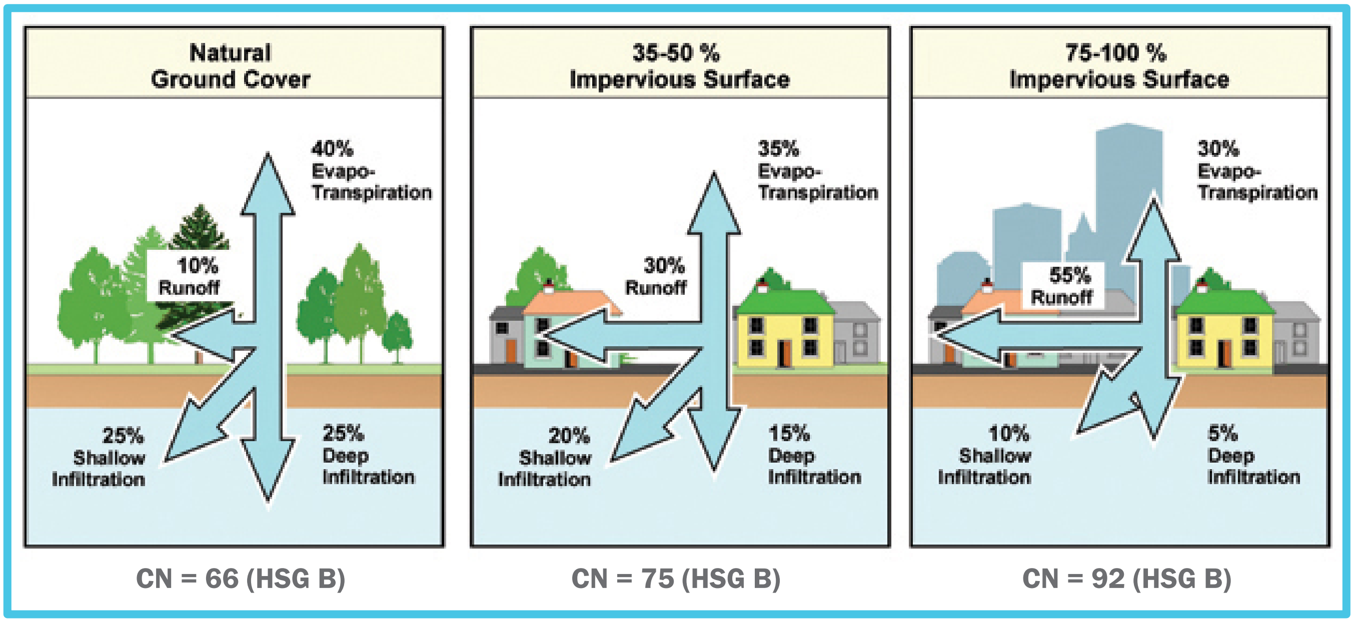


Table 3-3: Weighted Average Curve Numbers per Basin

South Fork Peachtree Creek	Shoal Creek	Peavine Creek	Sugar Creek
76	75	81	80

3.2.4 Development of Overland Sheet Flow Length and Subbasin Slope

Overland sheet flow length for each subbasin was obtained from the longest flow path developed using ArcHydro tool. Measuring this length and slope will help estimate the time it will take for storm water to flow across the basin. The longest flow path was digitized using DeKalb County's (County) 2010 LIDAR. Subbasin slope was also calculated in the ArcGIS environment and incorporated in to the PCSWMM for each subbasin.

3.2.5 Delineation of Storm Frequency and Rainfall Depths and Distribution

Pre-and post-development hydrology was analyzed for the following design storm events:

- 2-year/24-hour recurrence event storm (50% annual probability)
- 5-year/24-hour recurrence event storm (20% annual probability)

- 10-year/24-hour recurrence event storm (10% annual probability)
- 25-year/24-hour recurrence event storm (4% annual probability)
- 50-year/24-hour recurrence event storm (2% annual probability)
- 100-year/24-hour recurrence event storm (1% annual probability)

The above design storm events are standard design events used for storm water infrastructure analysis, as they represent a range of normal to extreme precipitation. The 24-hour duration precipitation depths were obtained from NOAA for each design storm **Table 3-4.**

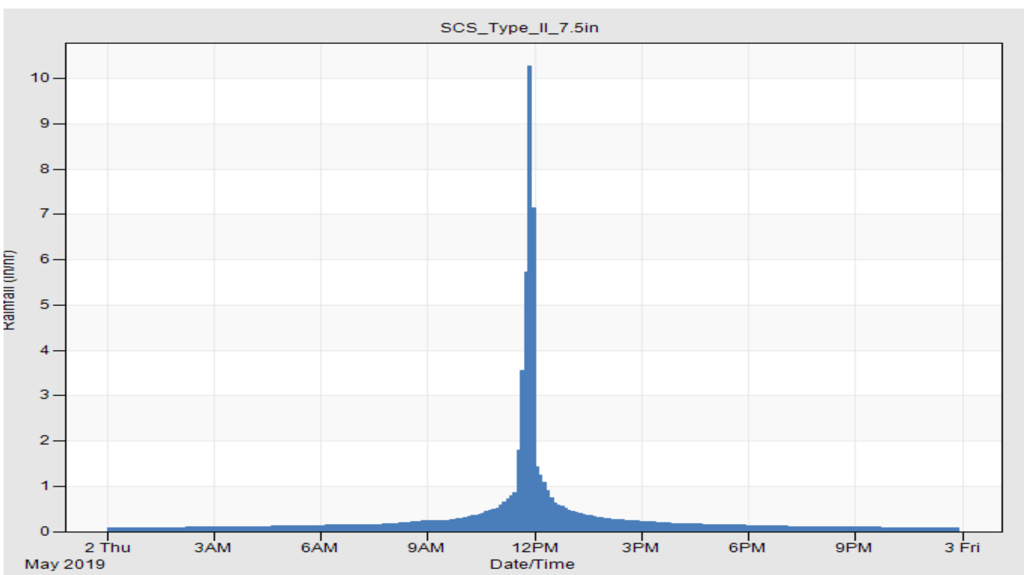
Table 3-4: Design Storm Precipitation (inches) Data for Atlanta, GA

2-Year/24-Hour Total	5-Year/24-Hour Total	10-Year/24-Hour Total	25-Year/24-Hour Total	50-Year/24-Hour Total	100-Year/24-Hour Total
3.70	4.40	5.03	5.95	6.70	7.50

Ref: NOAA Atlas 14, Volume 9, Version 2 ATLANTA

For this study, rainfall depths published by NOAA (**Table 3-4.)** were used for rainfall amounts with a SCS Type II distribution, as shown in the figure below, **Figure 3-9.** This graph shows the simulated rain is distributed over the 24-hour period.

Figure 3-9: SCS Type II Example



The City also requested an analysis of a short but intense storm that may occur at a higher frequency than the above events. The City has noted an increase in public reported storm water concerns resulting from short duration high intensity storms. To develop an event scenario to address this request, rainfall analysis was performed by reviewing rainfall data for the period of May 2018 – December 2018 for United States Geological Survey (USGS) Station 02203873, whose location is at Cobbs Creek at Rainbow Dr, Near Decatur, Ga (**Figure 3-10**). This station was selected as it was in closer proximity to Decatur than the NOAA weather station in Peachtree City. Rainfall intensity was developed for that period and is shown in **Figure 3-11**.

Figure 3-10: USGS Station 02203873, Cobbs Creek at Rainbow Dr

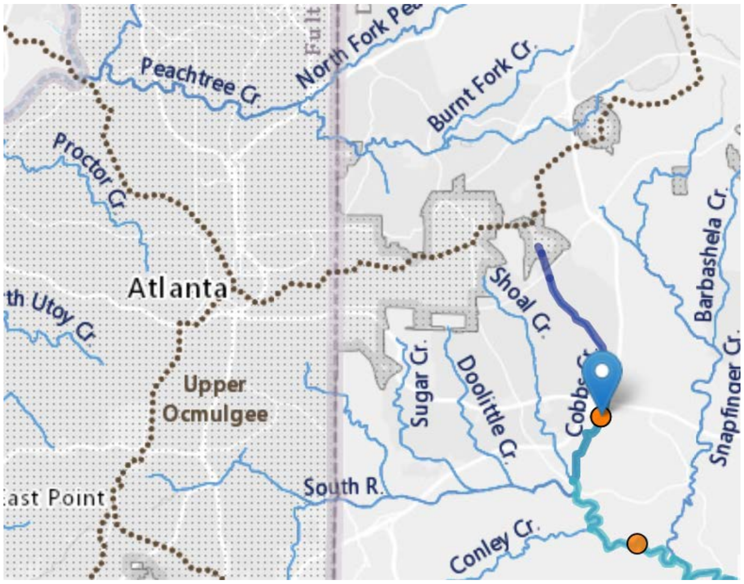
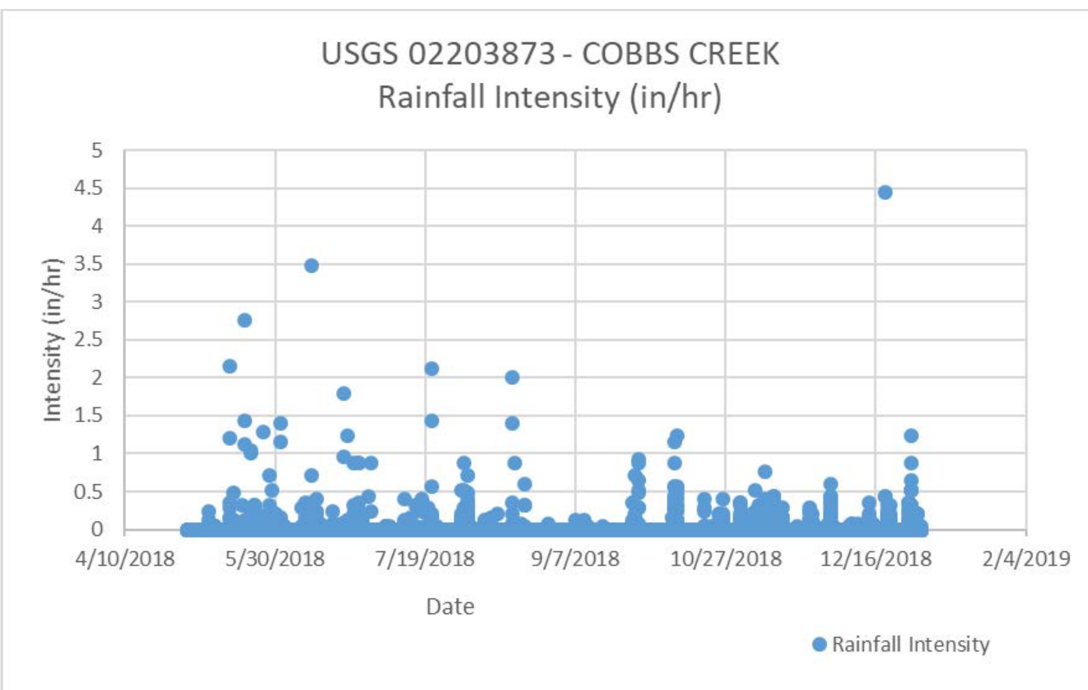


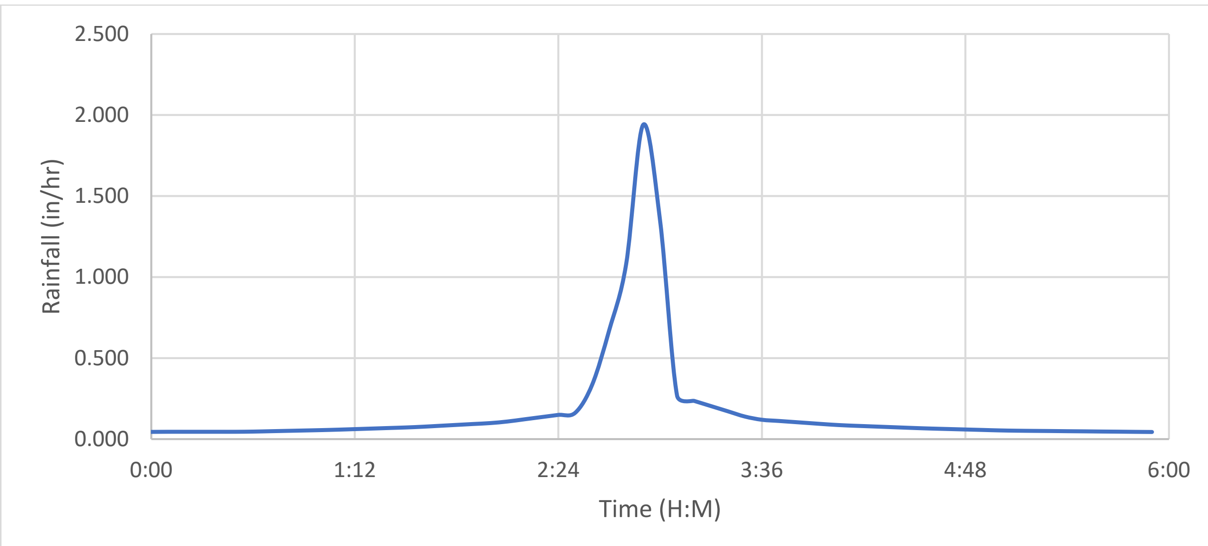
Figure 3-11: Cobbs Creek Rainfall Intensity



Based on the rainfall analysis, rainfall intensity for an event that addressed the City's request falls within the range of 0.5 inch to 1.5 inches over a 6-hour duration. A 6-hour duration storm was selected since it is considered the most common smaller duration storm industrywide and the rainfall distribution pattern is readily available in most of the software applications commonly used in the water resource industry. Comparing the rainfall depth against the NOAA Precipitation Frequency Estimates, rainfall depth is comparable to a 1-year- 6-hour duration event, which produces a total of 2.2 inches in rain. This storm event, with an SCS Type II Rainfall distribution (**Figure 3-12**) was also included in the project storm water modeling.

The above design storm configuration was considered as the "critical storm" and will be considered as part of the Level of Service (LOS) criteria, to determine recommended improvements, and to help determine project scheduling. Adding this storm event to the typical design events detailed in **Section 3.2.5** provides a full range of normal to extreme precipitation events on which to assess system performance.

Figure 3-12: SCS - Type II 6-hour Rainfall Distribution



3.3 Water Quantity Model – Hydraulics

A hydraulic component of the model is a simulation of the behavior of storm water once it is collected by the storm drain system. It will predict how full the pipes are flowing during various storm events and at what location the capacity if exceeded and flooding may result. The objective of the water quantity modeling effort was to determine flows and flood levels for the 6-hour critical storm, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year frequency and 24-hour duration storm events. Information needed to develop the hydraulic model includes the node-link configuration, channel cross-sections, Manning's roughness coefficients, initial stages, stage-area determination, and boundary conditions. The PC-SWMM model developed for Decatur is a 1-dimensional (1D) model that was used to estimate both hydrology and hydraulics. A 1D model can be used effectively to determine the capacity and performance of linear features in a storm water management system such as pipes, culverts, and channels. However, a 1D model has only limited capability in predicting the amount of overland flooding in a watershed. The maximum water levels that are projected to overtop the structures from a 1D model will not spread on the surface, and the model does not predict the how much area the flooding may impact. However, to understand the potential flooding impacts, the infrastructure improvements recommended in this plan were compared against certain defined Level of Service criteria (sizing for the "critical storm" and/or 25-year/24-hour storm). The model results demonstrated that the maximum storm water levels should be maintained within the confines of the improved infrastructure for those events.

Development of the hydraulic model includes the following tasks:

- Delineation of the storm water network
- Development of surface storage
- Inclusion of condition assessment parameters in the network
- Development of boundary conditions

3.3.1 Delineation of the Storm Water Network

The storm water network was delineated in the model based on the information acquired from the 2004 model files, the 2018 GIS databases provided by the City, as-built drawings, and AECOM's field survey data (see Section 2). A connected network of all storm water assets was created using spatial locations of the assets. Flow directions were determined based on invert elevations and slopes. In some cases, such as locations where pipes had adverse slopes, engineering judgement was used to determine the flow directions. The network was developed to simulate the major pipe systems across the City., but for some contributing areas, minor pipes were included to maintain system connectivity.

The hydraulic network also includes six regional detention ponds; these are shown in Appendix E.

Areas within the overall storm water network that lacked information such as pipe and culvert diameters and inverts were included based on the following:

- If sections were missing inverts and diameters between upstream and downstream structures, diameters for those missing sections were assumed to be the same as the upstream pipe diameters and the inverts were interpolated between the upstream and downstream inverts.
- If inverts were not available in any dataset, appropriate slopes per common design standards were assumed depending on the pipe diameter.
- If lacking information was related to physical characteristics, such as pipes, culverts, swales, channels etc., additional data was incorporated from LiDAR or georeferenced aerial photography provided in GIS.

3.3.2 Development of Surface Storage

Runoff for each subbasin within the model was generated using Land Use Type and Soil Group. The presence of minor detention structures within these subbasins will not impact the amount of runoff generated for a subbasin or for a particular design storm event. However, the presence of these detention structures does affect the surface storage within these basins and has a direct impact on the Net Water Surface Elevation.

To estimate the water surface elevation appropriately, minor detention structures were included in the model as surface storage. The surface storage was developed on DeKalb County's (County) 2010 LIDAR using the ArcHydro tool and was incorporated into the model as a "Storage" junction type.

3.3.3 Inclusion of Condition Assessment Parameters in the Network

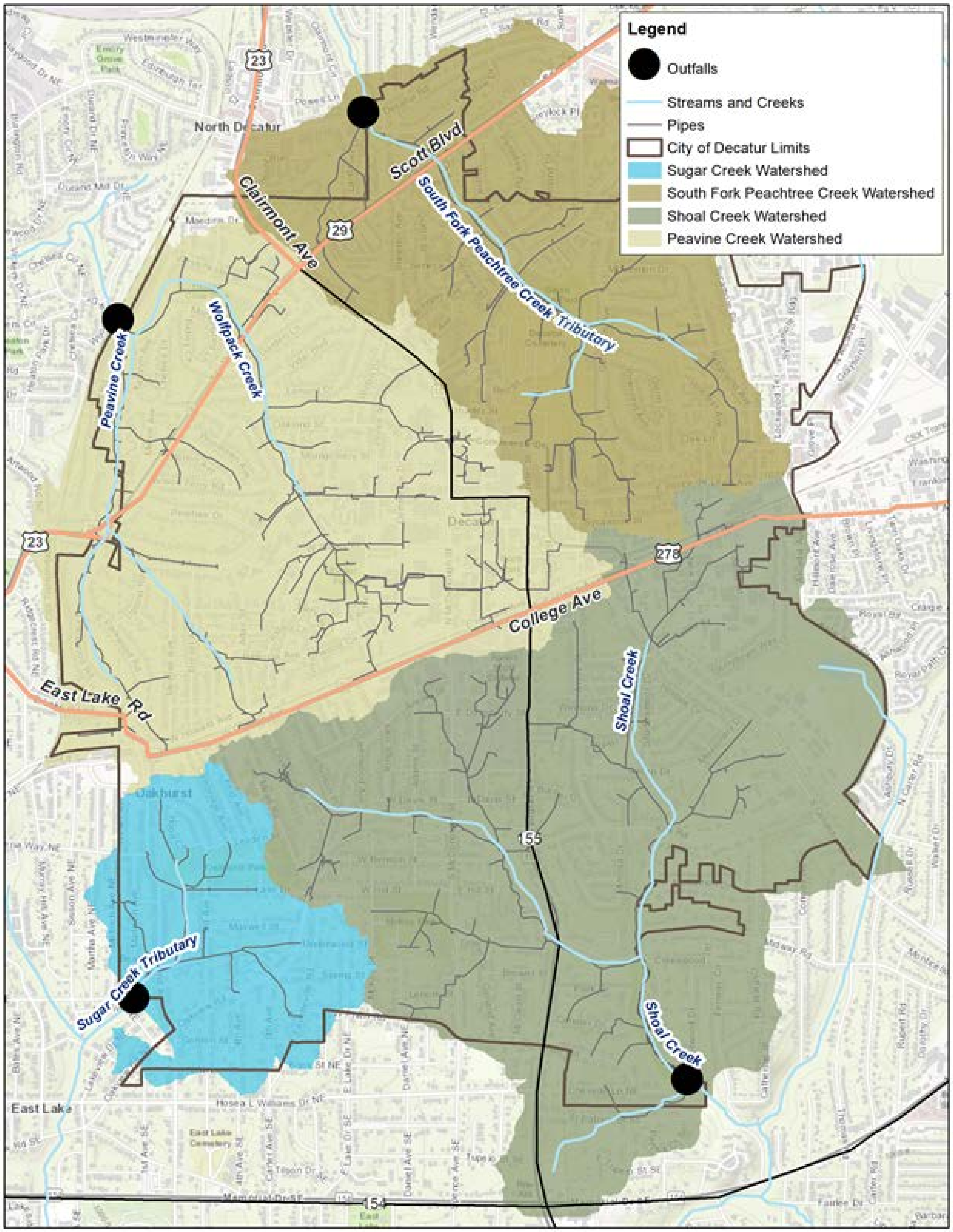
Once the model was built with the existing network, the condition assessment data for each infrastructure as available were incorporated into the model. The condition assessment data mostly included either defects in pipe or blockages. This model is considered the existing conditions model.

3.3.4 Development of Boundary Conditions

Boundary conditions represent the final discharge point where all these watersheds drain and what happens subsequently beyond that point. These are defined in the model in terms of the established water level at the point of discharge at the City limits. Boundary conditions for the existing conditions model were determined at the final outfall of their respective watersheds. Figure 3-14 shows the outfall locations for each of the watersheds. Since the watersheds discharge to inland stream/creeks system, there is no influence of tidal impacts, and given a lack of gage data, boundary conditions for the model were considered as free outfall for all design storm events.

Figure 3-13: Major Streams Near City Limits

Figure 3-14: Watershed Outfall Locations at City Limits



3.3.5 Existing Conditions Model Results Summary

The existing conditions model was used to simulate the design storm events as defined in Section 3.2.5 to determine the capacity of the existing storm water system. Results are summarized below.

The model contains nodes that represent critical locations where results can be obtained. Each node in the model was assigned an initial stage and a warning stage. The initial stage is the water surface elevation at a node before the beginning of the precipitation. The warning stage is the ground surface elevation at the node. The model calculates the elevation of the water surface at each node in the model throughout the selected simulation duration and records the maximum value (maximum stage). If the maximum stage at a node is higher than the warning stage, the model results indicate that the node is experiencing flooding. The depth of flooding is calculated by subtracting the warning stage (round surface elevation) at the node, from the maximum stage, which is the highest water surface elevation calculated by the model for that node. When the water level reaches the ground surface for a node or above the warning stage, the model determines the maximum or peak water levels by accounting for the stage-area relationship incorporated into the model. The stage-area relationship tells the model the internal storage in the system and helps the model predict when flooding may occur. With the stage-area relationship provided, the model calculates the storage volume for each incremental depth above the warning stage.

Based on the evaluation of results from the 6-hour Critical storm and 2-year/24-hour design storm to the 100-year/24-hour design storm event, the existing conditions model shows that several locations across the City's watersheds lack storage capacity and have a high potential for flooding indicating the lack of capacity. The degree and depth of flooding varies depending on the type of design storm event selected.

The general symbology used in the figures below include the following:

- Nodes highlighted in Yellow are overtopping manholes, where the maximum stage is above the ground surface elevation at that node location
- Conduits/Channels highlighted in red are the ones that lack capacity and needs to be upgraded

Shoal Creek Watershed: Figures 3-15 and 3-16 show the modeled locations of flooding within the Shoal Creek watershed for the 6-hour Critical storm and 25-year/24-hour design storm events. Locations of flooding that are common to both design storm events are listed below:

- East College Avenue between New Street and Sam Street
- Along Talley Street
- Between Avery Street and Inman Drive
- North of Ansley Street
- Intersection of S Candler Street and Garland Avenue

In addition to the above, there are additional locations that were modeled to flood during the 25-year design storm event:

- Between Mead Road and Olympic Place
- Along Oakview Road

- North of Pharr Road up to Lenore Street
- North of New Street
- North of E Dougherty Street

Note, the modeling results shown in this Section was just one component of the storm water system assessment performed for this project. Also taken into to consideration were public reported concerns and an inlet capacity assessment (**Section 5.3**)

KEY TERMS

Critical Design Storm: A storm event of duration and intensity that the infrastructure is designed to manage. In the case of Decatur, the critical design storm is 2.2 inches of rain over 6 hours. This amount is reflective of a typical heavy storm.

25-Year/24-Hour Storm: An extreme storm event with a rainfall amount that has a four percent probability of occurring at a location in a year. This event is equal to 5.95 inches over 24 hours and would be likely to occur in an extreme weather event, such as a tropical storm.

Figure 3-15: Shoal Creek Watershed Performance during Critical Storm

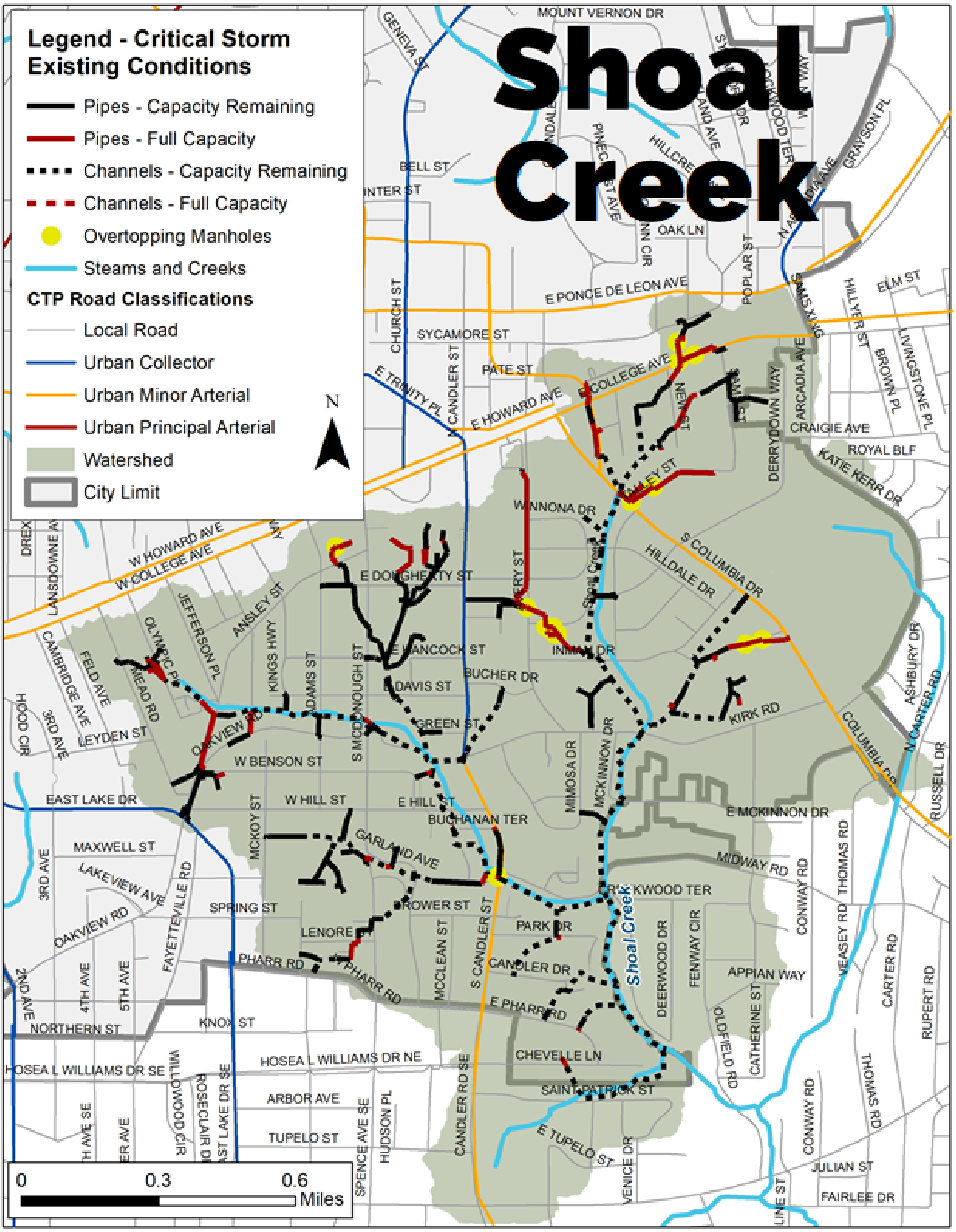
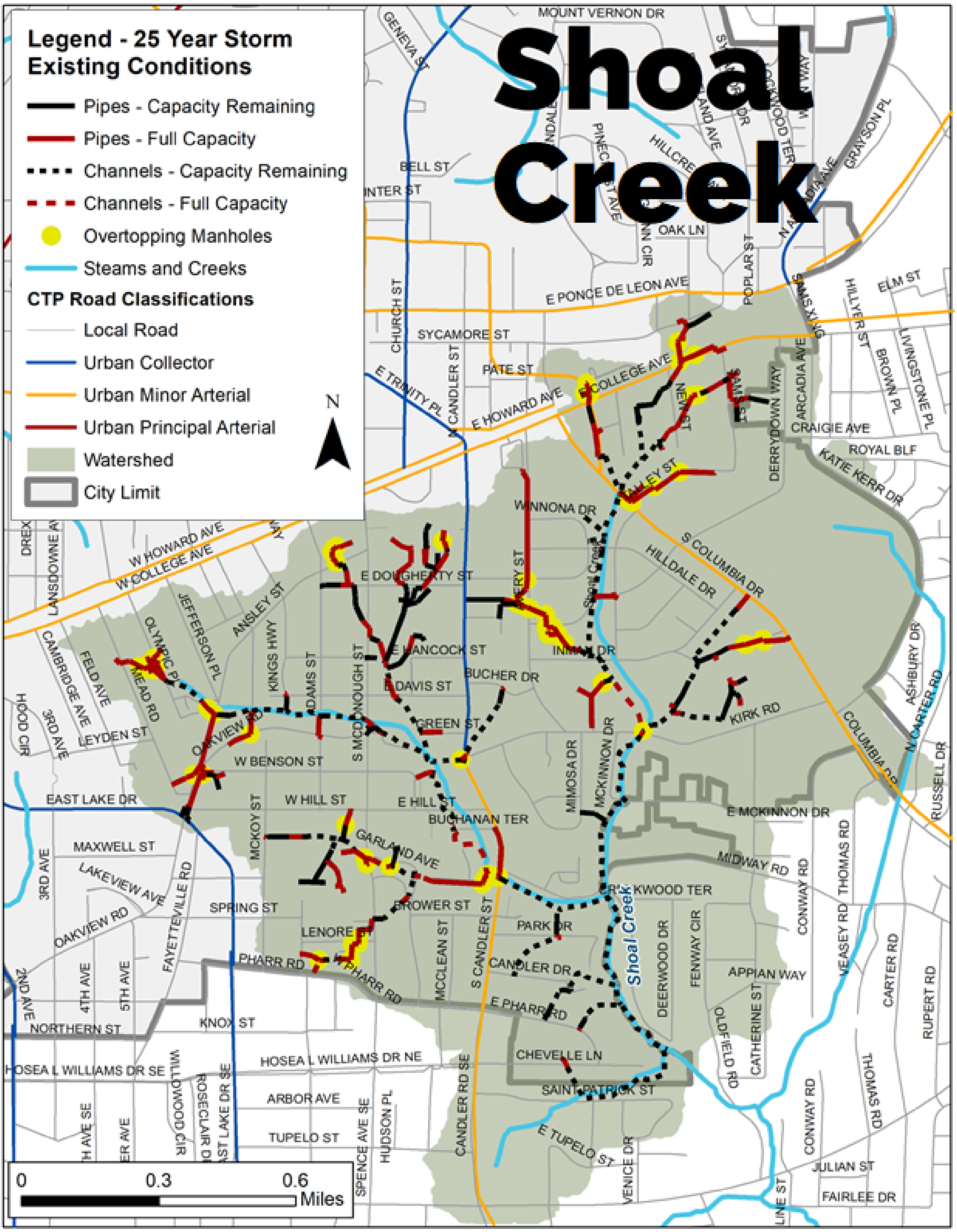


Figure 3-16: Shoal Creek Watershed Performance during 25-year/24-hour Storm



Sugar Creek Watershed: Figures 3-17 and 3-18 show the modeled locations of flooding within the Sugar Creek watershed for the 6-hour Critical storm and 25-year/24-hour design storm events. Locations of flooding that are common to both design storm events are listed below:

- Intersection of Oakview Rd NE and Underwood Street

In addition to the above, there are additional locations that were modeled to flood during the 25-year design storm event as summarized below:

- South of W Pharr Road and along Fayetteville Road
- North of East Lake Drive
- East of 2nd Avenue NE along the major system

Figure 3-17: Sugar Creek Watershed Performance during Critical Storm

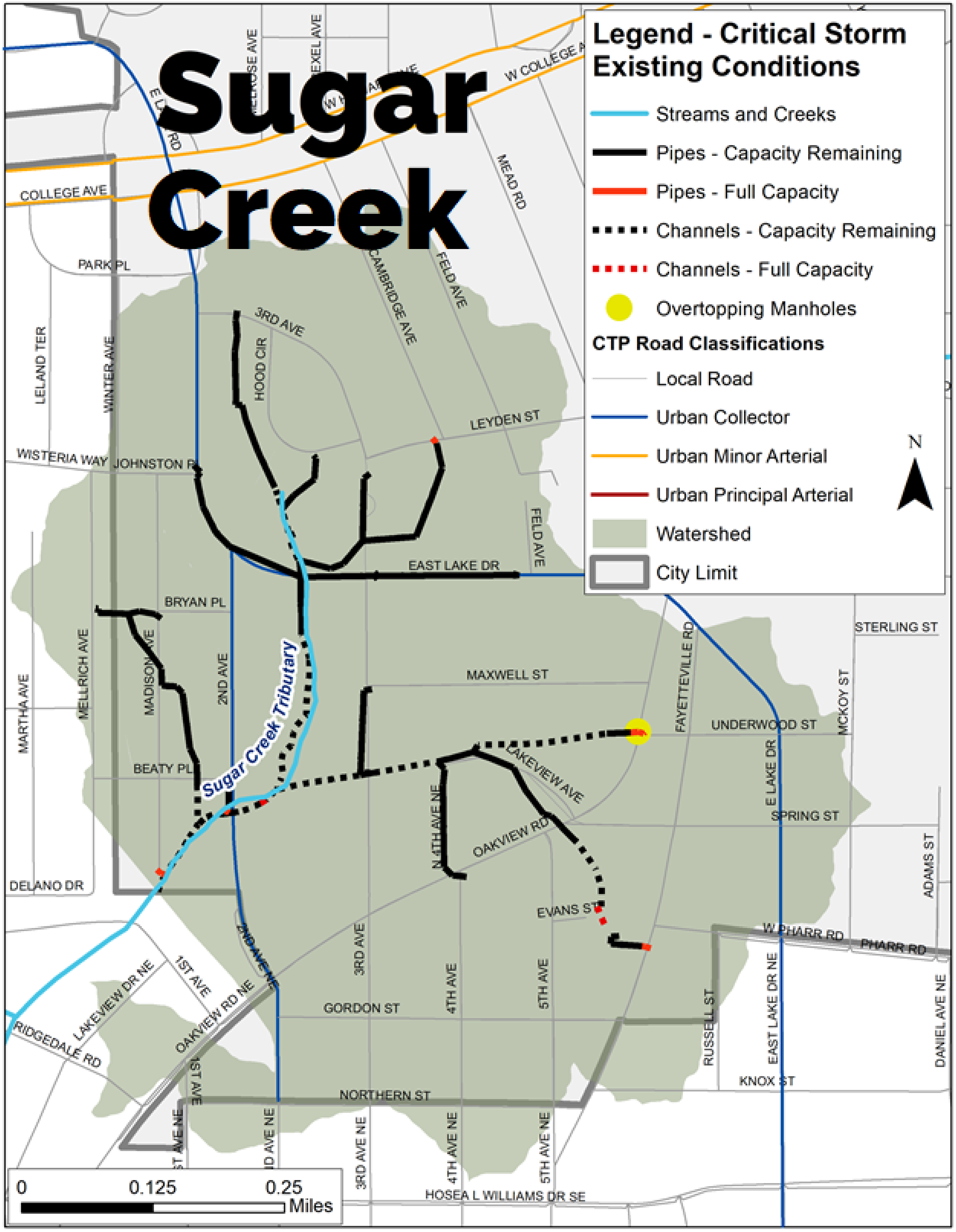
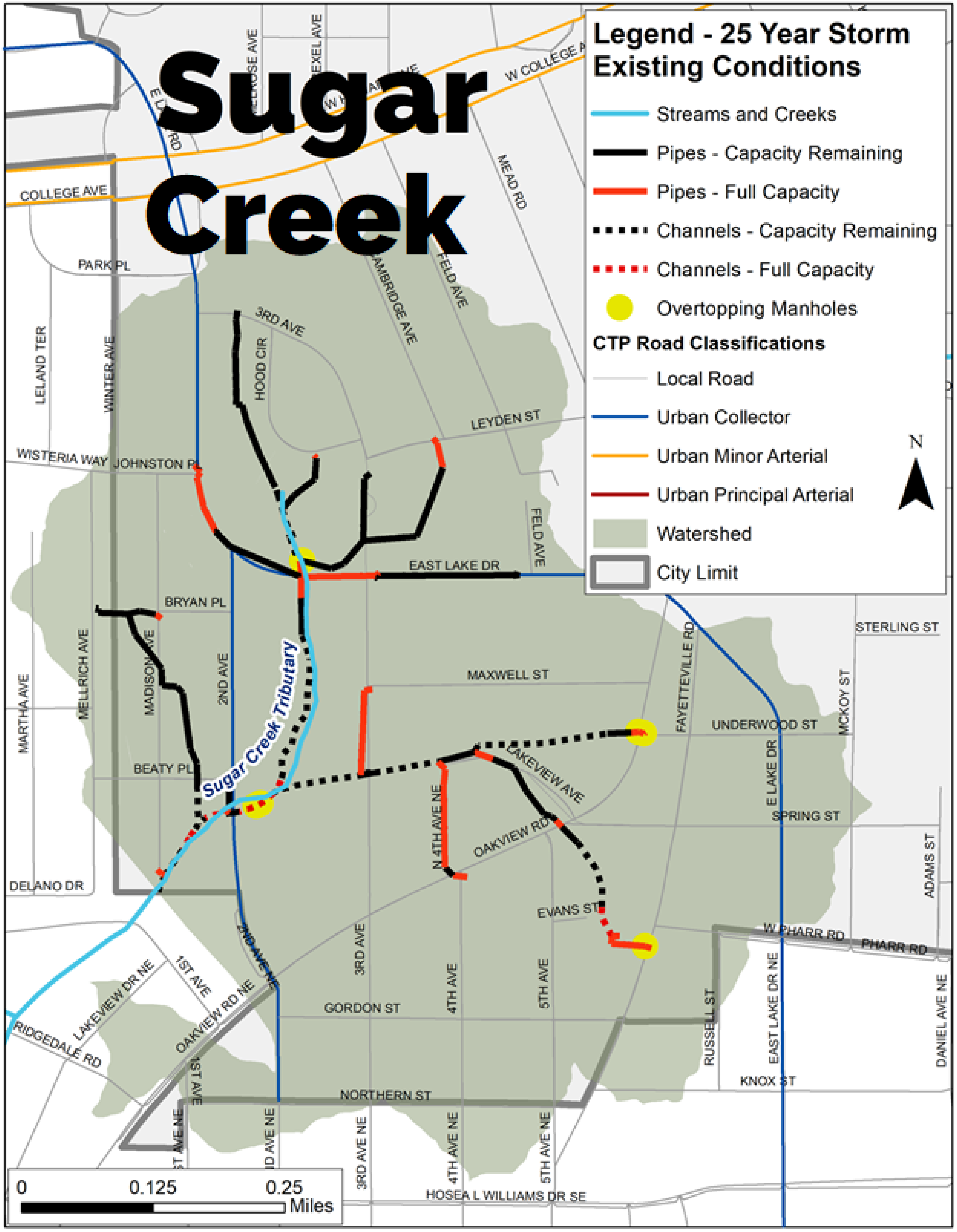


Figure 3-18: Sugar Creek Watershed Performance during 25-year/24-hour Storm



Peavine Creek Watershed: Figures 3-19 and 3-20 show the modeled locations of flooding across the Peavine Creek watershed for the 6-hour Critical storm and 25-year/24-hour design storm events. Locations of flooding that are common to both design storm events are listed below:

- Intersection of Upland and Ponce De Leon
- Along Hibernia

In addition to the above, there are additional locations that were modeled to flood during the 25-year design storm event as summarized below:

- Between Northern and Fairview
- Along Ponce De Leon
- Across Electric
- North of Beaumont
- Between Lorene and Merrill
- Along Scott and North of Garden
- Along Chelsea

Figure 3-19: Peavine Creek Watershed Performance during Critical Storm

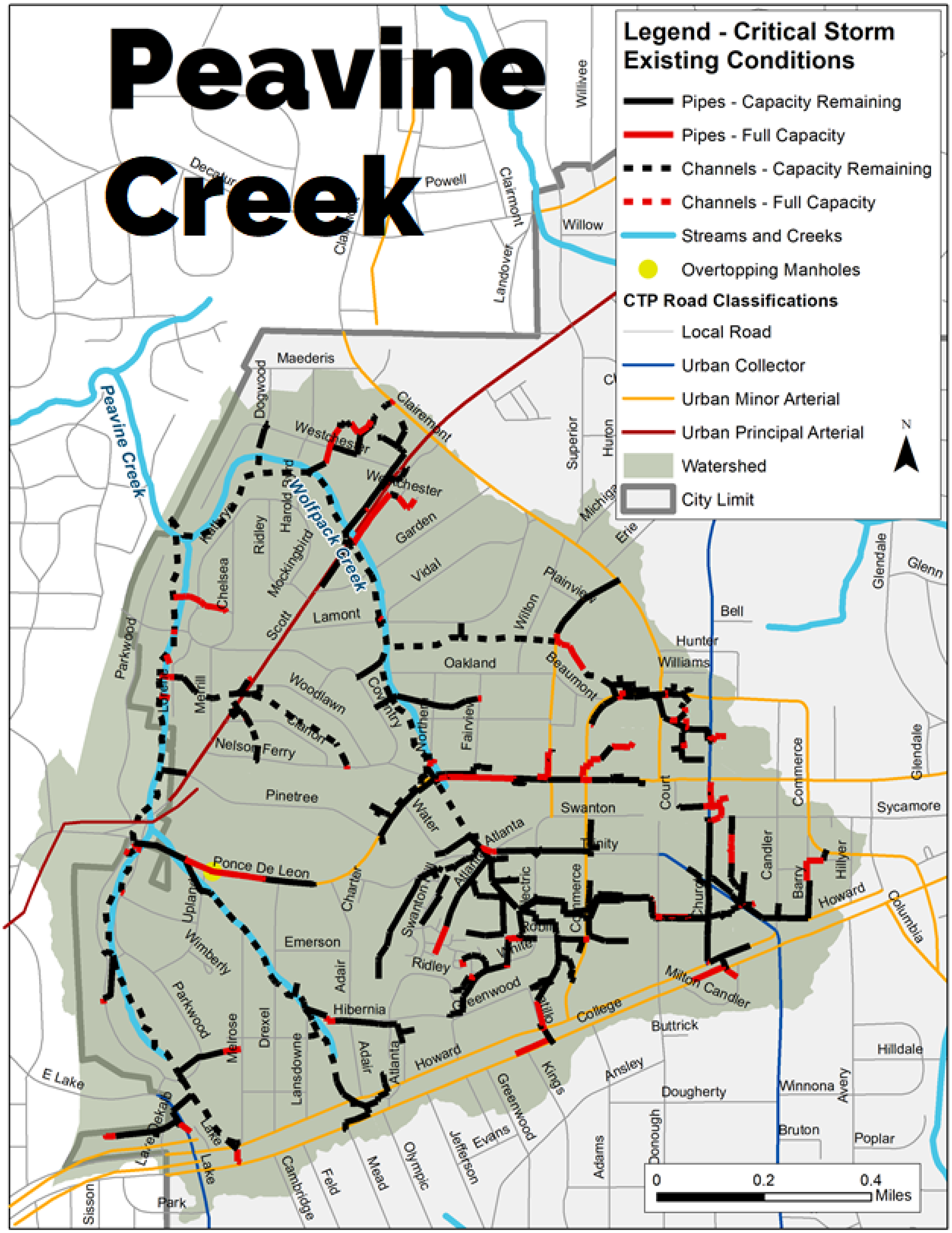
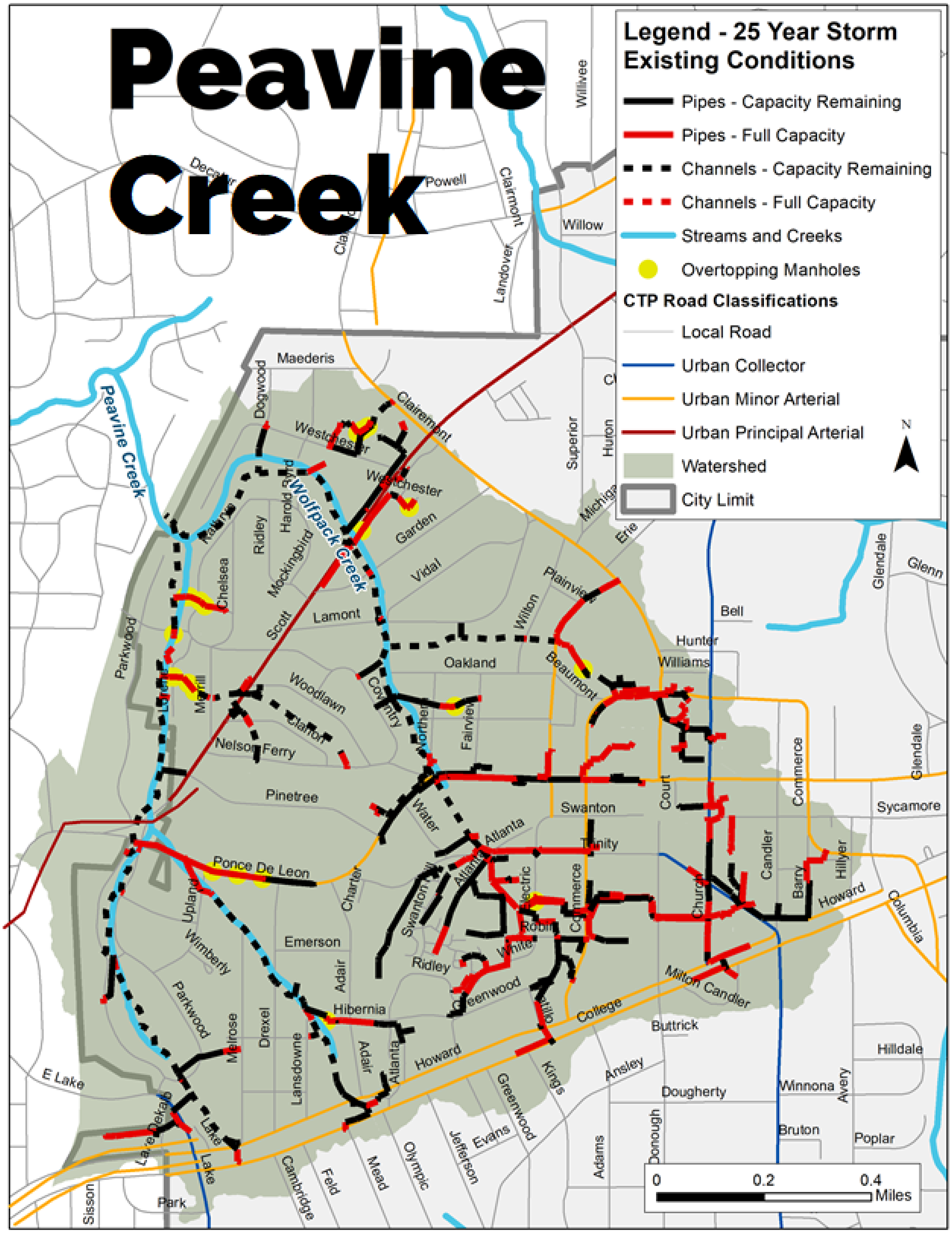


Figure 3-20: Peavine Creek Watershed Performance during 25-year/24-hour Storm



South Fork Peachtree Creek Watershed: Figures 3-21 and 3-22 show the modeled locations of flooding across the South Fork Peachtree Creek watershed for the 6-hour Critical storm and 25-year/24-hour design storm events. No flooding is anticipated within South Fork Peachtree Creek Watershed for the Critical storm event but there are locations that were modeled to flood during the 25-year design storm event as summarized below:

- Crossing Landover Drive
- North of Scott Blvd and South of Willow Lane
- Intersection of Willow Lane and Eastland Drive
- Crossing Mount Vernon Drive
- West of Glendale Avenue and North of E Ponce De Leon Ave
- North of E Ponce De Leon Ave

For all watersheds, all the nodes shown on the figures as flooding may not experience flooding at the same time. Appendix F provides more detailed results for each node such as the:

- Maximum hydraulic grade line (predicted water level)
- Warning stage (elevation at which water is above the ground surface)
- Flooding depths
- Maximum flow rate, and
- Maximum velocity.

Figure 3-21: South Fork Peachtree Creek Watershed Performance during Critical Storm

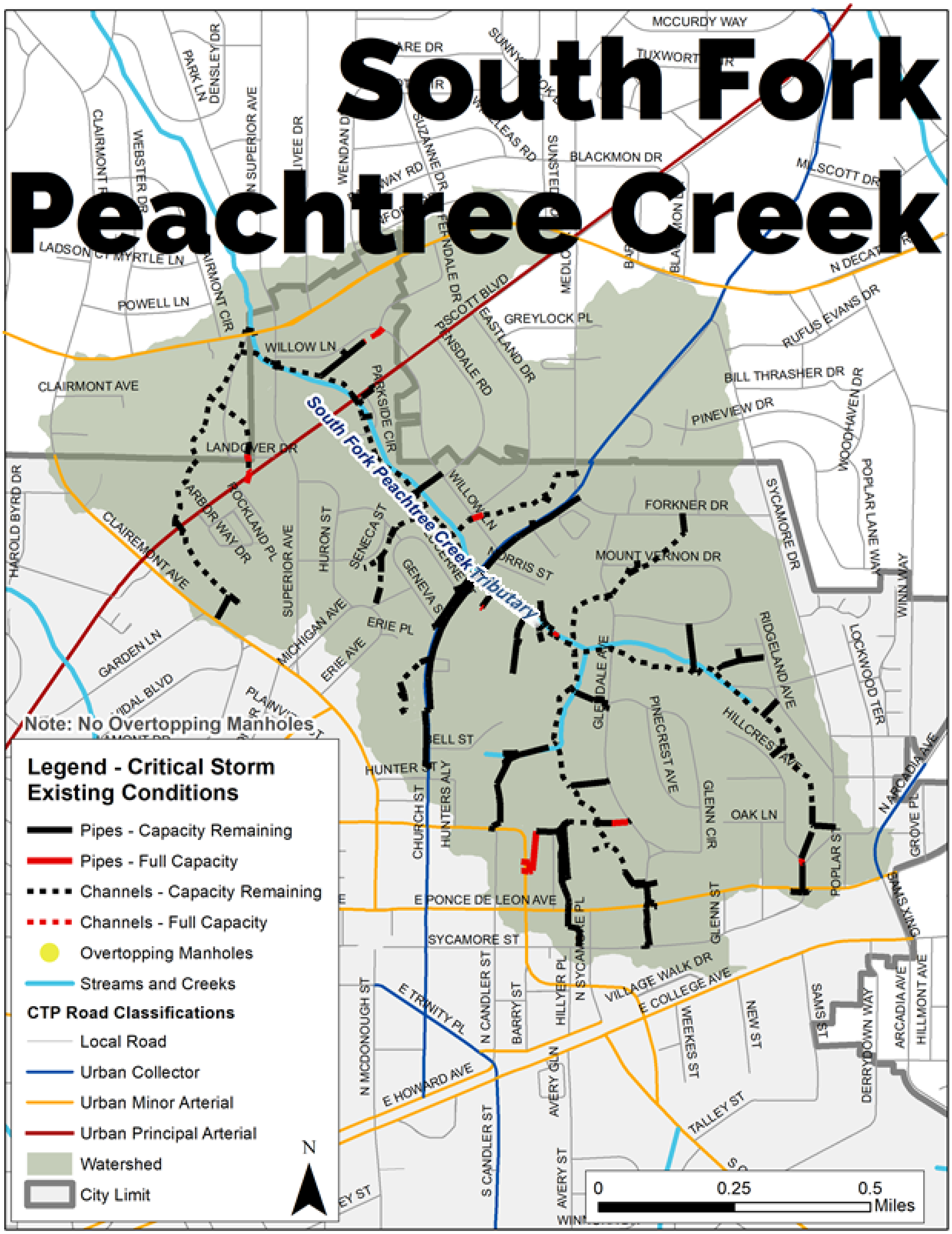
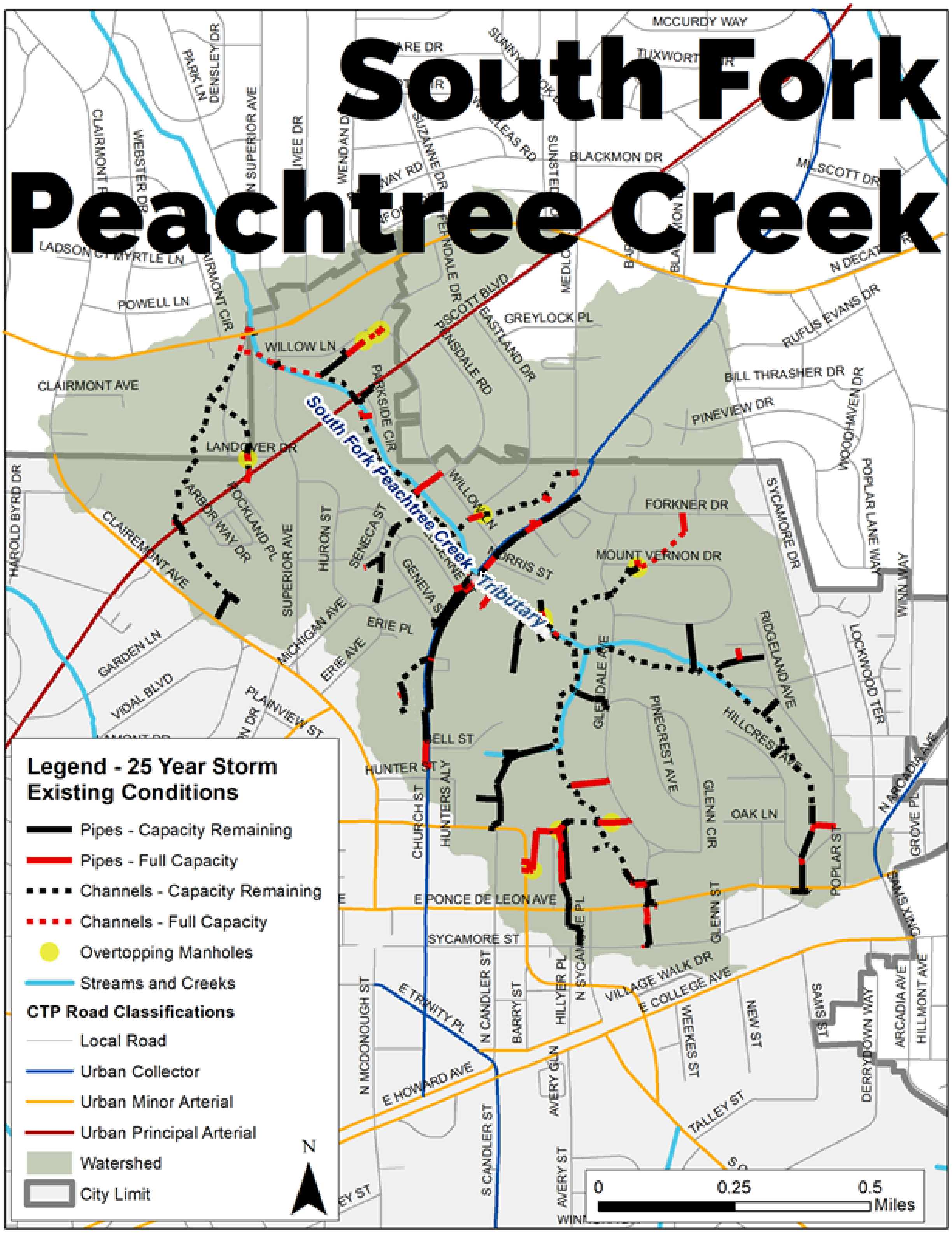


Figure 3-22: South Fork Peachtree Creek Watershed Performance during 25-year/24-hour Storm



4. LEVEL OF SERVICE AND DESIGN STANDARDS RECOMMENDATIONS

4.1 Storm Water Management Level of Service

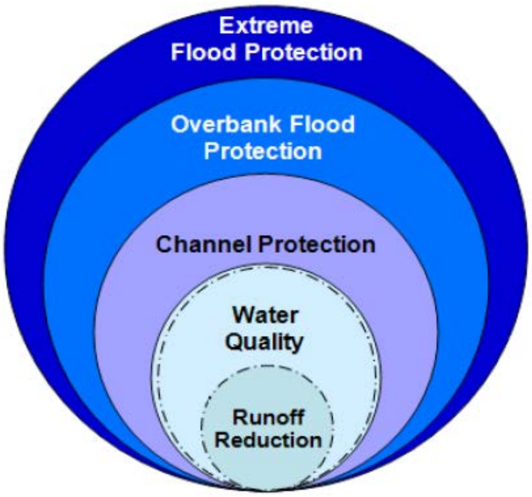
The Level of Service (LOS) standards are expectations of how the system will perform under various numeric design criteria. LOS expectations for new development in the City is set based on the standards of the Georgia Storm Water Management Manual (GSMM), which is also known as the “Blue Book.” This manual specifies state storm water management performance standards. The GSMM provides an integrated approach to address both quality and quantity issues associated with storm water runoff. The standards in the GSMM are recommended for all communities in Georgia and can be adopted by local jurisdictions as storm water management development requirements or modified to meet local or watershed-specific storm water management goals and objectives.

According to the 2016 GSMM, storm water management standards are intended to apply to any development site that meets one or more of the following criteria:

1. New development that includes the creation or addition of 5,000 square feet or greater of new impervious surface area, or that involves land disturbing activity of 5,000 square feet or more of land. New development is defined as land disturbing activities, structural development (construction, installation or expansion of a building or other structure), and/or creation of impervious surfaces on a previously undeveloped site.
2. Redevelopment that includes the creation or addition of 5,000 square feet or greater of new impervious surface area, or that involves land disturbing activity of 1 acre or more. Redevelopment is defined as structural development, creation or addition of impervious surfaces, and land disturbing activities associated with structural or impervious development.
3. Any commercial or industrial new development or redevelopment, regardless of size, that is considered a “Hotspot” land use. Hotspot land use is a land use with a Standard Industrial Classification (SIC) code that falls under the NPDES Industrial Storm Water Permit program, or a land use or activity on a site that produces higher concentrations of trace metals, hydrocarbons or other priority pollutants than are normally found in urban storm water runoff. Examples of hotspot land uses include gas stations, vehicle service and maintenance areas, salvage yards, material storage sites, garbage transfer facilities, and commercial parking lots with high-intensity use.

Developments that meet the above criteria should comply with the guidelines of the Unified Sizing Criteria for storm water management. These criteria are show in Figure 4-1 and Table 4-1.

Figure 4-1: Unified Storm Water Sizing Criteria Storage Graphic



Reference: GSMM, 2016 edition

Table 4-1: Unified Storm Water Sizing Criteria Definitions

Sizing Criteria		Description
Water Quality	Runoff Reduction, RR_v (Standard #3)	Retain or reduce the runoff for the first 1.0 inch of rainfall, or to the maximum extent practicable. Since runoff reduction practices eliminate stormwater runoff, and the pollutants associated with it, rather than treating or detaining, they can contribute to other stormwater management standards. If the entire 1.0 inch runoff reduction cannot be achieved, the remaining runoff from the 1.2 inch rainfall must be treated, as described in Standard #4.
	Treatment, WQ_v (Standard #4)	Retain or treat the runoff from 85% of the storms that occur in an average year. For Georgia, this equates to providing water quality treatment for the runoff resulting from a rainfall depth of 1.2 inches. The water quality treatment goal is to reduce average annual post-development total suspended solids loadings by 80%.
Channel Protection		Provide extended detention of the 1-year, 24 hour storm event released over a period of 24 hours to reduce bankfull flows and protect downstream channels from erosive velocities and unstable conditions.
Overbank Flood Protection		Provide peak discharge control of the 25-year, 24 hour storm event such that the post-development peak rate does not exceed the predevelopment rate to reduce overbank flooding.
Extreme Flood Protection		Evaluate the effects of the 100-year, 24 hour storm on the stormwater management system, adjacent property, and downstream facilities and property. Manage the impacts of the extreme storm event through detention controls and/or floodplain management.

Reference: GSMM, 2016 edition

Runoff reduction was added to the GSMM as an additional sizing criterion in the 2016 manual update and was incorporated into the City's NPDES Permit Requirements in 2019. The City is required to incorporate runoff reduction for all development projects by December 10, 2020. Runoff reduction practices focus on infiltration and elimination of storm water discharges and associated pollutants for the first 1.0-inch of rainfall. If the entire 1.0-inch runoff reduction volume cannot be infiltrated on-site, the remaining runoff from the 1.2-inch rainfall must be treated with other storm water management practices.

4.1.1 City of Decatur – Existing Ordinance

Storm water requirements for the City of Decatur are addressed in Article 9 of the City's Unified Development Ordinance (UDO). In its requirements, the City uses the GSMM Unified Sizing Criteria, described above, for storm water management. The City has adopted the Water Quality, Channel Protection, Overbank Flood Protection, and Extreme Flood Protection criteria as presented in Table 4-1. The Runoff Reduction Sizing Criteria from the GSMM is not currently included in the City's storm water requirements, but runoff reduction practices can be used to meet the Water Quality treatment requirements per the City's Storm Water Management Policy Guidelines (November 5, 2014). Table 4-2 highlights the development thresholds that trigger each storm water mitigation level according to the City of Decatur's Code of Ordinances, PART IV – Unified Development Ordinance (UDO), Article 9. – Environmental Protection, Section 9.3 – Storm Water Management (December 4, 2014).

Table 4-2: Existing Storm Water Mitigation Requirements

<table>
<tr><th colspan="2">Unified Sizing Criteria Treatment Level</th><th>Trigger</th></tr>
<tr><td rowspan="2">Water Quality</td><td>Runoff Reduction/Infiltration</td><td>Not currently required in the UDO</td></tr>
<tr><td>Water Quality Treatment</td><td>Creation, addition, and/or replacement of impervious area that is 5,000 square feet or more for non-single-family residential projects.</td></tr>
<tr><td colspan="2">Channel Protection</td><td rowspan="3">Runoff increase of more than 0.55 cubic feet per second (cfs) from the pre-development runoff during a 10-year storm event. This includes both single-family residential and non-single-family residential projects.</td></tr>
<tr><td colspan="2">Overbank Flood Protection</td></tr>
<tr><td colspan="2">Extreme Flood Protection</td></tr>
</table>

The City also requires that an area should be considered in its natural undeveloped state when assessing the pre-developed condition for storm water management performance criteria evaluations, even if a property is undergoing redevelopment. Also, when the overbank and extreme flood protection storm water management criteria apply, runoff must be attenuated to 90% of the natural undeveloped runoff level for all the following storms: 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year.

4.1.2 Metropolitan North Georgia Planning District Model Ordinance

The City is a member of the Metropolitan North Georgia Water Planning District (MNGWPD). The District has a model ordinance for Post-Development Storm Water Management which applies to new development and redevelopment. Most jurisdictions in the metro Atlanta region use the requirements of this model ordinance as a framework for their local storm water ordinances.

The model ordinance was recently updated by the District (December 2019). The updates to the model ordinance incorporate the Runoff Reduction/Infiltration Criteria of the GSMM described above from the 2016 GSMM. As a member of the District, the City is required to be consistent with this ordinance, including the recent update.

The model ordinance recommends site development triggers that match the GSMM, but also allows communities to set these triggers at lower levels of development at their discretion. A summary of implementation triggers adopted for communities across the District are included in the Ordinance Review Memo included as **Appendix A**.

4.1.3 Suggested Ordinance Modifications

It is recommended that the City adopt the latest MNGWPD Post-Construction Storm Water Management Ordinance that includes incorporation of Runoff Reduction/Infiltration Criteria consistent with the 2016 revision to the Georgia Storm Water Management Manual.

Impervious surfaces across the City have substantially increased in recent years, as discussed in **Section 2.6.** Storm water issues have been reported across the City, particularly in the residential areas (see **Figure 2-4**). To mitigate increases in impervious cover, additional modifications to the storm water mitigation thresholds in the City's storm water regulations are recommended based on of comparison of ordinances thresholds in other jurisdictions and public input. Suggested thresholds for unified sizing criteria for storm water management are described in **Table 4-3.** These will be applied through ordinance revisions that will be applied to new development and redevelopment projects.

Table 4-3: Proposed Storm Water Mitigation Requirements

<table>
<tr><th colspan="2">Unified Sizing Criteria Treatment Level</th><th>Existing Trigger</th><th>Proposed Trigger</th></tr>
<tr><td rowspan="2">Water Quality</td><td>Runoff Reduction/Infiltration</td><td>Not currently required in the UDO</td><td>• Creation, addition, and/or replacement, of 500 square feet or more for single-family residential construction
• Creation of any new impervious area for developments outside of single-family residential construction
• Replacement of 500 square feet or more of impervious area for developments outside of single-family residential construction</td></tr>
<tr><td>Water Quality Treatment</td><td>Creation, addition, and/or replacement of impervious area that is 5,000 square feet more.</td><td>Allowed where runoff reduction is proven infeasible</td></tr>
<tr><td colspan="2">Channel Protection</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td colspan="2">Overbank Flood Protection</td></tr>
</table>

Unified Sizing Criteria Treatment Level	Existing Trigger	Proposed Trigger
Extreme Flood Protection	Runoff increase of more than 0.55 cfs from the pre-development runoff during a 10-year storm event	Runoff increase of more than 0.55 cfs from the pre-development runoff during a 10-year storm event

Additionally, based on public input, the City should define common runoff coefficients to be used in hydrologic and hydrologic analysis for new development and redevelopment. Currently selection of these coefficients is at the engineer's discretion. The addition of these coefficients within the post-construction storm water management ordinance will help standardize application of the imperviousness factor for common land covers.

4.1.4 Infiltration Practicability

Runoff reduction practices provide important water quality benefits, but certain conditions, such as soils with very low infiltration rates, high groundwater, or shallow bedrock, may justify waiving or reducing the runoff reduction requirement. A practicability policy should be adopted to provide guidance about the conditions and supporting documentation that could justify a runoff reduction "Determination of Infeasibility." The MNGWPD has developed sample practicability criteria for the region, in consulting this document and other recent local implementation experience, some recommended practicability criteria are included in **Appendix G** which includes review of the following factors:

- Depth to groundwater and potential for recharge
- Depth to and type of rock
- Site slopes
- Permeability of soils
- Floodplains
- Proximity to building and property lines
- Previous contamination
- Proximity to historic resources
- Economic hardship

4.2 Design Standard Recommendations

The Level of Service (LOS) refers to the standard condition, capacity, and performance of the storm water system. LOS is an important component of storm water management as it dictates the standard sizing of inlets and piped systems that are installed by the City and private entities whenever new storm water infrastructure is constructed. A summary of LOS for similar communities and agencies is included in the Ordinance Review Memo included as **Appendix A.**

The City should consider codifying LOS standards within its UDO; currently the Georgia Storm Water Management Manual is referenced as the design standard, but this manual only includes a range of potential design storms for consideration in infrastructure sizing. LOS recommendations include:

- 25-year/24-hour design standard for pipes and inlets
- 50-year/24-hour design standard for pipes in inlets along State Routes (GDOT standard)
- Hydraulic Grade Line (HGL) should remain below the surface of the road for the above storm events

The above LOS design standards should be added to the "Drainage System Guidelines" in Section 9.3.5 of the UDO.

Proposed improvements for this study, described in Section 5, were based on meeting the following LOS criteria:

- No roadway flooding for the Critical storm (2.2 inches/ 6-hour Critical storm event)
- No roadway flooding along major arterials (as defined in the Community Transportation Plan) for the 25-year/24-hour design storm event

5. STORM WATER MANAGEMENT IMPROVEMENT PROJECTS

This section lists potential storm water infrastructure improvement recommendations on a sub-basin level. We combine the model results, which identified areas of flooding, with the local inlet capacity assessment, and the list of areas of known concerns (identified by City staff and residents) to suggest areas where future storm water infrastructure improvements are needed.

5.1 Modeled System

Using the model results, we identified areas of the City with existing storm water infrastructure that may experience flooding. Flooding indicates a need for infrastructure improvements, which are suggested in this section. Later sections consider additional improvements needed to address inadequate (or missing) existing storm water infrastructure or infrastructure in areas with known concerns.

Flooding locations for each watershed were determined based on the existing conditions model results. Based on these flooding locations, surface water management improvement projects were proposed to meet the recommended Level of Service (LOS) criterion. These proposed improvements projects were analyzed in a proposed conditions model for each LOS.

Capital Improvement Projects (CIPs) are defined as improvements required to not only restore the function but also solve flooding issues. These projects mainly focus on increasing the capacity of the system. Some of the proposed projects considered in this plan would make the following types of improvements to the City's storm water system:

- Provide storm water storage facilities such as retention and detention systems to capture and retain or detain excess storm waters and reduce downstream peak discharge rates.
- Provide an enhanced conveyance system, through channel and structure improvements, which increases the hydraulic efficiency of the drainage system and reduces peak flood elevations.
- Raise the elevation of a roadway to detain the flood waters upstream thereby limiting the downstream discharge rates and reducing peak flood elevations.
- Add in-line check valves to control the flow direction and limit the storm water system backups from downstream areas.

The proposed improvements may not be adequate to solve all of the City's flooding problems for the 25-year/24-hour storm; however, these improvements will help to alleviate the flooding that is currently experienced in the watershed for the 6-hour critical storm.

5.1.1 Constraints, Limitations and Assumptions

To recommend surface water management improvement projects, the following list of constraints, limitations, and assumptions were considered prior to the selection of proposed projects:

- The post-development flowrate should be less than or equal to the pre-development flowrate at the point of discharge.
- No adverse impacts, either upstream or downstream, should result from the proposed improvements within the watershed. This means the maximum stage should be less than the existing or warning stage (see Section 3.3.5).

5.1.2 Selection Criteria

In addition to the constraints, limitations and assumptions, the selection of surface water management improvement projects was also based on the following criteria:

- Meeting the 6-hour critical storm criteria had a higher priority
- Maximizing the benefit on the 25-year LOS criterion
- Availability of City-owned lands for storage facilities within the watershed
- Availability of open/vacant lands within the watershed for additional storage
- Availability of rights-of-way and drainage easements
- Cost-benefit consideration for the proposed surface water improvements

5.1.3 Capital Improvement Project Recommendations

Shoal Creek Watershed

Table 5-1 presents a listing of road names along the primary drainage system that show flooding and fail to meet the Level of Service in the existing condition model results for the Critical storm and 25-year/24-hour design storm events (as defined in Section 3), and how the proposed projects improved the drainage system. This table identifies the roadway classifications per the Community Transportation Plan as well as the modeled performance of the system under the critical storm and 25-year LOS criteria.

Table 5-1: Shoal Creek Watershed - Existing and Proposed Conditions

Road Name	Road Classification	LOS (Pass/Fail)			
		Existing Conditions		Proposed Conditions	
		Critical Storm	25-Year/24-Hour	Critical Storm	25-Year/24-Hour
E College Ave[1]	Urban Minor Arterial	Fail	Fail	Pass	Pass
S Columbia Dr	Urban Minor Arterial	Fail	Fail	Pass	Pass
S Candler St[1]	Urban Minor Arterial	Fail	Fail	Pass	Fail
E Trinity Pl	Urban Collector	Pass	Fail	Pass	Pass

1. State Route – GDOT owned storm water conveyance

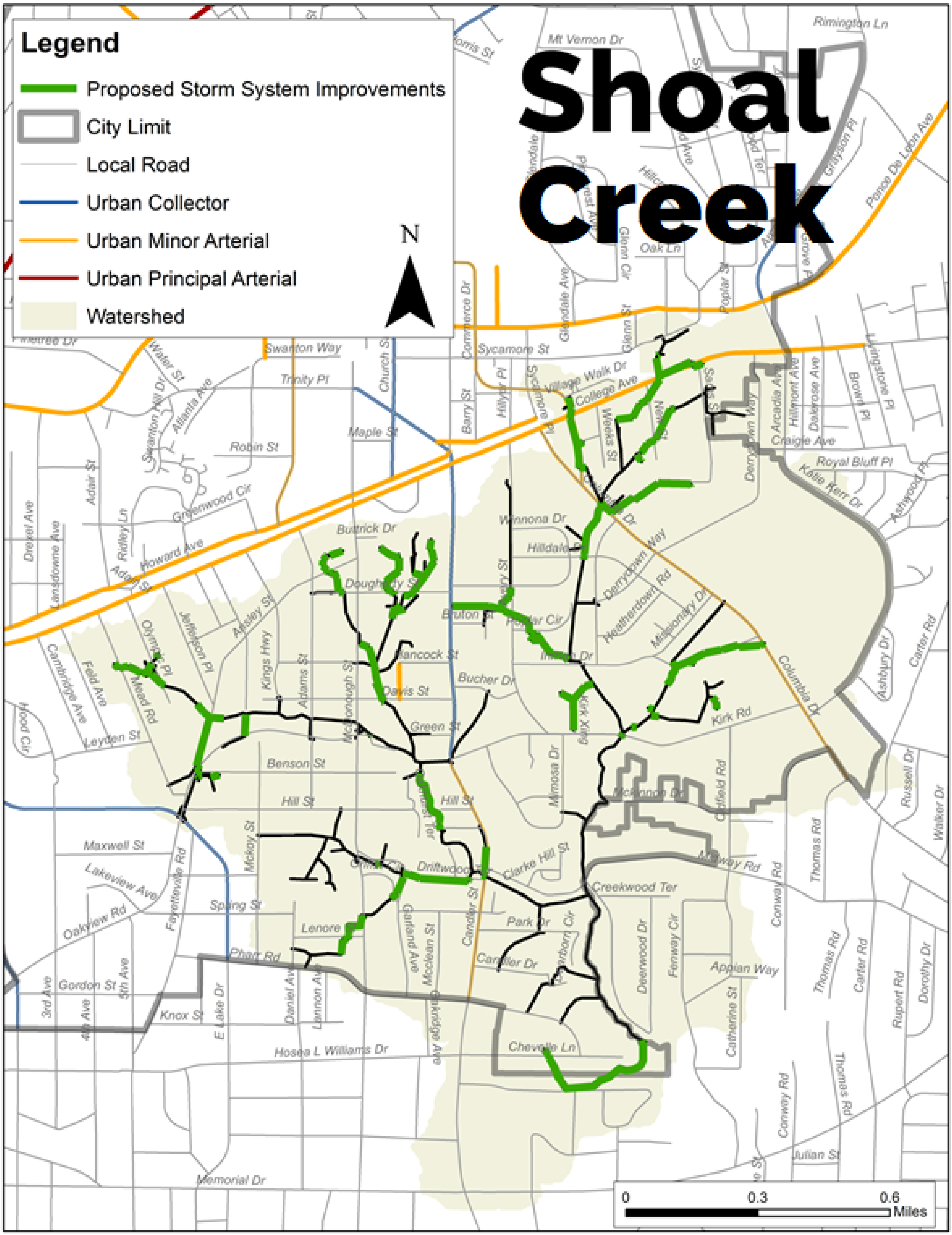
To address flooding and meet the LOS criteria, the following capital improvement projects are suggested for Shoal Creek Watershed based on the model analysis:

- 18,800 linear feet of existing storm water pipe replaced with increased diameter pipe ranging between 2.0 feet and 6.0 feet
- 3,900 linear feet of channels widened
- Additional storage of 4 acres for an average depth of 3 feet

The proposed condition results show all the roadways meet the intended Level of Service criteria for the Critical Design Storm event. However, for the 25-year/24-hour design storm event, one roadway (S. Candler Street) within the Shoal Creek Watershed does not meet the intended Level of Service criteria in the proposed conditions model results. The recommended improvements are based on the 25-year/24-hour storm, so even if the improvements do not completely eliminate the flooding for the 25-year/24-hour storm, they will eliminate or greatly reduce it for the higher frequency storms (smaller storms). Similarly, the benefits of improvement will apply to lower frequency storms (larger storms) by reducing the severity of flooding during larger storm events.

Figure 5-1 graphically represents the location of these improvements.

Figure 5-1: Shoal Creek Model Improvements



Sugar Creek Watershed

Table 5-2 presents a listing of road names in the Sugar Creek Watershed along the primary drainage system that show flooding and fail to meet the Level of Service in the existing condition model results for the critical storm and 25-year/24-hour design storm events (as defined in **Section 3**), and how the proposed conditions improved the drainage system. This table identifies the roadway classifications per the Community Transportation Plan as well as the modeled performance of the system under the critical storm and 25-year LOS criteria.

Table 5-2: Sugar Creek Watershed – Existing and Proposed Conditions

Road Name	Road Classification	LOS (Pass/Fail)			
		Existing Conditions		Proposed Conditions	
		Critical Storm	25-Year/24-Hour	Critical Storm	25-Year/24-Hour
East Lake Dr	Urban Collector	Pass	Fail	Pass	Pass
2nd Ave	Urban Collector	Pass	Fail	Pass	Pass

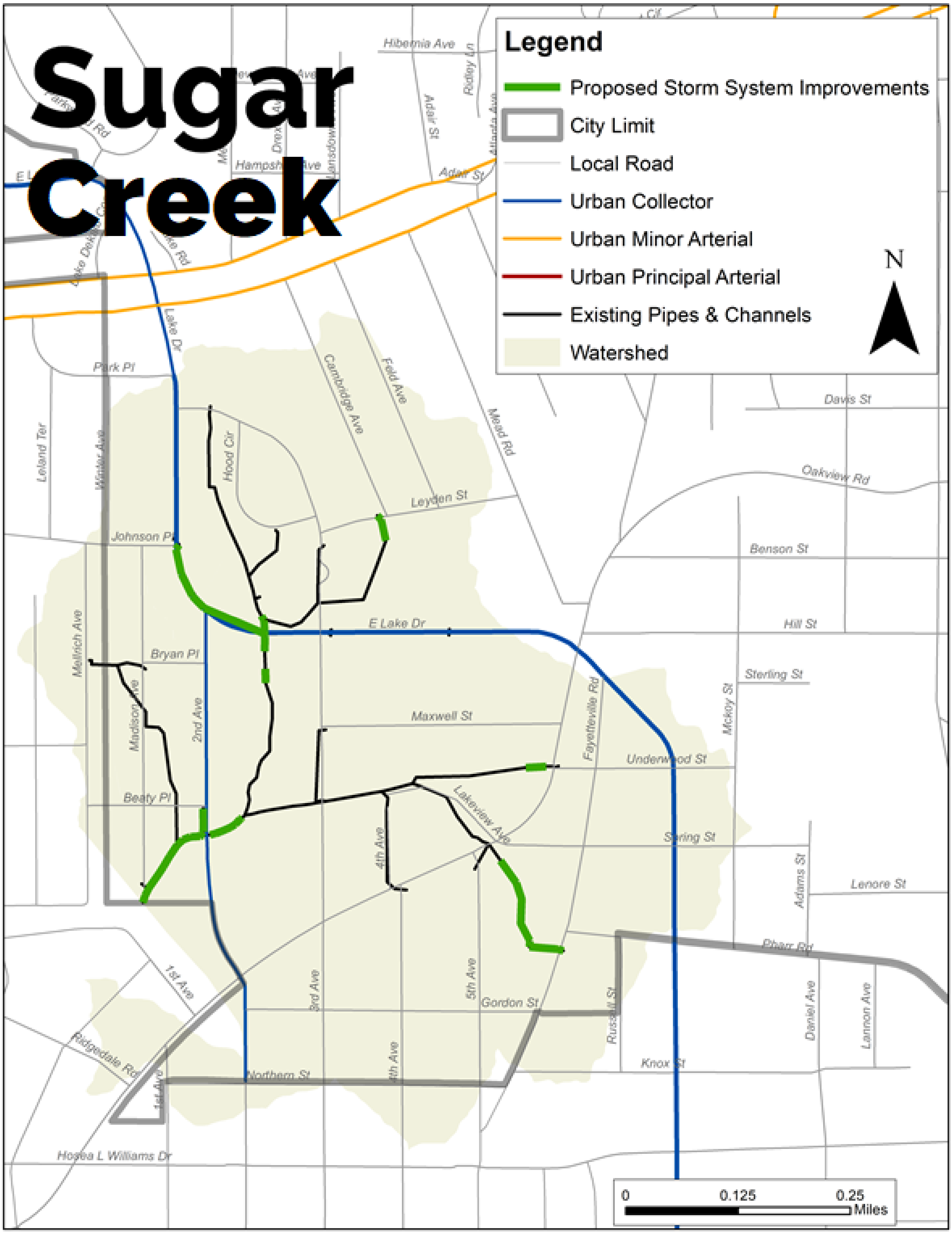
To address the flooding and meet the LOS criteria, the following capital improvement projects are suggested for Sugar Creek Watershed based on the model analysis:

- 3,600 linear feet of existing storm water pipe replaced with increased diameter pipe ranging between 2.0 feet and 5.0 feet 2,650 linear feet of channels widened
- No additional storage required for Sugar Creek Watershed

With the proposed enhancements, all of the roadways meet the intended LOS criteria for Critical Design Storm event and the 25-year/24-hour design storm event.

Figure 5-2 graphically represents the location of these improvements.

Figure 5-2: Sugar Creek Model Improvements



Peavine Creek Watershed

Table 5-3 presents a listing of road names in the Peavine Creek Watershed along the primary drainage system that show flooding and fail to meet the Level of Service in the existing condition model results for the critical storm and 25-year/24-hour design storm events (as defined in **Section 3**), and how the proposed conditions improved the drainage system. This table identifies the roadway classifications per the Community Transportation Plan as well as the modeled performance of the system under the critical storm and 25-year LOS criteria.

Table 5-3: Peavine Creek Watershed – Existing and Proposed Conditions

Road Name	Road Classification	LOS (Pass/Fail)			
		Existing Conditions		Proposed Conditions	
		Critical Storm	25-Year/24-Hour	Critical Storm	25-Year/24-Hour
Ponce De Leon	Urban Minor Arterial	Fail	Fail	Pass	Pass
Scott Blvd[1]	Urban Principal Arterial	Pass	Fail	Pass	Pass

1. State Route – GDOT owned storm water conveyance

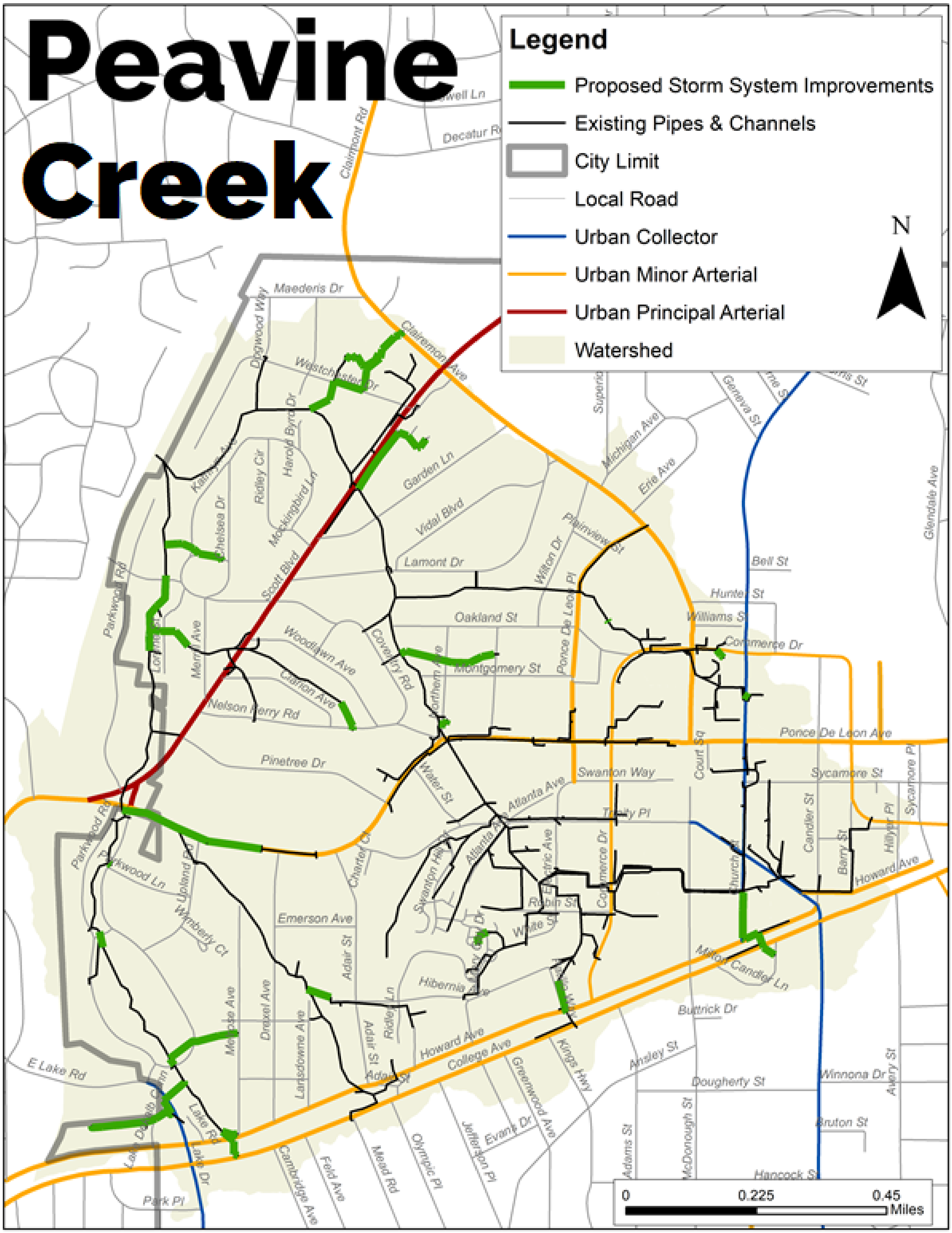
To address the flooding and meet the LOS criteria, the following capital improvement projects are suggested for Peavine Creek Watershed based on the model analysis:

- 10,400 linear feet of existing storm water pipe replaced with increased diameter pipe ranging between 2.0 to 4.5 feet
- 950 linear feet of channels widened
- Additional Storage of 4 ac for an average depth of 3 feet

With the proposed enhancements, all of the roadways meet the intended LOS criteria for Critical Design Storm event and the 25-year/24-hour design storm event.

Figure 5-3 graphically represents the location of these improvements.

Figure 5-3: Peavine Creek Model Improvements



South Fork Peachtree Creek Watershed

Table 5-1 presents a listing of road names along the primary drainage system that show flooding and fail to meet the Level of Service in the existing condition model results for the Critical storm and 25-year/24-hour design storm events (as defined in Section 3), and how the proposed projects improved the drainage system. This table identifies the roadway classifications per the Community Transportation Plan as well as the modeled performance of the system under the critical storm and 25-year LOS criteria.

Table 5-4 presents a listing of road names in the South Fork Peachtree Creek Watershed along the primary drainage system that show flooding and fail to meet the Level of Service in the existing condition model results for the critical storm and 25-year/24-hour design storm events (as defined in Section 3), and how the proposed conditions improved the drainage system. This table identifies the roadway classifications per the Community Transportation Plan as well as the modeled performance of the system under the critical storm and 25-year LOS criteria.

Table 5-4: South Fork Peachtree Creek Watershed - Existing and Proposed Conditions

Road Name	Road Classification	LOS (Pass/Fail)			
		Existing Conditions		Proposed Conditions	
		Critical Storm	25-Year/24-Hour	Critical Storm	25-Year/24-Hour
Scott Blvd[1]	Urban Principal Arterial	Pass	Fail	Pass	Pass
Commerce Dr	Urban Minor Arterial	Pass	Fail	Pass	Pass

1. State Route – GDOT owned storm water conveyance

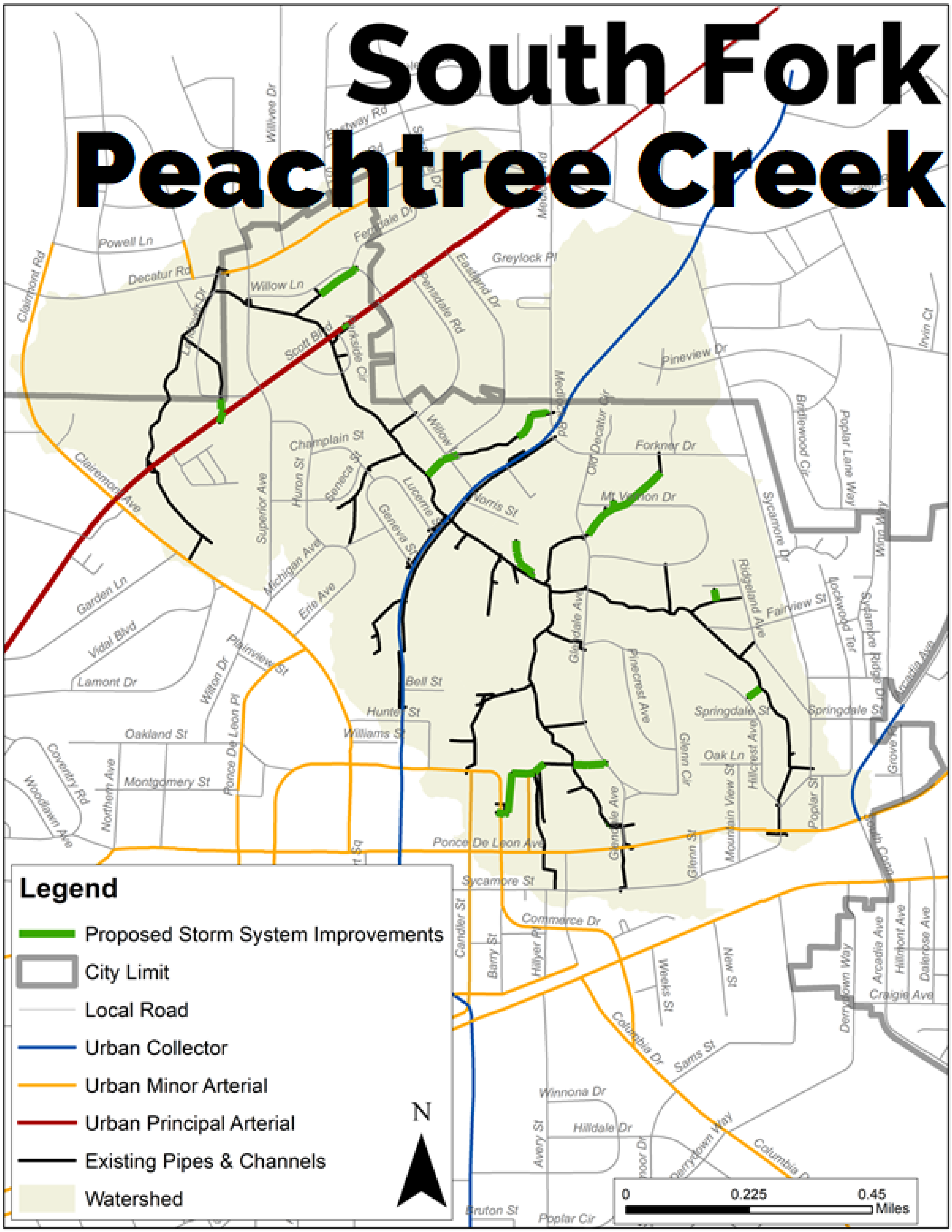
To address the flooding and meet the LOS criteria, the following capital improvement projects are suggested for South Fork Peachtree Creek Watershed based on the model analysis:

- 5,200 linear feet of existing storm water pipe replaced with increased diameter pipe ranging between 1.5 feet and 5.0 feet
- 3,600 linear feet of channels widened
- Additional storage of 2 acres for an average depth of 3 feet

With the proposed enhancements, all the roadways meet the intended LOS criteria for Critical Design Storm event and the 25-year/24-hour design storm event.

Figure 5-4 graphically represents the location of these improvements.

Figure 5-4: South Fork Peachtree Creek Model Improvements



Appendix H provides the node maximum stage comparison results between the existing and proposed conditions for critical storm and 25-year/24-hour design storm events along with warning stage. This data compares the modeled water levels to the structure and ground heights for both design events. In the proposed condition, flooding is reduced, or eliminated where possible, and there are no adverse impacts, i.e. flooding is not worsened in any area.

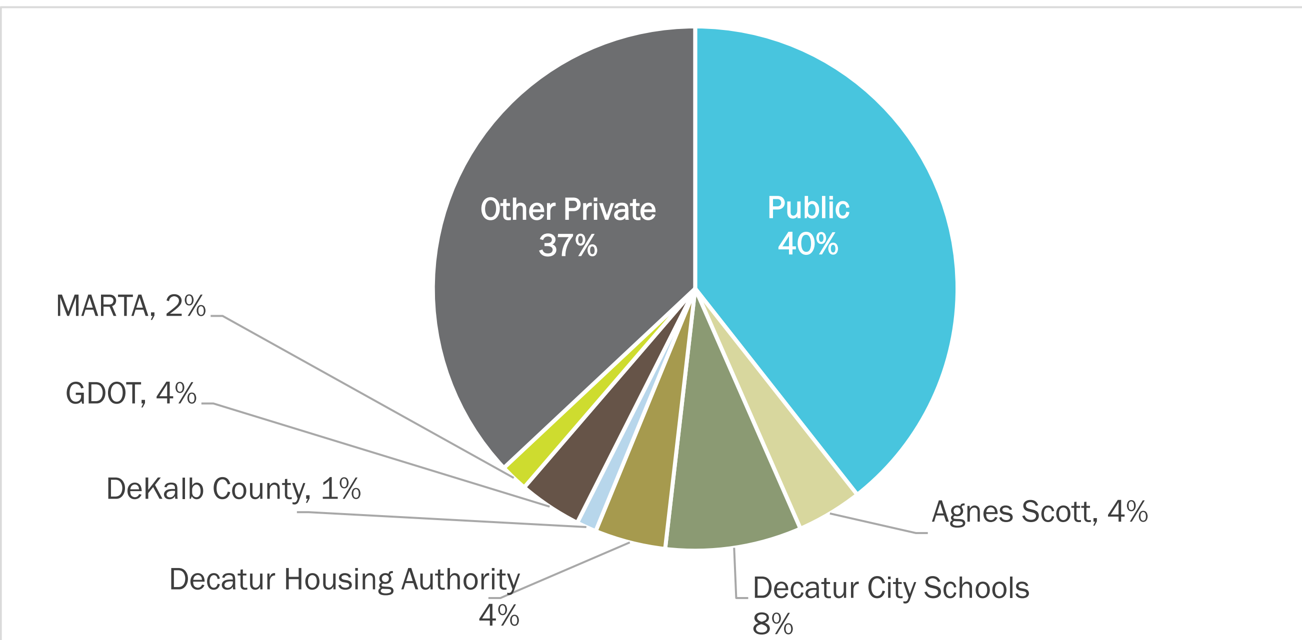
5.2 Public and Private Assets

The City's storm water inventory identifies nearly 50 miles of pipes and channels. Traditionally, the City of Decatur only maintains and repairs the infrastructure that it owns (E.G. within its right-of-way or dedicated easement) which is approximately 40% of the total storm water system in the City. The remaining components in the storm water system are owned by others and referred to as "private" though it is owned by a variety of entities, including institutions, other City entities (E.G. Decatur Housing Authority or Decatur City Schools), other government agencies (E.G., GDOT), and private owners. In this plan, infrastructure marked as "public" is owned by the City, and infrastructure marked as "private" is owned by other entities and individuals. A breakdown of ownership of the system is shown in **Table 5-5** and **Figure 5-5**. A map of the system with linear asset ownership is included in **Appendix I.**

Table 5-5: Storm Water System Ownership – Linear Assets

Ownership	Linear SW Assets (Ft)	% of City SW system
PUBLIC		
Public (City ROW)	103,745	39.5
PRIVATE		
Agnes Scott College	10,591	4.0
Decatur City Schools	22,071	8.4
Decatur Development Authority	339	0.1
Decatur Housing Authority	11,474	4.4
DeKalb County	3,238	1.2
GDOT	14,212	5.4
MARTA	2,559	1.0
Other Private	95,139	36.0
	262,836	**100.0**

Figure 5-5: Storm Water System Ownership – Linear Assets



5.2.1 Components that Convey Runoff from Multiple Properties

Part of the SWMP scope included a feasibility study for acceptance of private infrastructure. This assessment focused on storm water infrastructure that is privately-owned and privately maintained but conveys runoff from multiple properties.

A GIS analysis was performed to identify pipes that:

- Directly connects to a publicly owned pipe or right-of-way upstream or
- Collects and convey runoff from multiple properties or developments upstream

Pipes that were installed only to serve a specific development that were installed during a single development activity were considered single development pipes and not pipes that convey runoff from multiple properties. If the ownership of these pipes was not transferred to the City, it is assumed that the pipes are the responsibility of the development (homeowners association). This situation is commonly found in developments with privately-owned streets (E.G., Swanton Hill or Sycamore Station).

This analysis identified 491 private pipes (45,091 linear feet) that convey public runoff or runoff from multiple properties; this equates to about 47% of the private pipes in the City (17% of the City's storm water system).

5.2.2 Requests for Assistance with Maintenance and Repair

Part of the SWMP scope included an evaluation of storm water system components for which the City had received requests for assistance with maintenance and repair. In communication with the City, it was determined that the storm water concerns database generated during the SWMP update would be used as the basis for this evaluation.

Of the private pipes conveying public water, identified in 5.2.1 above:

- 255 pipes (23,173 linear feet) lie within an area with drainage concerns
  + 57 of these pipes (4,829 linear feet) are GDOT pipes
  + 71 of these pipes (6,619 linear feet) are associated with other agencies (e.g., Decatur Schools, DeKalb County) or developments (e.g., commercial, industrial, multifamily, or HOA with private utilities)
  + 127 of these pipes (11,725 linear feet) are owned by other private owners (e.g., single-family home property owners)

The 127 pipes owned by private single-family dwelling property owners generally were the storm water system components for which the City had received requests for assistance with maintenance and repair per the SWMP scope. These pipes were identified through public engagement, organizational meetings, complaints, and staff interviews. A map of these assets can be found in **Appendix I**. Eighteen (18) of these pipes, approximately 3,041 linear feet, are flagged in the inventory with survey location issues (i.e. could not be field located), and have estimated locations and lengths.

5.2.3 Evaluation of Assets Recommended for Acceptance

Based on the above assessments, AECOM recommends the City to consider an Extent of Service/Level of Service policy for its storm water system. This policy should include:

- Description of storm water assets owned and maintained by the City,
- Expectations for maintenance and service of privately-owned storm water infrastructure,
- Graphic depictions of ownership mapped for public understanding, and
- A new City policy for the evaluation of privately-owned assets for consideration of extension of service (i.e., acquisition by the City).

The City should consider including the following acquisition criteria in the policy:

1. Storm water assets considered for acquisition will consist of pipes, channels, flumes, and/or associated junctions (e.g., manholes, catch basins, inlets, junction boxes, etc.).
2. Acquisition consideration will not be given to physical storm water BMPs that provide water quality or water quantity control for a development including detention ponds, underground systems, green infrastructure, or other BMPs.
3. Asset to be acquired is owned by a single-family dwelling owner.
4. Asset conveys mostly public water (e.g., over 50% public water) or was identified in the SWMP as a component that conveys runoff from multiple properties.
5. Asset is associated with an area of public storm water concern, documented by the SWMP or public input.
6. Asset was identified in the SWMP and/or local drainage study as having an impact on surrounding hydrology.
7. Asset is free of major structural defects:
   A. Major structural defects may include broken headwalls, crushed pipes, and other defects that affect the structural integrity or lifespan of the pipe.
   B. Lack of routine maintenance is not considered a structural defect.
8. Property owner is willing to donate the asset and provide an easement.
9. Easement is clear of structures and/or obstructions.
10. Easement provides access from the street or other public right-of-way.

5.3 Areas of Insufficient Infrastructure

Decatur was one of the first incorporated cities in the Metro Atlanta area, and as such, parts its storm water system have been in place for over a century. Most of the residential areas of the City were developed without storm water infrastructure that is now considered standard. Public comment indicates a desire to increase the storm water Level of Service by upgrading areas of inadequate and/or failing storm water infrastructure.

In addition to the improvements proposed for each watershed along the main drainage network, additional inlets, or openings where storm water can enter the drainage system, are proposed where there is deficiency in inlet capacity. An inlet capacity assessment was performed for every subbasin by counting the number of existing inlets and determining if that was adequate to drain the area during the critical storm and 25-year/24-hour design storms. The assumptions and the methodology that were used to determine the capacity of the existing inlets are described below. The types of inlets that were identified within the project area is as shown below. Details on each inlet type can be found in **Appendix J**:

- Single wing catch basin
- Double wing catch basin
- Non-standard catch basin
- Drop inlet
- Curb inlet

Non-standard catch basins were not included as part of the analysis since they make up only 2% of the system and would require additional field data collection to assess their capacity.

The goal of the inlet capacity assessment was to identify the flow deficiencies for each basin to identify basins with insufficient infrastructure. The capacity assessment for existing inlets was conducted as follows:

1. Existing inlets within the project area were analyzed for the critical storm;
2. The number of inlets by basin was determined using the City's storm water inventory digitally mapped in GIS and categorized into different types by each individual basin;
3. Total inlet capacity and total peak flow for the critical storm was tabulated for each basin;
4. Deficiency in capacity in terms of percentage was tabulated for each basin; and
5. As the final step, the deficiencies were graphically mapped, and appropriate recommendations were provided to address the capacity issue.

To perform this assessment, the following assumptions were used:

1. Inlets were completely submerged and are located at the lowest point;
2. Inlets do not have -gutter depressions;
3. Inlets that do not have dimensions will be assumed based on outgoing pipe diameter or the common inlet dimensions; and
4. Non-standard Catch Basins (NSCB) were not included in the analysis.

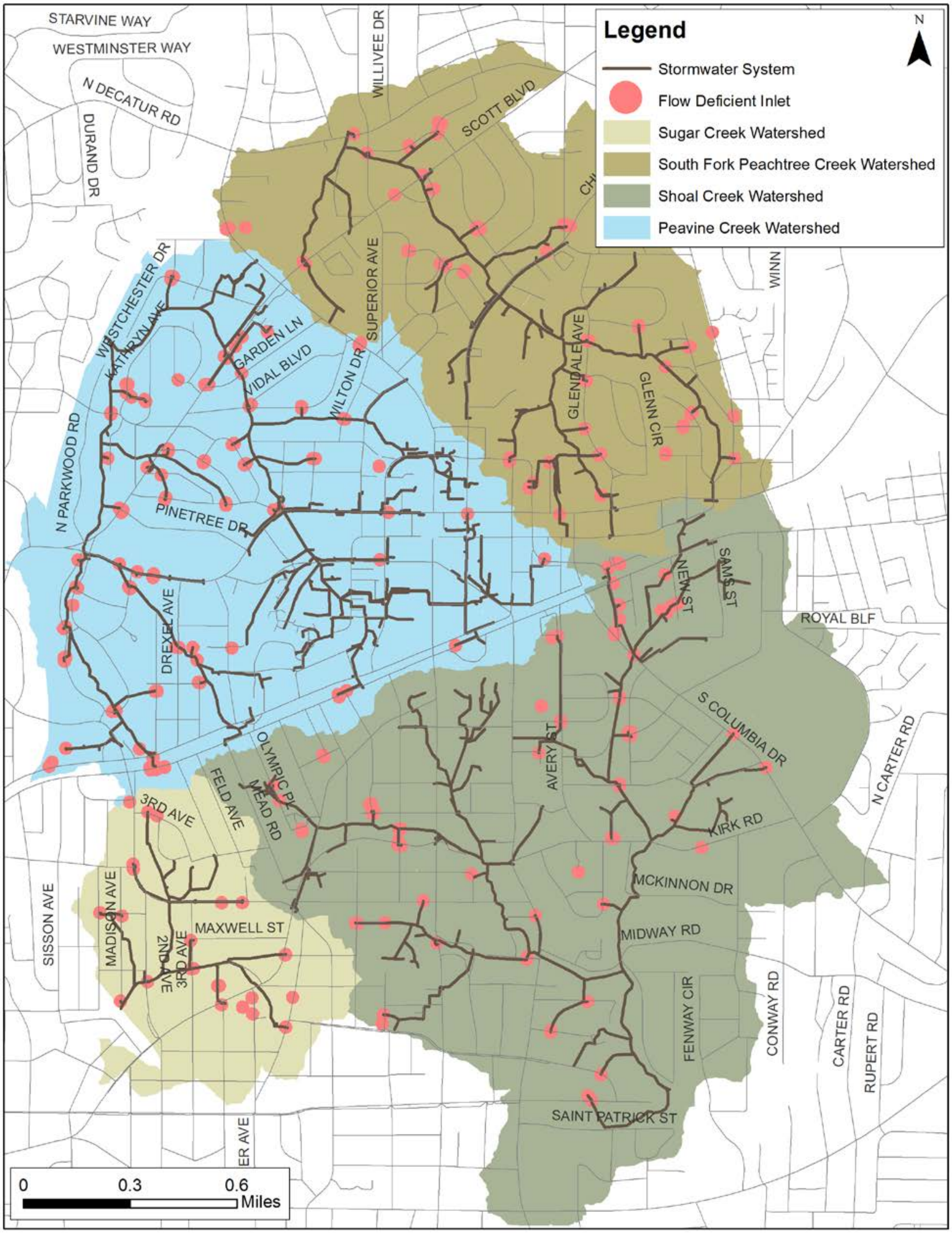
The critical storm analysis identified numerous deficient areas across the City. A summary of the locations identified per watershed are shown in **Table 5-6.**

Table 5-6: Inlet Capacity Analysis Results

Watershed	Critical Storm	25-Year/24-Hour Storm
Shoal Creek	39	91
Sugar Creek	12	22
Peavine Creek	48	87
South Fork Peachtree Creek	30	56

Critical storm mapping for areas with insufficient inlet capacity is shown in **Figure 5-6**, additional details are provided on both the critical storm and the 25-year/24-hour design storm inlet capacity analysis summary for each watershed is provided in **Appendix K.**

Figure 5-6: Critical Storm Inlet Capacity Analysis



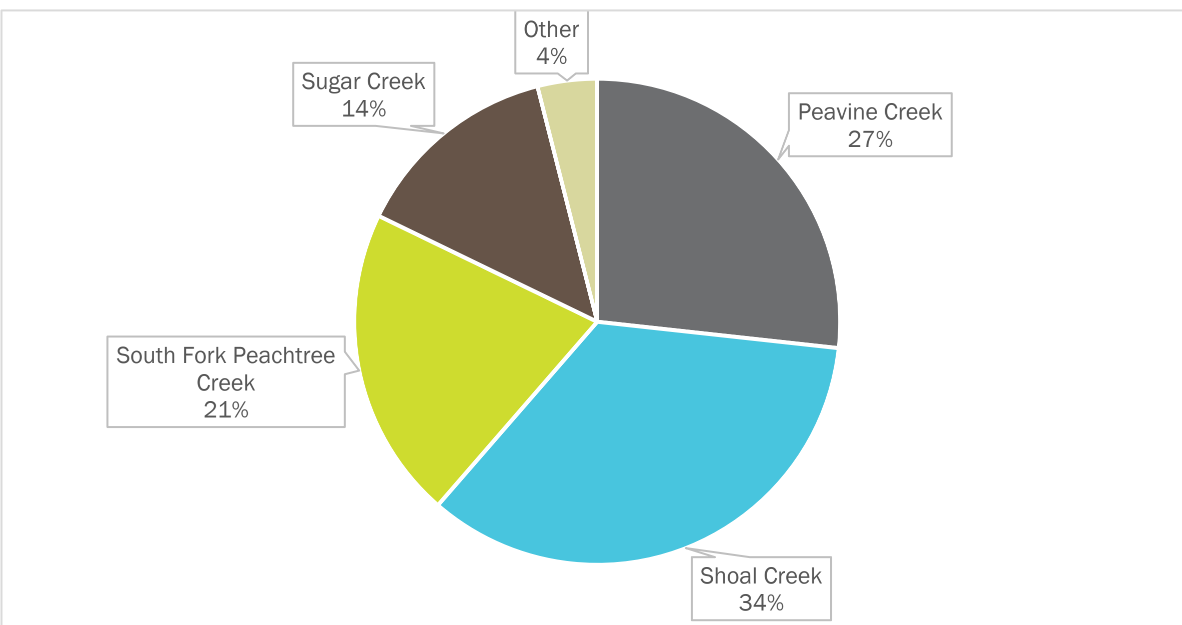
5.4 Areas of Concern

Through staff interviews, review of City complaint logs, input from the public engagement process, and comments received through the online WikiMapping website, 331 areas with storm water concerns were identified across the City. Some of the reported concerns do not represent unique issues because in many cases, multiple comments were received on similar or related issues. We analyzed the 331 concerns using one-acre drainage basins for the City to consolidate the list into unique areas of concern. Consolidation gave us a list of 101 unique areas of concern across the City. The areas of concern can be categorized into:

- Reports of flooding
- Reports of inadequate infrastructure
- Maintenance needs
- Construction and erosion and sedimentation issues
- Sanitary sewer issues
- Other water quality concerns

These 101 areas of concern are distributed across the City's four major watersheds. A small percentage of concerns were located outside the four main watersheds, these areas (listed below as "other") were not included in the model but were assessed independently. Shoal Creek has the greatest percentage of these areas, as shown in **Figure 5-7**. All the areas of concern are mapped in **Figure 2-4.**

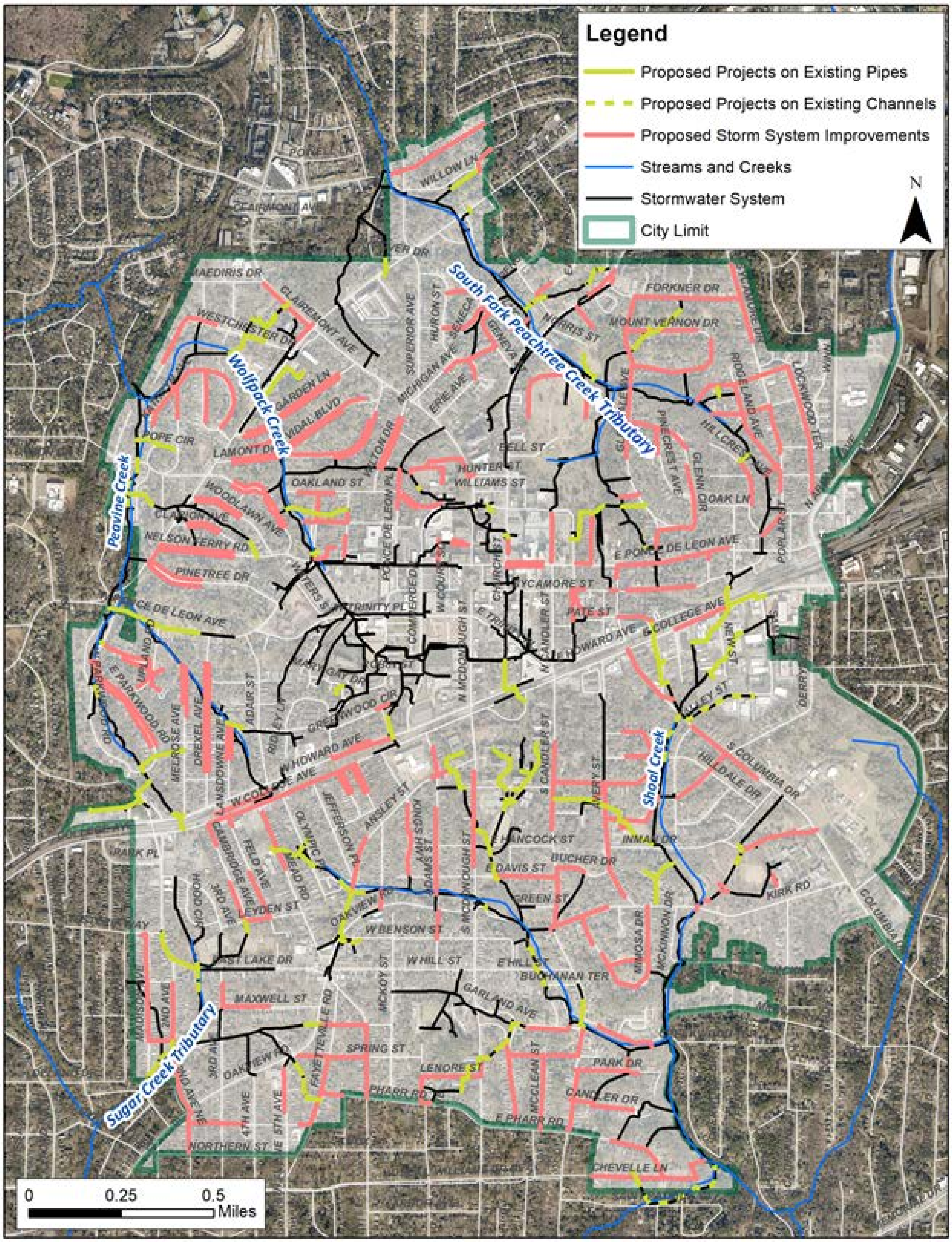
Figure 5-7: Reported Storm Water Concerns by Watershed



5.5 Potential Projects

AECOM mapped the model results, the insufficient inlet capacity assessment and the identified areas of concern described in **Section 5-4** to identify locations for recommended capital improvements as mapped in **Figure 5-8**. This plan described the long-term storm water system goal for the City. Reaching this goal is not realistic within the 20-year master planning period, and therefore, the map is a long-term goal for the City that extends beyond the scope of this plan. Projects shown include new storm system improvements (brown) and modifications to existing conduits (pipes) or channels (green). For each “project” area, we calculated conceptual sizing for required piped systems. However, the City’s goal is to incorporate green infrastructure practices on the surface in as many locations as possible during the full design for each project identified on the map (See new Engineering Policies in **Section 7.1.3**). Green infrastructure will allow smaller, more frequent, storm events to be conveyed on the surface while larger, extreme events can be diverted to sub-surface piping.

Figure 5-8: Proposed System Goal



6. PRIORITIZATION OF STORM WATER IMPROVEMENT PROJECTS

For the storm water infrastructure improvements identified in **Section 5**, AECOM developed a prioritization and weighting system to guide project implementation. Prioritization criteria were developed and used to sort the projects into priority tiers, and then weighting factors were established to guide the development of a project implementation schedule. The development and application of prioritization criteria and weighting factors and the resulting project priority tiers and schedule are described in this Section.

6.1 Metrics and Scoring

AECOM developed a methodology to prioritize and schedule the proposed infrastructure improvements recommended in **Section 5**. The proposed improvements identified in **Section 5** are located throughout the entire City but vary widely in size and impact to the community. A scoring and ranking system needs to consider many factors to direct capital investments toward the highest priorities based on frequency and severity of impacts. The scoring system was developed to establish priority tiers for all projects, and then scheduling criteria were developed to categorize projects in each priority tier into implementation brackets. During the stakeholder engagement meetings for this plan, we gathered public input to guide the development of criteria for project prioritization. This input is described in detail in the Community Engagement Report (**Appendix C**).

Each of the recommended projects was reviewed by AECOM to determine a relative priority regardless of project size. The goal was to place recommended projects into priority tiers solely based on the following technical criteria:

- **Severity of problem** – Highest priority should be given to projects that are affected by the critical storm, which is more common than 25-year/24-hour storms.
- **Position in watershed** – At times downstream projects must be addressed first because they affect drainage in the whole watershed. Without adequate infrastructure downstream, upstream projects may not be able to attain needed improvements.
- **Ownership of infrastructure** – Publicly owned projects can be completed more quickly as no property acquisition is required.

All projects from **Section 5.5** were placed into Priority Tiers defined as A, B, C, and D as shown in **Figure 6-1.** **Figure 6-2** shows the storm water improvement projects by Priority Tier on a map.

Figure 6-1: Capital Improvement Project Prioritization Tiers

A

- Impacted by the “critical design storm”
- No downstream capacity issues
- Publicly owned system or proposed pipes in the right-of-way

B

- Areas impacted by the “critical design storm”
- Downstream capacity issues addressed in Priority A
- Publicly owned system or proposed pipes in the right-of-way

C

- Areas impacted by the “25-year storm”
- Publicly owned systems or proposed pipes in the right-of-way

D

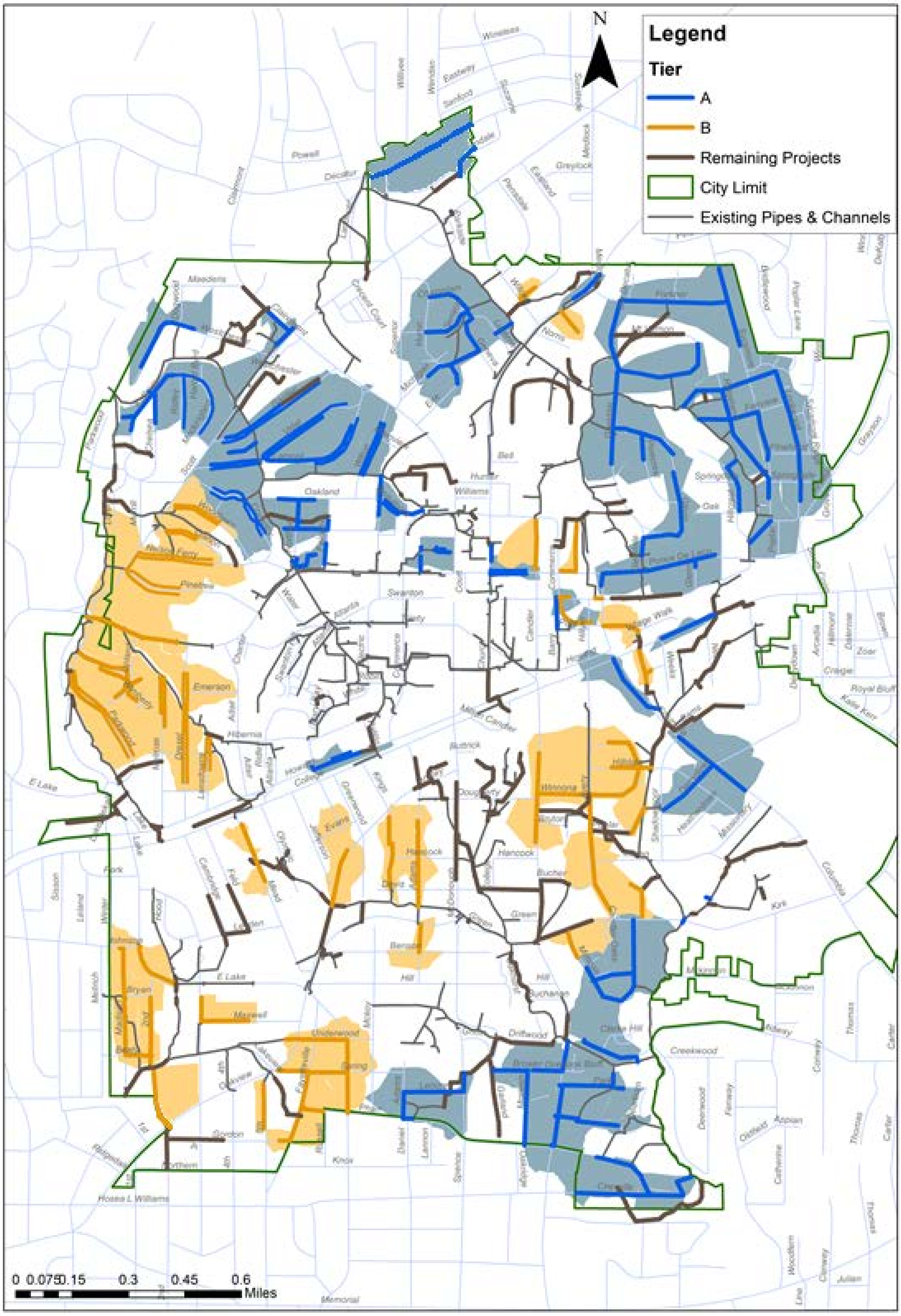
- Remaining projects/private systems

KEY TERMS

Critical Design Storm: A storm event of duration and intensity that the infrastructure is designed to manage. In the case of Decatur, the critical design storm is 2.2 inches of rain over 6 hours. This amount is reflective of a typical heavy storm.

25-Year/24-Hour Storm: An extreme storm event with a rainfall amount that has a four percent probability of occurring at a location in a year. This event is equal to 5.95 inches over 24 hours and would be likely to occur in an extreme weather event, such as a tropical storm.

Figure 6-2: Prioritization of Recommended Projects



6.2 Scheduling of Storm Water Improvement Projects

Within each prioritization tier, all recommended improvement projects were rated with a priority score to develop the schedule for projects and to compare project priorities across watersheds. **Figure 6-3** is a summary of the importance of various criteria to community members that participated in the community engagement meetings. These factors were built into the scheduling criteria. The priority score was determined by summarizing the ranking criteria shown in **Table 6-1**.

Figure 6-3: Evaluation of Prioritization Criteria by Stakeholders

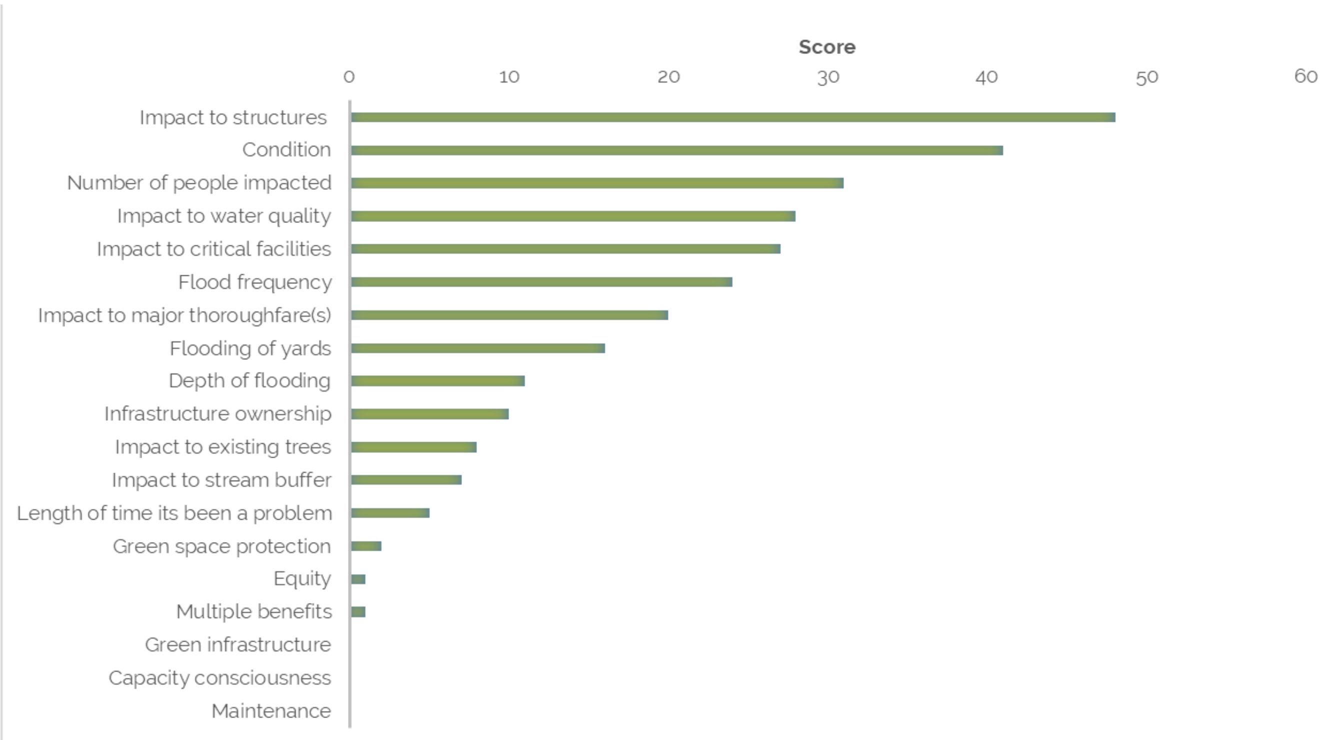


Table 6-1: Project Ranking Criteria

Category	Scores			
	3	2	1	0
Flood Impacts to Properties	Documented flooding of primary buildings	Documented flooding of secondary buildings (e.g., shed), driveway or other structures	Flooding of yards	No property impacts reported
Population Impacted	100 or more households within subbasin	50-99 households within basin	0-49 or more households within basin	0 households within basin
Impact to Critical Facilities	Critical facility within 50 feet	N/A	N/A	No impacts

Category	Scores			
	3	2	1	0
Impact to Major Thoroughfares (as defined in the Community Transportation Plan)	Urban Principal Arterial within 50 feet	Urban Minor Arterial within 50 feet	Urban Collector within 50 feet	Local Roadway within 50 feet
Condition	Potential pipe failure or major system blockage within 50 feet	Pipe capacity substantially impacted within 50 feet	Minor pipe condition issues within 50 feet	No known condition issues within 50 feet

- Major Thoroughfares – Given segment is within 50' of roadways classified per the Community Transportation Plan. Major thoroughfares such as Urban Principal Arterials are usually evacuation routes, requiring higher priority relating to flooding than other roads in the City. **Figure 6-4** illustrates the Major Thoroughfares included in the ranking criteria.

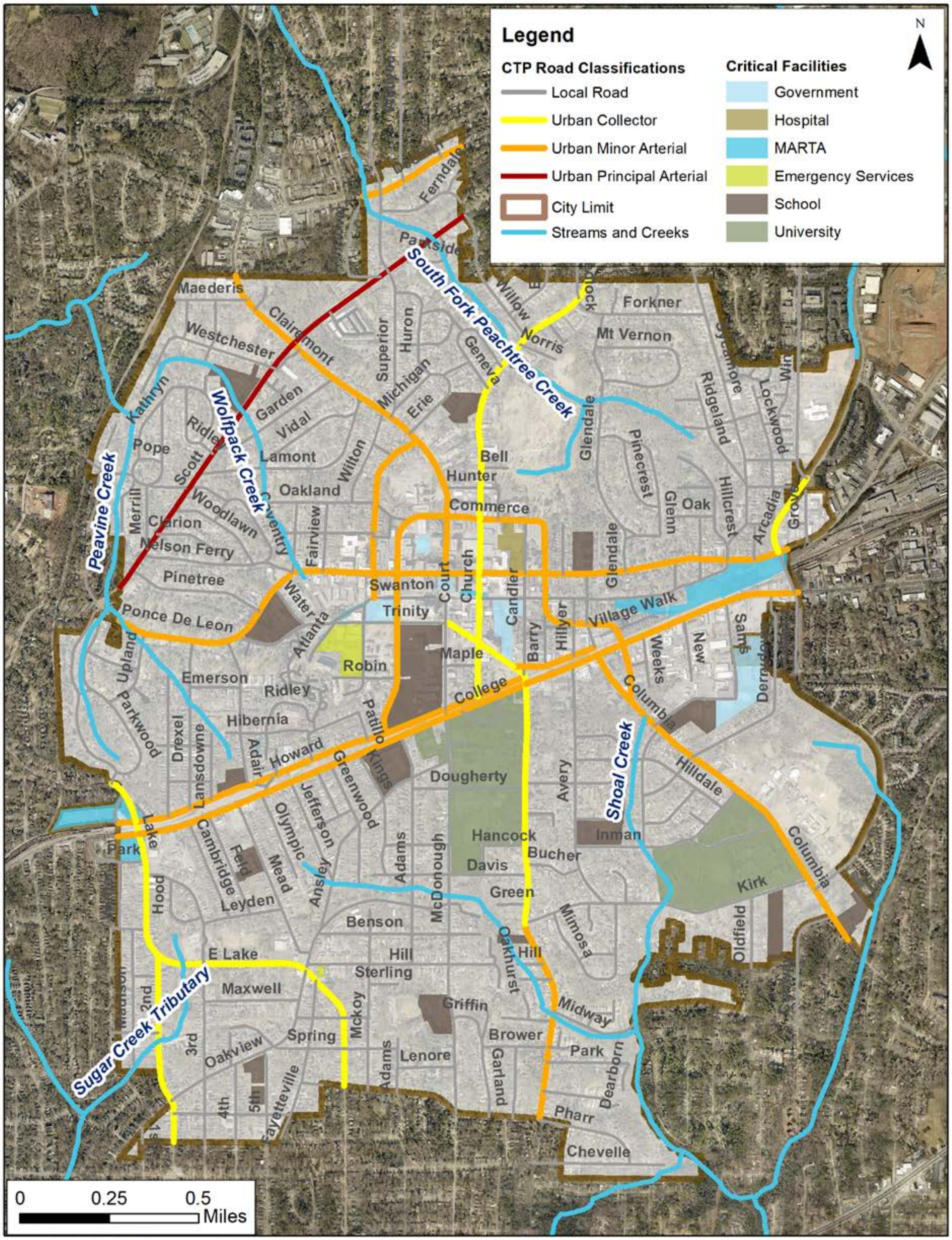
- Critical Facilities - Identified as government buildings, hospital, emergency services, schools, universities, or MARTA. These were used in the ranking criteria as described above. **Figure 6-4** illustrates Critical Facilities included in the ranking criteria.

- Flood Impacts to Properties - These are based on details provided in reports storm water concerns from the community.

- Population Impacted - Population impacts for this project were defined as single-family residential impacts based on community input. The assessment was based on a count of residential lots within the drainage basin for a proposed improvement project.

- Condition - Pipe condition was included in the analysis by using the City of Decatur's infrastructure inventory and querying the pipes with less than good condition. Poor condition pipes were prioritized to prevent existing problems from getting worse, resulting in system failure.

Figure 6-4: Major Thoroughfares and Critical Facilities



6.2.1 Criteria Weighting

Once the ranking categories were defined, some ranking criteria were weighted to calculate a composite score for each project.

- Prioritization Tiers were used as the foundation for weighting the projects. Weighting points were assigned as follows:
  + Tier A: 40 points
  + Tier B: 30 points
  + Tier C: 20 points
  + Tier D: 10 points
- A 2x multiplier was added to the Flood Impacts criteria to weight the final score, as this was a factor of high importance based on community feedback.
- A 4x multiplier was added to the Population Impacted criteria to weight the final score, as this was a factor of high importance based on community feedback.

6.2.2 Final Scoring

Each project area consists of many project segments (E.G., lengths of new proposed infrastructure along different road segments in the same neighborhood). The final scores were tabulated using weighted average across all segments in the project area. The maximum possible tabulated score was 46.5. Then, scores were normalized on a 0 to 100 scale.

The final weighted scores for all recommended projects are presented in **Tables 6-2** through **6-5, and Figures 6-5** through **6-8** for Shoal, Sugar, Peavine, and South Fork Peachtree Creek Watersheds. For the purposes of scheduling, it was determined that implementation of projects in Tiers A and B would be the extent of projects that could be realistically completed within a 20-year master planning horizon, so projects in Tiers C and D were not given a prioritization score.

Table 6-2: Weighted Scores – Projects in Shoal Creek Watershed

Project Name	Tier	Location	Length (feet)	Score
SH109	A	Derrydown Way	2,128	100
SH116	A	Park Drive & Candler St	2,789	99.89
SH117	A	Brower St and Mclean St	2,405	93.60
SH113	A	Mimosa Drive and Mimosa Pl	2,532	92.51
SH115	A	Chevelle Ln & Pharr Rd	2,921	90.05
SH114	A	Midway Rd	888	86.45
SH108	A	Columbia Dr at College Ave	1,003	84.57
SH110	B	Avery Drive and Winnona St	6,240	84.00
SH101	A	Lenore St	1,617	75.61
SH111	B	Kirk Crossing	547	67.73
SH102	B	Ansley St at Jefferson Pl	818	67.66
SH105	B	Adams St south of Oakview Rd	394	62.02
SH104	B	Adams St north of Hancock St	1,211	62.02
SH106	B	Commerce Dr at Village Walk Dr	541	60.14
SH107	B	Commerce Dr south of College Ave	599	60.14
SH103	B	Kings Highway	1,039	56.38
SH112	B	Kirk Rd	425	56.38

Figure 6-5: Projects in Shoal Creek Watershed

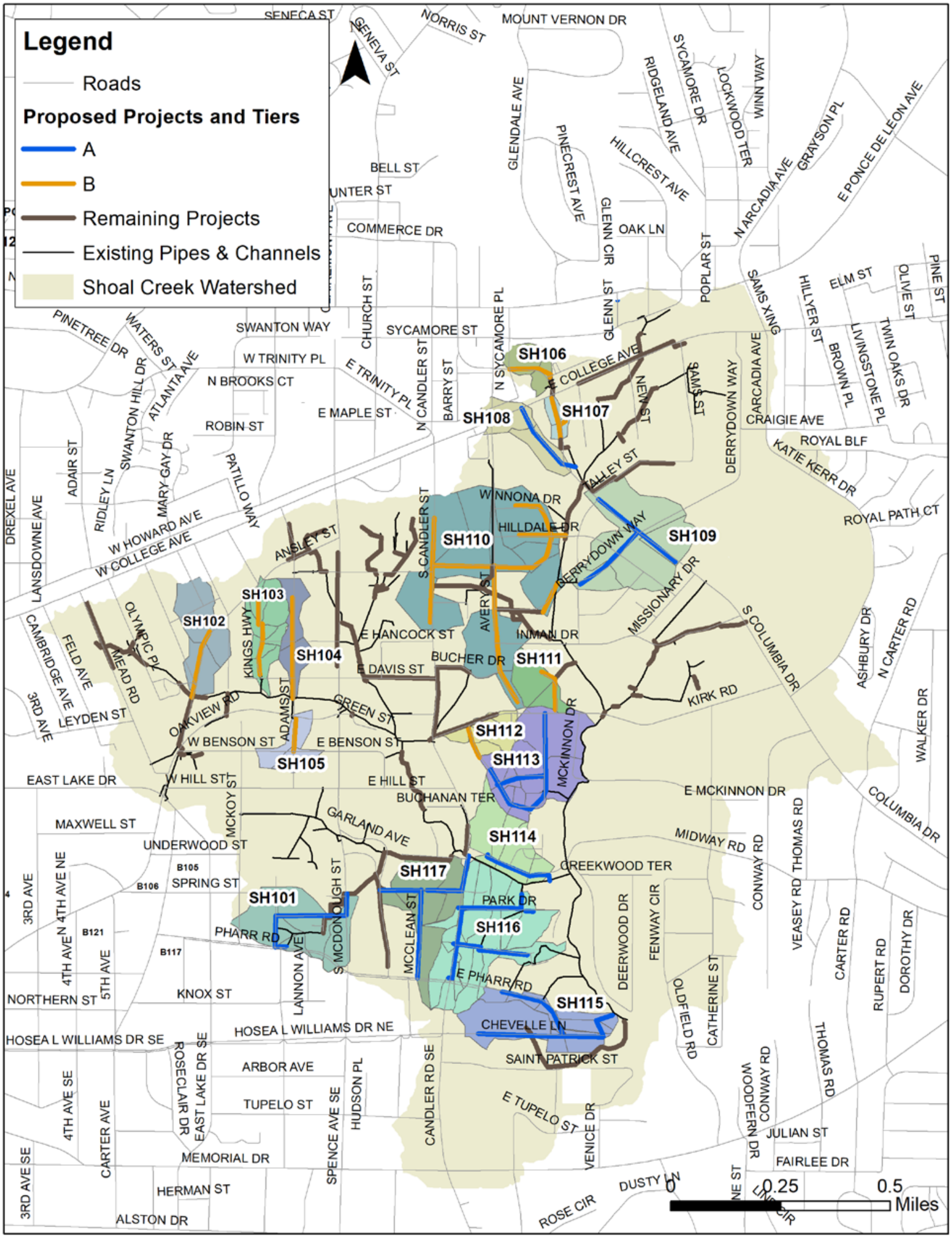


Table 6-3: Weighted Scores – Projects in Sugar Creek Watershed

Project Name	Tier	Location	Length (feet)	Score
SC107	B	Spring St and East Lake Dr	2,397	77.58
SC102	B	Madison Ave and Second Ave	2,914	75.14
SC103	B	Second Ave north of Oakview Rd	548	73.43
SC106	B	Spring St at Fayetteville Rd	426	73.30
SC105	B	5th Ave	615	62.75
SC104	B	Maxwell St and Third Ave	990	62.02
SC108	B	Fayetteville Rd	1,323	58.94
SC101	B	East Lake Dr	1,200	58.26

Figure 6-6: Projects in Sugar Creek Watershed

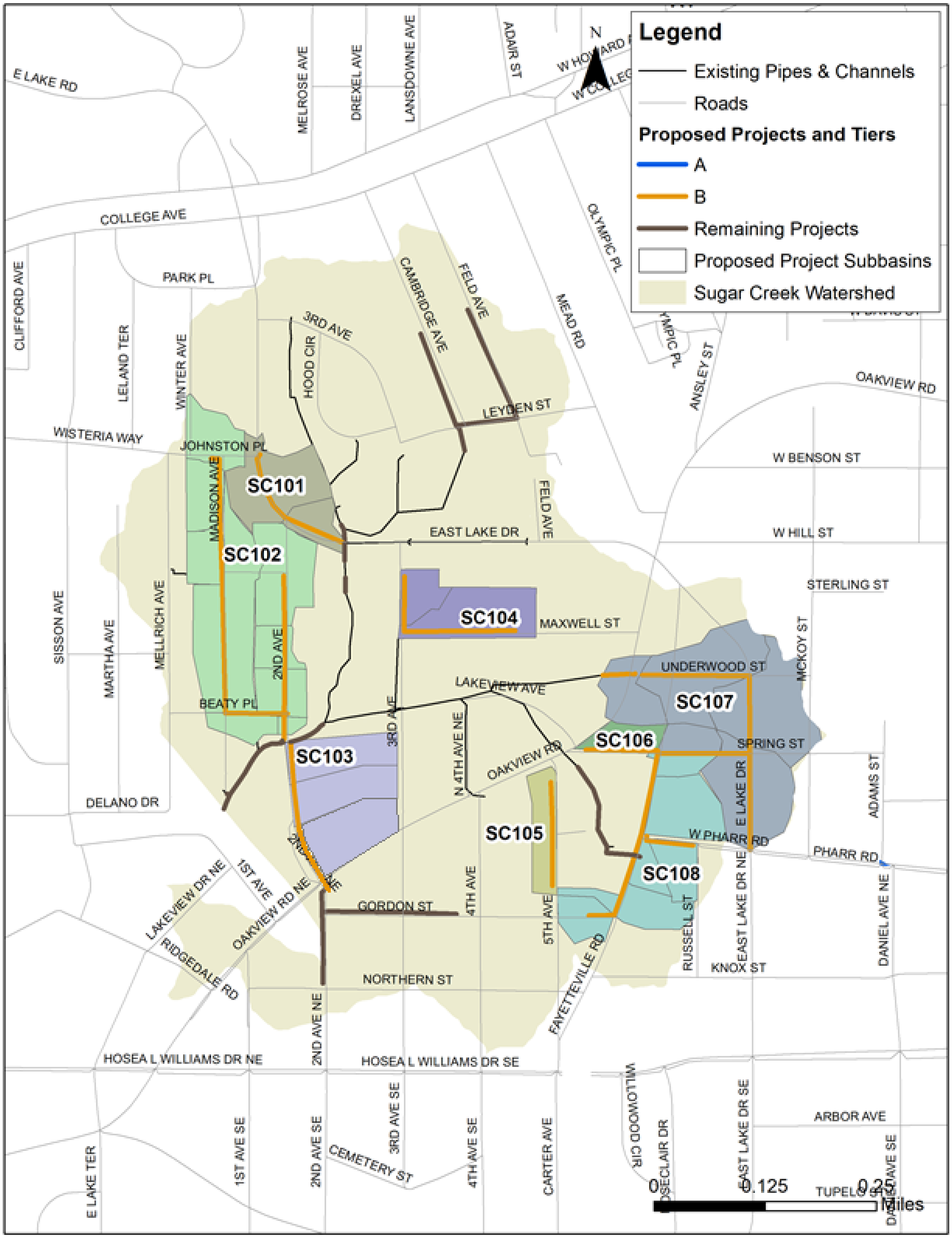


Table 6-4: Weighted Scores – Projects in Peavine Creek Watershed

Project Name	Tier	Location	Length (feet)	Score
PC108	A	Lamont Dr (northeast)	943	92.09
PC109	A	Wilton Dr at Plainview St	1,552	92.09
PC112	A	North of West Ponce de Leon Ave between Commerce and Clairemont	211	90.21
PC107	A	Vidal Blvd	3,890	88.42
PC105	A	Garden Ln	3,161	86.62
PC118	A	Coventry Rd	2,159	86.45
PC115	A	Commerce Dr	1,260	85.39
PC114	A	Ponce de Leon Ave at Church St	1,271	85.19
PC110	A	Ponce de Leon PL and Beaumont Ave (west)	546	84.57
PC130	A	Howard Ave at Pattillo Way	1,230	84.57
PC116	A	Northern Ave at West Ponce de Leon	750	84.18
PC104	A	Clairmont Ave at Scott Blvd	783	83.48
PC111	A	Ponce de Leon PL and Beaumont Ave (east)	912	82.36
PC117	A	Northern Ave between Oakland St and Montgomery St	1,436	82.10
PC106	A	Lamont Dr (west)	1,755	80.81
PC113	A	West of Claremont Ave (north of Ponce)	402	80.81
PC103	A	Ridley Cir and Mockingbird Ln	1,987	80.81
PC101	A	Westchester Dr	1,136	80.81
PC102	A	Chelsea Dr and Kathryn Ave	1,697	80.81
PC119	B	Woodlawn Ave	1,343	70.40
PC128	B	Drexel Ave at Devonshire Ave	1,923	67.66
PC124	B	Drexel Ave at Emerson Ave	1,154	67.66
PC127	B	Melrose Ave	1,240	67.66
PC129	B	Devonshire Ave at Landsdowne Ave (southwest)	943	67.66
PC120	B	Clarion Ave	891	65.62
PC122	B	Pinetree Dr and Nelson Ferry Rd (west)	2,959	65.49
PC125	B	Parkwood Ln	2,190	62.79
PC121	B	Nelson Ferry Rd (east)	1,124	62.73
PC123	B	West Ponce de Leon between Drexel and Parkwood	1,330	62.72
PC126	B	Parkwood Rd	3,053	62.02

Figure 6-7: Projects in Peavine Creek Watershed

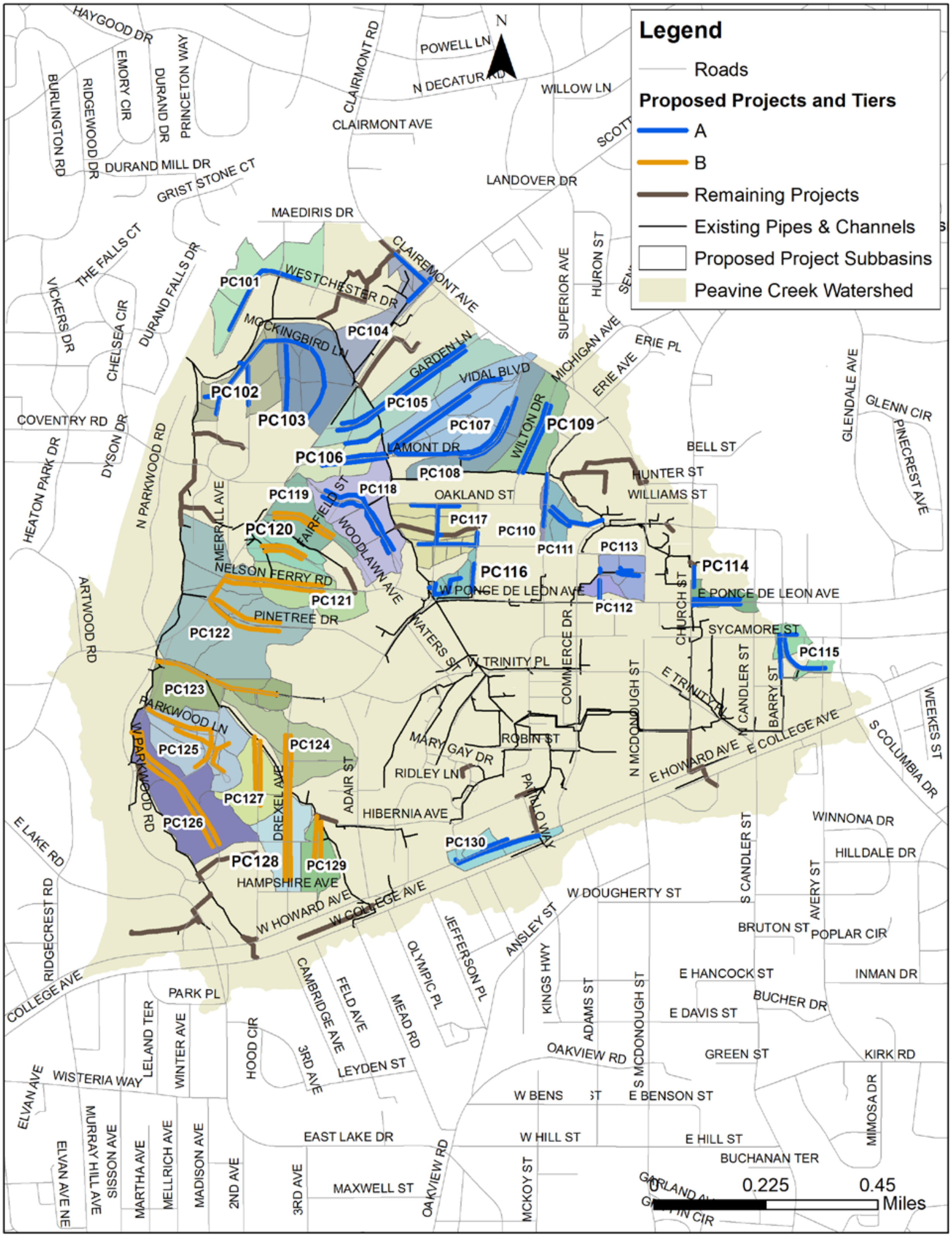
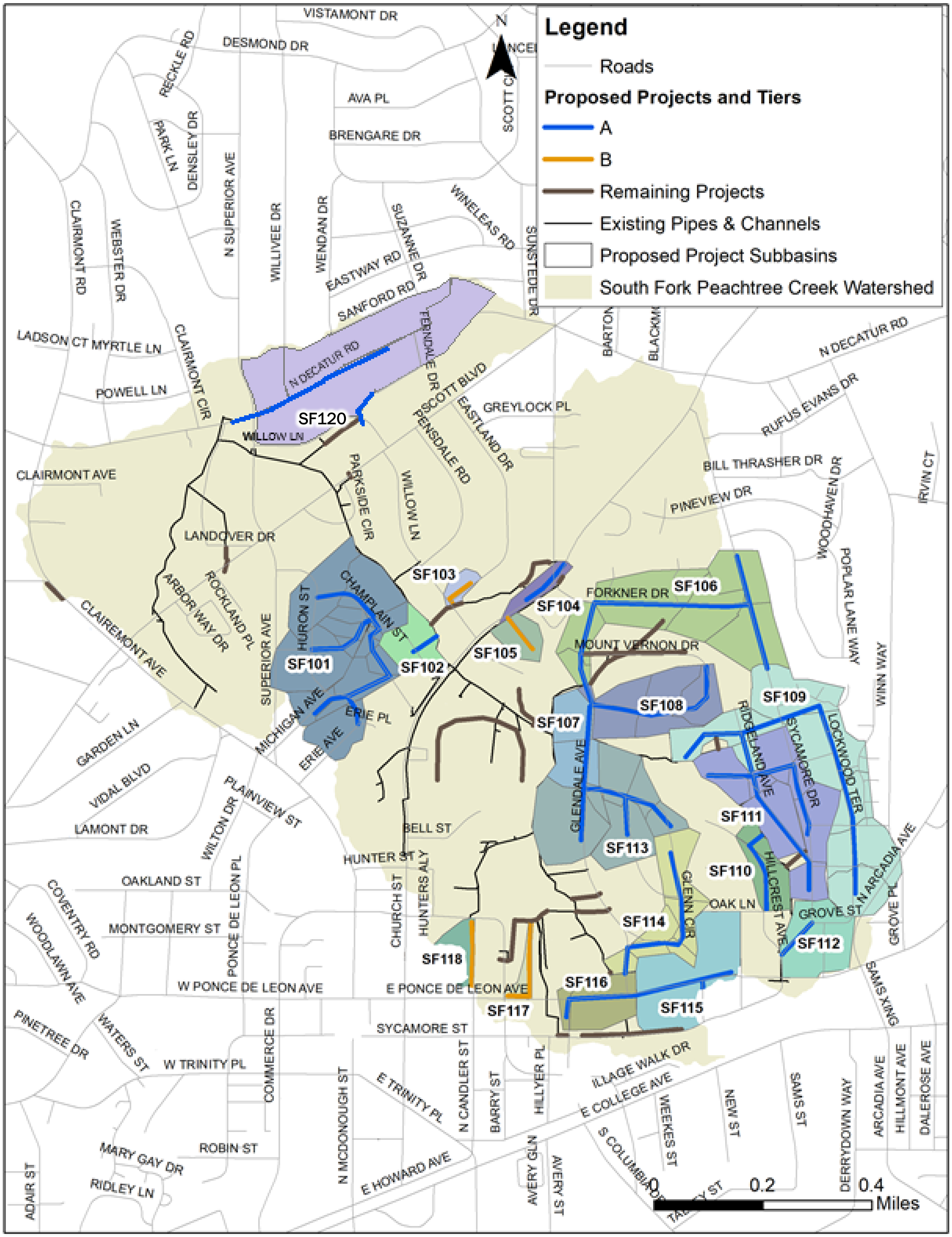


Table 6-5: Weighted Scores – Projects in South Fork Peachtree Creek Watershed

Project Name	Tier	Location	Length (feet)	Score
SF120	A	North Decatur and Ferndale	2,008	99.68
SF101	A	Champlain St, Seneca St, Geneva St	2,672	93.58
SF111	A	Sycamore Drive and Fairview St	2,805	93.16
SF109	A	Lockwood Terrace	3,690	92.09
SF116	A	Sycamore Place and Ponce de Leon Ave	817	91.69
SF106	A	Forkner Dr	3,446	90.54
SF108	A	Mt Vernon Dr	1,667	88.74
SF107	A	Glendale Ave south of Mt Vernon Dr	800	86.58
SF114	A	Glen Circle - Glendale Ave through Pinecrest Ave (south)	1,662	86.45
SF113	A	Glen Circle - Glendale Ave through Pinecrest Ave (north)	1,827	86.45
SF115	A	Ponce de Leon Ave west of Glendale Ave	1,052	85.80
SF112	A	Sycamore Drive	423	82.69
SF102	A	Lucerne St (northeast)	273	80.81
SF104	A	Church St at Medlock Rd	501	77.06
SF118	B	Candler St	693	77.06
SF110	A	Hillcrest Ave	813	76.93
SF117	B	E Ponce de Leon at Commerce Dr	928	73.30
SF103	B	Eastland Dr	337	65.78
SF105	B	Glenlake Commons	381	60.14

Figure 6-8: Projects in South Fork Peachtree Creek Watershed



6.2.3 Green Infrastructure

The City's location within the headwaters of four basins puts it in a unique position to manage the water quantity and quality of the storm water that drains through the City. Any water quality problems in Decatur's streams originate in Decatur, and thus the City has the opportunity to influence its own water quality. Green infrastructure projects are ideal for headwater areas because infiltration and water quality improvements are best managed at a local level. Part of each recommended storm water improvement project is to incorporate green infrastructure practices on the surface in as many locations as possible during the full design for each project. Green infrastructure will allow smaller, more frequent, storm events to be conveyed on the surface and infiltrated or treated prior to release to streams.

6.2.4 Cost Estimating

Cost estimates were developed for all projects in CIP Prioritization Tiers A and B. The attributes in **Table 6-6** were used to calculate the Total Project Cost for each project. Detailed project cost details are included in **Appendix L.** Projects in Tiers C and D should be considered for further development and cost estimation during the next master plan update.

Table 6-6: Basis of Cost Estimation

Cost Attributes	Cost Basis	
Construction time (based on linear feet of pipe)	Pipe diameter = 1.00 feet – 2.00feet	50 LF/day
	Pipe diameter = 2.5 feet	45 LF/day
	Pipe diameter = 3.0 feet	40 LF/day
	Pipe diameter = 3.5 feet	35 LF/day
	Pipe diameter = 4.0 feet	30 LF/day
	Pipe diameter >= 4.5 feet	25 LF/day
Crew days	Pipe length/[Construction time (LF)]	
Crew costs	$4000/day	
Pipe costs (per foot diameter)	$25*[pipe length (feet) * pipe diameter]	
Erosion control mat (per LF)	$10/foot of pipe length	
Overhead + Contingency	50% of total cost	
Design cost	30% of total construction cost (includes contingency)	

Tier A

The Tier A projects can be found in **Table 6-7.** They total approximately 67,817 linear feet and will cost approximately $22,672,661.

Table 6-7: Tier A Project Costs

Project Name	Location	Watershed	Length (feet)	Cost
PC101	Westchester Dr	Peavine Creek	1,136	$348,999
PC102	Chelsea Dr and Kathryn Ave	Peavine Creek	1,697	$491,475
PC103	Ridley Cir and Mockingbird Ln	Peavine Creek	1,987	$623,934
PC104	Clairmont Ave at Scott Blvd	Peavine Creek	783	$208,340
PC105	Garden Ln	Peavine Creek	3,161	$910,601
PC106	Lamont Dr (west)	Peavine Creek	1,755	$364,845
PC107	Vidal Blvd	Peavine Creek	3,890	$1,146,548
PC108	Lamont Dr (northest)	Peavine Creek	943	$296,826
PC109	Wilton Dr at Plainview St	Peavine Creek	1,552	$456,509
PC110	Ponce de Leon PL and Beaumont Ave (west)	Peavine Creek	546	$127,347
PC111	Ponce de Leon PL and Beaumont Ave (east)	Peavine Creek	912	$242,617
PC112	North of West Ponce de Leon Ave between Commerce and Clairemont	Peavine Creek	211	$52,211
PC113	West of Claremont Ave (north of Ponce)	Peavine Creek	402	$138,960
PC114	Ponce de Leon Ave at Church St	Peavine Creek	1,271	$308,197
PC115	Commerce Dr	Peavine Creek	1,260	$297,484
PC116	Northern Ave at West Ponce de Leon	Peavine Creek	750	$182,463
PC117	Northern Ave between Oakland St and Montgomery St	Peavine Creek	1,436	$376,481
PC118	Coventry Rd	Peavine Creek	2,159	$622,406
PC130	Howard Ave at Pattillo Way	Peavine Creek	1,230	$303,092
SF101	Champlain St, Seneca St, Geneva St	South Fork Peachtree Creek	2,672	$993,116
SF102	Lucerne St (northeast)	South Fork Peachtree Creek	273	$85,777
SF104	Church St at Medlock Rd	South Fork Peachtree Creek	501	$136,896
SF106	Forkner Dr	South Fork Peachtree Creek	3,446	$1,490,401
SF107	Glendale Ave south of Mt Vernon Dr	South Fork Peachtree Creek	800	$245,633
SF108	Mt Vernon Dr	South Fork Peachtree Creek	1,667	$611,966
SF109	Lockwood Terrace	South Fork Peachtree Creek	3,690	$1,667,552
SF110	Hillcrest Ave	South Fork Peachtree Creek	813	$175,365

Project Name	Location	Watershed	Length (feet)	Cost
SF111	Sycamore Drive and Fairview St	South Fork Peachtree Creek	2,805	$1,006,385
SF112	Sycamore Drive	South Fork Peachtree Creek	423	$152,551
SF113	Glen Circle - Glendale Ave through Pinecrest Ave (north)	South Fork Peachtree Creek	1,827	$605,181
SF114	Glen Circle - Glendale Ave through Pinecrest Ave (south)	South Fork Peachtree Creek	1,662	$693,709
SF115	Ponce de Leon Ave west of Glendale Ave	South Fork Peachtree Creek	1,052	$340,114
SF116	Sycamore Place and Ponce de Leon Ave	South Fork Peachtree Creek	817	$245,597
SF120	North Decatur and Ferndale	South Fork Peachtree Creek	2,008	$909,610
SH101	Lenore St	Shoal Creek	1,617	$887,020
SH108	Columbia Dr at College Ave	Shoal Creek	1,003	$347,031
SH109	Derrydown Way	Shoal Creek	2,128	$766,411
SH113	Mimosa Drive and Mimosa Place	Shoal Creek	2,532	$759,485
SH114	Midway Rd	Shoal Creek	888	$286,303
SH115	Chevelle Ln & Pharr Rd	Shoal Creek	2,921	$1,010,681
SH116	Park Drive & Candler St	Shoal Creek	2,789	$1,036,350
SH117	Brower St and Mclean St	Shoal Creek	2,405	$720,191

Tier B

The Tier B projects can be found in **Table 6-8.** They total approximately 42,716 square feet and will cost approximately $13,457,633.

Table 6-8: Tier B Project Costs

Project Name	Location	Watershed	Length (feet)	Cost
PC119	Woodlawn Ave	Peavine Creek	1,343	$423,987
PC120	Clarion Ave	Peavine Creek	891	$243,244
PC121	Nelson Ferry Rd (east)	Peavine Creek	1,124	$324,496
PC122	Pinetree Dr and Nelson Ferry Rd (west)	Peavine Creek	2,959	$960,176
PC123	West Ponce de Leon between Drexel and Parkwood	Peavine Creek	1,330	$367,953
PC124	Drexel Ave at Emerson Ave	Peavine Creek	1,154	$339,843

Project Name	Location	Watershed	Length (feet)	Cost
PC125	Parkwood Ln	Peavine Creek	2,190	$704,022
PC126	Parkwood Rd	Peavine Creek	3,053	$460,632
PC127	Melrose Ave	Peavine Creek	1,240	$338,389
PC128	Drexel Ave at Devonshire Ave	Peavine Creek	1,923	$526,786
PC129	Devonshire Ave at Landsdowne Ave (southwest)	Peavine Creek	943	$257,331
SC101	East Lake Dr	Sugar Creek	1,200	$218,639
SC102	Madison Ave and Second Ave	Sugar Creek	2,914	$1,406,034
SC103	Second Ave north of Oakview Rd	Sugar Creek	548	$161,913
SC104	Maxwell St and Third Ave	Sugar Creek	990	$326,882
SC105	5th Ave	Sugar Creek	615	$65,165
SC106	Spring St at Fayetteville Rd	Sugar Creek	426	$105,975
SC107	Spring St and East Lake Dr	Sugar Creek	2,397	$741,431
SC108	Fayetteville Rd	Sugar Creek	1,323	$310,350
SF103	Eastland DR	South Fork Peachtree Creek	337	$83,797
SF105	Glenlake Commons	South Fork Peachtree Creek	381	$103,975
SF117	E Ponce de Leon at Commerce Dr	South Fork Peachtree Creek	928	$230,689
SF118	Candler St	South Fork Peachtree Creek	693	$218,093
SH102	Ansley St at Jefferson Pl	Shoal Creek	818	$285,525
SH103	Kings Highway	Shoal Creek	1,039	$357,572
SH104	Adams St north of Hancock St	Shoal Creek	1,211	$340,341
SH105	Adams St south of Oakview Rd	Shoal Creek	394	$118,473
SH106	Commerce Dr at Village Walk Drive	Shoal Creek	541	$155,195
SH107	Commerce Dr south of College Ave	Shoal Creek	599	$129,948
SH110	Avery Drive and Winnona St	Shoal Creek	6,240	$2,651,198
SH111	Kirk Crossing	Shoal Creek	547	$126,346
SH112	Kirk Rd	Shoal Creek	425	$373,235
PC119	Woodlawn Ave	Peavine Creek	1,343	$423,987

7. PROGRAM RECOMMENDATIONS

7.1 Policy Recommendations

Policies provide the framework (philosophy, timing, direction) and set the boundaries for storm water management services to be provided by the City. Policies directly impact the need for labor, materials, equipment, and capital investments, which in turn define the level of financial commitment required for program implementation. The policies recommended in this plan were formed based on a review of the policy recommendations in the 2004 Storm Water Master Plan (SWMP), input gathered from City staff, and public input gathered in the community engagement process. We also conducted research into policies from other jurisdictions to identify approaches, innovations, and specifications that might inform the development of policy for the City. This section presents policy recommendations to be considered by the City and to provide guidance in implementing the Storm Water Master Plan.

A long list of proposed storm water policies was presented in the 2004 SWMP. These policies were broken down into the following implementation categories (as defined in the 2004 SWMP):

- **Institutional** - the development and administration of a program for storm water management including staffing, equipment, service levels, intergovernmental and agency cooperation, public involvement, and enforcement.
- **Financial** - the Storm Water Utility rate structure, the mix of funding options, customer billing systems and other aspects of funding the storm water management program
- **Engineering** - the planning, analysis, design, and construction of the drainage system. Addresses the review of privately proposed development and the enforcement of the City's ordinances
- **Operations and Maintenance** - the day-to-day activities necessary to ensure that storm water facilities are performing as intended and the repair, enhancement, or replacement of failed, damaged, or inadequate facilities

Within these implementation categories, policies were presented in the areas listed in **Table 7-1.** The same policy framework is maintained in this SWMP update.

Table 7-1: Storm Water Program Policy Areas (from 2004 SWMP)

Implementation Categories	Policy Areas
Institutional	*Policy Area 1: Management Policy Statements*
	Policy Area 2: Coordination with Other Programs & Plans
	Policy Area 3: Emergency Preparedness / Disaster Control
	Policy Area 4: Development Submittals
	Policy Area 5: Erosion and Sedimentation Control
	Policy Area 6: Floodplain Management
	Policy Area 7: Land
	Policy Area 8: Records Management
	Policy Area 9: Inspection
	Policy Area 10: Enforcement
	Policy Area 11: Customer – Public Response
	Policy Area 12: Public Information and Involvement
	Policy Area 13: Research
Financial	*Policy Area 1: General*
	Policy Area 2: Funding Options
	Policy Area 3: Rate Structure
	Policy Area 4: Billing Method
	Policy Area 5: Service Charge Credits and Exemption
	Policy Area 6: Asset Management
Engineering	*Policy Area 1: Planning and Design*
	Policy Area 2: Construction of Public and Private Facilities
	Policy Area 3: Water Quality
Maintenance and Operations	*Policy Area 1: General*

The 2004 plan has policy statements that were developed based on the City' goals and regulatory requirements at that time. For this update of the SWMP, a review of these statements was performed to determine if these policies were still valid and if any updates should be considered. An update of these existing policy statements is included as **Appendix M**. New policies are presented below based on stakeholder input and review of policies in similar jurisdictions. Policy updates focused on minor edits to existing policy ideas (as captured and marked in **Appendix M**) to update to recent context. New policies are new ideas suggested for implementation as a result of this project. The major direction of new policies includes:

- Addition of green infrastructure to storm water requirements for new development and redevelopment.
- Lowering of thresholds for storm water management on new development and redevelopment.

- Establishment of criteria for acquisition of private infrastructure by the City where it benefits the public.
- Realignment of storm water utility rate structure based on an analysis of current development practices.

7.1.1 Institutional

Policy Area 1: Management Policy Statements

- The City should consider environmental sensitivity with new development including the use of low impact development and green infrastructure techniques, stream buffer protections, and tree conservation where possible.

  How: UDO changes proposed in this plan (see Policy Area 4: Development Submittals) will require infiltration and green infrastructure practices unless determined infeasible by site constraints.

- The City should develop a Comprehensive Storm Water Inspection and Maintenance Policy, as described in **Section 5.2.** To be comprehensive this policy should:

  + Describe the extent of assets maintained by the City,
  + Provide clear guidance with graphics to help facilitate homeowner understanding of ownership and maintenance responsibilities. Guidance should detail maintenance for pipes, structures, and permanent post-construction storm water management practices (green infrastructure and detention),
  + Outline maintenance expectations for privately-owned/maintained infrastructure,
  + Establish standards addressing how the City will consider acquiring privately-owned storm water assets that receive public water and provide a public benefit (see **Section 5.2**)
  + Request policy approval by the City Commission to guide consistent application.

  How: The City should write, adopt, and publish a policy similar to the City of Alpharetta's Comprehensive Storm Water Inspection and Maintenance Policy. For more detail, see the Private Infrastructure Acceptance Feasibility Memo (**Appendix I**).

- The City should provide guidance to property owners on the types of contractors that can help with storm water BMP and infrastructure maintenance. The City should develop a storm water maintenance course for contractors and homeowners. The City should track contractor attendance and maintain a list of contractors who have completed the course as a reference for residents.

  How: The City should write, adopt, and publish a policy similar to the City of Alpharetta's Comprehensive Storm Water Inspection and Maintenance Policy that details responsibilities for private owners. For more detail, see the Private Infrastructure Acceptance Feasibility Memo (**Appendix I**). The City could explore possible 319(h) funding for storm water maintenance training course development; education and training are eligible grant activities.

- The City should continue to evaluate its eligibility for National Flood Insurance Program Community Rating System (CRS) credits to determine if any additional credits can be obtained.

  How: The City is scheduled for CRS verification in 2020. A review of applicable CRS activities should be reviewed prior to this time for consideration of measures that may provide residents NFIP cost savings.

Policy Area 2: Coordination with Other Programs & Plans

- The City should continue to follow steps required for Metro North Georgia Water Planning District (MNGWPD) compliance including adoption of the revisions to the model ordinances for Floodplain Management and Post-Construction Storm Water Management as they are made available.

  How: The City should stay connected with the MNGWPD Watershed/Storm Water Technical Coordinating Committee Sub-Committee to stay engaged with other jurisdictions, compare policies and programs, and stay aware of model ordinance changes and other policy recommendations. AECOM has provided suggested edits to the City's storm water ordinance sections to reflect the recommendations listed in the updated model ordinance. e.

- Storm water management should be completed on sites with as little impact to trees as possible. This can be incorporated by:

  + Adoption of infeasibility criteria if allowed by the updated MNGWPD Post-Construction Storm Water Management model ordinance. These criteria can allow alternative storm water treatment in lieu of infiltration BMPs when trees would need to be removed to implement an in-ground BMP (e.g., flow well, rain garden, etc.). Drafeet guidance is anticipated to be forthcoming from MNGWPD.

  + Promotion of vegetated filter strips and other landscape BMPs (per the Georgia Storm Water Management Manual) to be used on development projects.

  How: Public education and outreach as well as multi-disciplinary concept plan reviews for new development should provide information on the benefit of trees. Vegetated filter strips are an acceptable BMP per the Georgia Storm Water Management Manual but are underutilized in the City. Public education on how vegetated filter strips can be used around existing trees may be valuable in promoting their use.

- Regional storm water management and improvements should be incorporated into the City's targeted development plans (Avondale MARTA, East Lake MARTA, Legacy Park) as these projects are conceptualized.

  How: The City should use the storm water model developed for this project (and/or model results) and the SWMP to identify storm water concerns and proposed improvements near these project areas. Improvements should be incorporated into site improvements where possible. For example, if a proposed new development will tie into an existing pipe that is modeled to be at or above capacity, the City should require that the new development include storm water infrastructure improvements to increase downstream capacity in the public system before the new development can tie in.

- The City should continue to coordinate with DeKalb County on the reporting and follow-up for sanitary sewer issues reported by residents. Although the sanitary and storm water systems are separate, storm water may contribute to sanitary sewer overflows, and sanitary sewer failures may complicate and exacerbate storm water problem areas.

  How: The City staff currently refers residents to contact the County and, in some instances, contacts the County on their own to report issues. A standardized response from City officials would help to indicate that they are actively engaging with the County on the problems and provide assurances to residents.

- The City should coordinate with DeKalb County to identify upcoming sewer capital improvement projects to coordinate on potential co-located storm water improvements so that construction activities and roadway restoration can be aligned in a manner that may reduce costs as well as disturbance to traffic and neighborhoods.

  How: The County is currently developing a water and sewer master plan. Proposed locations for water and sewer improvement projects in the County plan should be compared to the City's SWMP to identify areas for potential coordination. Storm water projects could be reprioritized where a change in the implementation schedule can provide for coordination with County projects.

- The City should conduct a review of the UDO to better coordinate and reduce possible conflicts in the development code, including tree canopy requirements, impervious lot coverage limits, parking requirements, and storm water management.

  How: The SWMP will result in changes to the Post-Construction Storm Water Management section of the UDO. Additionally, the City is currently reviewing the tree ordinance for updates. The City will also be undertaking a strategic plan update in 2020. Community concerns expressed during the SWMP update over tree clearing, impervious coverage, and rear parking requirements (for residences) should be compared to concerns discussed in the strategic plan update. During or just after the completion of the strategic plan update, all sections of the UDO should be reviewed for internal consistency and support for storm water management policies, programs, and goals. Some specific areas that were identified as concerns during the SWMP process include:

  + Tree ordinance
  + Backyard parking requirements
  + Lot coverage limits
  + Commercial parking requirements
  + Impact fees

- The City should require the use of curb reclamation when repaving if curb height that has been lost to past overlays and impacts at driveways, utility covers, and other transitions are acceptable or can be mitigated.

  How: Curb heights should be assessed for each location selected for repaving, and milling performed where necessary to ensure roadway drainage is maintained. City repaving schedules should be compared to the SWMP CIP list (Tables 6-2 through 6-5) to identify co-located projects.

Policy Area 4: Development Submittals

- The City should revise its post-construction storm water management requirements to include runoff reduction criteria (infiltration of first 1-inch of runoff) to be consistent with regulatory requirements.

  How: AECOM has provided revisions to the UDO based on the MNGWPD post-construction storm water management model ordinance and provide red line revisions to the City to include a runoff reduction requirement.

- The City should encourage green infrastructure solutions where viable on new development and redevelopment sites.

  How: Green Infrastructure (GI) evaluations will be required through the addition of runoff reduction/infiltration criteria to City post-construction storm water management ordinance. The City should also include a GI evaluation on any new project undertaken within the ROW. Additional BMP guidance should be developed for single-family residential properties (see below).

- The City should lower its impervious threshold for post-construction storm water management requirements. For more detail, see the Analysis of Development Ordinances Memo (**Appendix A**). Suggested thresholds include:

  + The creation, addition, and/or replacement of ANY impervious coverage on non-single-family residential properties (similar to the City of Atlanta) and/or 10,000 square feet or more of land disturbing activities. (The impervious coverage threshold would be reduced from the current level of 5,000 square feet or more.)

  + The development or redevelopment of any site for the construction of a single-family residence.

  + Any addition or modification to a single-family residence that involves the creation, addition, or demolition and replacement of 500 square feet of impervious coverage.

  How: AECOM will provide red line revisions to the City to 1) align City requirements with the updated model ordinance and 2) incorporate the reduced impervious coverage thresholds described above.

- The requirement for detention should remain for single-family residential projects with a larger storm water impact. An increase of 0.55 cfs is the threshold for detention requirements in the current UDO.

  How: AECOM will review the forthcoming MNGWPD post-construction storm water management model ordinance and will provide red line revisions to the City to 1) City standards consistent with the model ordinance and 2) incorporate the reduced impervious thresholds described above.

- The City should prepare a single-family residential BMP guidance manual similar to that developed by the City of Atlanta. The residential BMP manual should describe a “toolbox” of options including:

  + Dry Wells

  + Vegetated Filter Strips

  + Modified French Drain

  + Permeable Pavers

  + Bioretention/Rain Gardens
  + Soil Amendments/Restoration

How: The City could refer to the existing City of Atlanta (COA) guidance as a preliminary step, or the City could obtain the COA manual and modify and update it for the City's needs (to add/remove BMPs or adjust calculation methodologies). Alternatively, the City could contract with a consulting firm to develop this guidance. The manual should address the following:

  + Identify and describe the full range of green infrastructure solutions that may be used to meet the newly established post-construction runoff reduction requirement for existing and new single-family residential properties (examples include rain gardens, dry wells, and vegetated filter strips);
  + Delineate between landscaped green infrastructure solutions and non-landscaped green infrastructure solutions (example: a dry well can be used underground to provide infiltration requirements but does not provide landscaping. Landscaped solutions are preferred where possible because they provide other ancillary benefits);
  + Include references to City-approved minimum design standards for each BMP that are consistent with the Georgia Storm Water Management Manual (2016 edition), yet general enough to be of practical use to homeowners and builders; and
  + Include a checklist of annual maintenance needs for each BMP to ensure these solutions remain in working condition and continue to perform their intended functions.

- The City should continue requiring a multi-disciplinary concept plan review process to review site slopes, floodplains, stream buffers, and tree protection in conjunction with development desires and storm water management requirements early in the permitting process for a project.

  How: A Storm Water Concept Plan Meeting is currently recommended in the UDO Section 9.3.4.b. "The purpose of this meeting is to discuss the post-development storm water management measures necessary for the proposed project, as well as to discuss and assess constraints, opportunities and potential ideas for storm water management designs before the formal site design engineering is commenced." Other communities (like the City of Atlanta) require this type of meeting for any project that meets their storm water management criteria. This consultation meeting should take place at the time of the preliminary development plan or at another identified early step in the development process. The City should consider requiring this type of meeting and expanding the scope of the meeting to introduce other departments (ex: arborist); this may require ordinance modification to broaden meeting scope and intent.

- The City should define common runoff coefficients within its post-construction storm water management regulations to standardize application. It should include an assumed imperviousness factor for pea gravel.

  How: AECOM will review the forthcoming update to the MNGWPD Post-Construction Storm Water Management model ordinance and provide red line revisions to the City with suggested runoff coefficients.

- The City should revise the Level of Service (LOS) Policy for the design of future storm water systems by the City and private entities. For more detail, see the Analysis of Development Ordinances Memo (ADD DATE) for comparison of requirements from other jurisdictions. This policy could include:
  + 25-year/24-hour design standard for pipes and inlets
  + 50-year/24-hour design standard for pipes in inlets along State Routes (GDOT standard)
  + Hydraulic Grade Line (HGL) should remain below the surface of the road for the above storm events

  How: AECOM will review the forthcoming update to the MNGWPD Post-Construction Storm Water Management model ordinance and provide red line revisions to the City to: 1) align City requirements with the updated model ordinance and 2) incorporate the reduced impervious coverage thresholds described above. AECOM also provided red line revisions to address the above LOS policy suggestions for incorporation into the UDO (Section 9.3.5: Drainage System Guidelines).

Policy Area 6: Floodplain Management

- The City should continue to pursue flood prone home acquisition projects with FEMA hazard mitigation grants to transform high hazard areas to protected greenspace.

  How: Flood mitigation grants opportunities from FEMA and GEMA are available on an annual basis. Projects can be identified based on citizen reports of structure flooding (reported to the City or collected in this planning process) or FEMA repetitive loss lists. If projects are nominated by owners, the City can prioritize these projects for future grants by completing a preliminary FEMA benefit-cost analysis and ranking projects by the score each project receives in that analysis.

Policy Area 9: Inspection

- The City should develop a Comprehensive Storm Water Inspection and Maintenance Policy, as described in Policy Area 1.

  How: The City should write, adopt, and publish a policy similar to the City of Alpharetta's Comprehensive Storm Water Inspection and Maintenance Policy. For more detail, see the Private Infrastructure Acceptance Feasibility Memo (**Appendix I**) and additional discussion in Policy Area 1.

7.1.2 Funding

Policy Area 1: General

- The City should explore opportunities for public-private partnerships on storm water infrastructure projects (e.g., projects could receive higher priority for implementation if property owners contribute to cost of improvements).

  How: For storm water projects that are rated as low priority due the private ownership, the City should discuss public-private partnerships to identify opportunities to address areas of concern. Based on feedback in the community engagement process, some local citizens are willing to financially contribute to the cost of improvements if the City can lead design and construction. The City could consider writing up formal rules for a community to petition for such a partnership and integrate these arrangements into the LOS/EOS and proposed infrastructure Acquisition policy (see Policy area 1). Any policy regarding public/private partnerships should consider how to address equity in the distribution of projects throughout the City.

- The City should continue to pursue grants to support green infrastructure installations, water quality improvements, buffer protection and enhancement, open space acquisition, stream restoration and daylighting (where feasible), and other environmental enhancement projects.

  How: Grant programs, such as 319(h) and other water quality grants, offer opportunities for proposals each year. Projects could be nominated by the ESB for consideration for grant proposals from the City annually. Examples of possible projects discussed during the SWMP planning process include improvements to the lake in Legacy Park and restoring channelized sections of Sugar Creek. Projects could also target channel restoration for segments that were over capacity in the model results.

Policy Area 3: Rate Structure

- The City should ensure that the storm water utility rate structure is equitable for all property owners, and the City should periodically re-evaluate the rate structure to reflect and address changing conditions in the City. Property owners should pay a fee relative to their storm water impacts on the storm water system (e.g., based on impervious surface coverage per property).

  How: See **Section 7.2**

- The City should structure the storm water utility rate structure for residential property owners with tiers based on impervious coverage.

  How: See **Section 7.2**

- The City should consider a significant increase in the storm water utility fee in the near-term future to allow for faster improvement of storm water infrastructure and mitigation of concern.

  How: See **Section 8.2**

Policy Area 5: Service Charge Credits and Exemptions

- The City should add runoff reduction and water quality credits to its existing storm water utility credit policy.

  How: The City should revise its existing SWU credit policy (UDO Section 9.8.3). Current available credits are only for detention, and that credit is a 50% maximum credit for reducing the 100-year peak flow by 10%. We have recommended a new tiered structure, 10% for water quality or runoff reduction, 10% for channel protection (1-year storm detention for 24-hours), 10% for 25-year peak flow reduction (detention), 10% for 100-year peak reduction (detention). Maximum credit in this scenario would be 40%, which is a reduction from current 50% credit. See revised Storm Water Utility Credit Manual (**Appendix N**)

- The City should consider adding tree credits, as well as runoff reduction and water quality credits, to the storm water utility.

  How: A water quality credit of 10% is suggested in the revised Storm Water Utility Credit Manual (**Appendix N**) for parcels maintaining over 45% tree cover on their property to encourage protection of mature trees.

- The City should require all storm water utility credit recipients to routinely self-verify that credits are still applicable for their site. Self-verification should occur at least as frequently as every 5 years. Verification should include proof that the BMP is still present and adequately maintained. The City should contact credit recipients to remind them about upcoming credit expiration and renewal requirements.

  How: The City should require that all storm water utility credits be renewed every 5 years. The City should send a letter to all credit holders prior to the expiration date. Credit holders should be responsible for completing the credit forms and certifying that the credited practices are in place and being maintained.

7.1.3 Engineering

Policy Area 1: Planning and Design

- The City should undertake development of Watershed Improvement Plans for each of the four City watersheds. These plans should focus on water quality and stream health and enhancement projects, with emphasis on restoration of buried streams where feasible (i.e., daylighting). These plans are required to be in place in order to peruse 319(h) grant funding.

  How: The City should contract the development of Watershed Improvement Plans to a specialized consultant as budget allows. The completed plans should be used to identify and prioritize water quality, stream restoration, and habitat improvement projects. The plans can be used to support grant applications for green infrastructure, water quality, and restoration projects (see Policy Area 1 in **Section 7.1.2**).

- The City should review opportunities for green infrastructure installation when designing new storm water improvement, streetscape, complete streets, and other projects within the right-of-way.

  How: Green Infrastructure evaluations will be required through the addition of runoff reduction and infiltration criteria to City post-construction storm water management ordinance (i.e., triggered by the addition or reconstruction of any impervious surface). The City should enforce these rules on their own projects and require utilization of green infrastructure, with an emphasis on landscaped green infrastructure, where feasible to meet runoff reduction and infiltration requirements on any new project undertaken within the right-of-way or elsewhere on City-owned land.

7.1.4 Maintenance and Operations

Policy Area 1: General

- The City should require self-verification by property owners of BMPs that have been installed and maintained across the City. Self-verification should include detention (surface and underground) as well as green infrastructure practices. It should certify that the BMP is still functioning as designed and has been properly maintained. Re-certification should be renewed at least as frequently as every 5 years.

How: The City should require that a maintenance certification be submitted for all storm water BMPs every 5 years. The City should send a letter to all BMP owners prior to expiration date of their current certification. Owners should be responsible for completing a maintenance verification form and certifying that practices are in place and being maintained. This recommendation aligns with the recommendation for SWU credit self-verification in **Section 7.2**. Policy Area 5, and these self-verifications should be coordinated to minimize duplication of effort by property owners and City staff.

- The City should provide additional resources to facilitate implementation of the green infrastructure requirements contained in the updated SWMP; familiarize property owners with BMP and green infrastructure maintenance requirements; and support homeowner compliance with the green infrastructure credit and annual verification process.

  How: The City should explore development of a storm water maintenance training course for contractors and property owners (see **Section 7.1.1** Policy Area 1). Existing training materials are available for Southface Institute that may be utilized in the development of this course. City resources could include:

  + A City-run or City-approved training program featuring separate tracks on green infrastructure: (1) design and installation and (2) maintenance and operations. The intended audience for this program should include builders, contractors, landscapers, and other relevant service providers. Property owners, including homeowners, should be eligible to participate in the maintenance and operations training.
  + A City-maintained list of individuals and businesses that have completed one or both training tracks.
  + Homeowners who have completed the maintenance and operations track should be eligible to inspect and certify functionality of green infrastructure for the purpose of complying with the requirements of the credit application and annual verification process.
  + The list of those that have completed the design and installation track can be a resource for City residents who need to identify a specialized contractor who can provide green infrastructure installation, maintenance, and repair services.

7.2 Storm Water Utility Recommendations

As discussed in **Section 2.6**, the ERU basis for the City was reevaluated as part of this study, and it was determined that ERU adjustments were needed based on changing impervious distribution across the City.

The recommendations to the ERU structure are based on two factors:

1. The desire by the City to develop a tiered residential ERU structure to more equitably set residential rates,
2. The average value of impervious surface for residential properties based on recent evaluation, and

3. Alignment of ERU tiers with the UDO, setting comparable triggers for additional storm water management requirements onsite and additional SWU fees post-development.

AECOM presented data and potential breakdowns of properties in a single tier (as exists today), three tiers, and four tiers. Through multiple work sessions with City staff, a four-tier system was determined to be most appropriate with a breakdown of tiers as shown in **Table 7-2**.

Table 7-2: Residential ERU Determination – Four Tiers

		Imp Area (square feet)	Count	Percentage	Average Imperviousness (square feet)	Median Imperviousness (square feet)
Tier 1	Less than or equal to	2,500	1,029	20%	1,985	2,125
Tier 2	Less than or equal to	4,000	2,276	45%	3,226	3,223
Tier 3	Less than or equal to	5,000	989	20%	4,440	4,411
Tier 4	Greater than	5,000	741	15%	6,385	5,827

For non-residential properties, various options for rounding the ERU size were evaluated. It was decided that all non-residential properties would have a value of at least 1 ERU but properties with impervious coverages greater than 4,000 square feet would be rounded to the nearest tenth. This is exemplified as follows:

- 3,700 square feet = 1.0 ERUs
- 4,300 square feet = 1.1 ERUs
- 7,700 square feet = 1.9 ERUs
- 8,300 square feet = 2.1 ERUs

7.2.1 Revised Credit Policy

The City's existing SWU has an existing Credit manual, developed in 2000, as part of the original Ogden study, but this manual needed update to align the criteria with current City storm water needs and design standards. The credit manual has been updated as part of the SWU assessment (see **Appendix O**). New credit criteria outlined in the revised manual are presented below.

- **Water Quality (10%)** – Water Quality Credits can be obtained through one of three methods:
  + **Runoff Reduction Requirement** – Design, construct and maintain storm water facilities that meet the requirements of the Georgia Storm Water Management manual to infiltrate onsite, the runoff from all storms of 1.0 inches or less precipitation.
  + **Water Quality Requirement** – Design, construct and maintain storm water facilities that meet the requirements of the Georgia Storm Water Management manual to treat runoff from all storms of 1.2 inches or less precipitation depth to a level that will reduce the Total Suspended Solids load from the effected impervious area by an annual amount of 80 percent.

+ **Tree Canopy** – Maintain greater than 45% tree cover across the entire parcel, as documented by site survey or aerial photography.

- **Stream Channel Protection (10%)** - Provide extended detention of the 1-year storm (3.36 inches) such that the volume is released over a 24-hour period to reduce bank-full flow conditions and downstream channel scour.
- **Overbank Flood Protection (10%)** - Provide peak discharge control such that the peak runoff rate for a 25-year design storm from the effected impervious area does not exceed 90 percent of the rate under undeveloped conditions.
- **Extreme Flood Protection (10%)** - Provide peak discharge control such that the peak runoff rate for a 100-year design storm from the effected impervious area does not increase the runoff rate under undeveloped conditions at the property boundary line or at any location within a downstream drainage area equal to 10 times the area of the effected impervious area.

Through an analysis of the City's GIS data, AECOM determined that 1,220 residential and 1,160 non-residential are identified as "detained parcels." Credit assumptions were built into the SWU rate study based on this assumed number of detained parcels as shown in **Table 7-3**.

Table 7-3: Assumed Credits

		Number			
	Percentage	Tier 1	Tier 2	Tier 3	Tier 4
Residential Credits	20%	249	551	240	180
		ERUs			
Non-residential Credits	20%	3,118			

7.2.2 Exemptions

The following are exempt from storm water utility fees, per Section 9.8.3 of the UDO. No changes are proposed to these existing exemptions from this study.

- State roads –the Georgia DOT is exempt from compliance with local ordinances; thus, state roads are exempted from SWU fees since collection of these fees is not possible.
- Railroad tracks – The Interstate Commerce Commission Termination Act preempts state and local regulation over railroad lands, and thus makes local ordinances unenforceable on these properties. Railroads are exempted from SWU fees since collection of these fees is not possible.
- Properties with less than 100 square feet imperviousness – the City adopted a de minimis threshold of 100 square feet for SWU billing purposes. Properties with less than 100 square feet (as delineated by the updated impervious cover assessment) were removed from billing.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Implementation Schedule

For the proposed storm water capital improvements presented in **Section 6.2**, it would take around a $36 million project budget to complete project Tiers A and B, this equates to around $1.8 Million per year in current dollars. To help prioritize project implementation, projects are presented in 5-year implementation blocks in **Tables 8-1** through **8-4**.

Table 8-1: Proposed Projects – Zero to Five-year Implementation Horizon

Project Name	Location	Watershed	Length (feet)	Score	Project Cost ($)	Running Funding Total ($)
SH109	Derrydown Way	Shoal Creek	2,128.4	100.00	$766,411	$766,411
SH116	Park Drive & Candler St	Shoal Creek	2,788.9	99.90	$1,036,350	$1,802,761
SF120	North Decatur and Ferndale	South Fork Peachtree Creek	2,007.5	99.68	$909,610	$2,712,371
SH117	Brower St and Mclean St	Shoal Creek	2,404.9	93.60	$720,191	$3,432,562
SF101	Champlain St, Seneca St, Geneva St	South Fork Peachtree Creek	2,672.4	93.58	$993,116	$4,425,678
SF111	Sycamore Drive and Fairview St	South Fork Peachtree Creek	2,804.6	93.16	$1,006,385	$5,432,062
SH113	Mimosa Drive and Mimosa Place	Shoal Creek	2,531.9	92.51	$759,485	$6,191,547
PC108	Lamont Dr (northest)	Peavine Creek	943.2	92.09	$296,826	$6,488,373
PC109	Wilton Dr at Plainview st	Peavine Creek	1,552.1	92.09	$456,509	$6,944,882
SF109	Lockwood Terrace	South Fork Peachtree Creek	3,690.1	92.09	$1,667,552	$8,612,434
SF116	Sycamore Place and Ponce de Leon Ave	South Fork Peachtree Creek	816.7	91.69	$245,597	$8,858,032
				5-Year Total	$8,858,032	
				Total with Inflation	$9,508,823	

Table 8-2: Proposed Projects – Five to Ten-year Implementation Horizon

Project Name	Location	Watershed	Length (feet)	Score	Project Cost ($)	Running Funding Total ($)
SF106	Forkner Dr	South Fork Peachtree Creek	3,445.9	90.54	$1,490,401	$10,348,433
PC112	North of West Ponce de Leon Ave between Commerce and Clairemont	Peavine Creek	210.9	90.21	$52,211	$10,400,644
SH115	Chevelle Ln & Pharr Rd	Shoal Creek	2,920.6	90.05	$1,010,681	$11,411,325
SF108	Mt Vernon Dr	South Fork Peachtree Creek	1,666.8	88.74	$611,966	$12,023,291
PC107	Vidal Blvd	Peavine Creek	3,890.0	88.42	$1,146,548	$13,169,839
PC105	Garden Ln	Peavine Creek	3,160.9	86.62	$910,601	$14,080,441
SF107	Glendale Ave south of Mt Vernon Dr	South Fork Peachtree Creek	800.4	86.58	$245,633	$14,326,074
SF114	Glen Circle - Glendale Ave through Pinecrest Ave (south)	South Fork Peachtree Creek	1,661.6	86.45	$693,709	$15,019,783
SH114	Midway Rd	Shoal Creek	887.8	86.45	$286,303	$15,306,085
PC118	Coventry Rd	Peavine Creek	2,158.9	86.45	$622,406	$15,928,491
SF113	Glen Circle - Glendale Ave through Pinecrest Ave (north)	South Fork Peachtree Creek	1,827.1	86.45	$605,181	$16,533,672
SF115	Ponce de Leon Ave west of Glendale Ave	South Fork Peachtree Creek	1,052.5	85.80	$340,114	$16,873,787
PC115	Commerce Dr	Peavine Creek	1,260.2	85.39	$297,484	$17,171,270
PC114	Ponce de Leon Ave at Church St	Peavine Creek	1,270.9	85.19	$308,197	$17,479,467
PC110	Ponce de Leon PL and Beaumont Ave (west)	Peavine Creek	546.3	84.57	$127,347	$17,606,814
SH108	Columbia Dr at College Ave	Shoal Creek	1,002.6	84.57	$347,031	$17,953,845
				5-Year Total	$9,095,814	
				Total with Inflation	$11,087,746	

Table 8-3: Proposed Projects – Ten to Fifteen-year Implementation Horizon

Project Name	Location	Watershed	Length (feet)	Score	Project Cost ($)	Running Funding Total ($)
PC130	Howard Ave at Patillo Way	Peavine Creek	1,230.3	84.57	$303,092	$18,256,938
PC116	Northern Ave at West Ponce de Leon	Peavine Creek	749.7	84.18	$182,463	$18,439,401
PC104	Clairmont Ave at Scott Blvd	Peavine Creek	783.0	83.48	$208,340	$18,647,741
SF112	Sycamore Drive	South Fork Peachtree Creek	422.9	82.69	$152,551	$18,800,292
PC111	Ponce de Leon PL and Beaumont Ave (east)	Peavine Creek	912.1	82.36	$242,617	$19,042,909
PC117	Northern Ave between Oakland St and Montgomery St	Peavine Creek	1,435.7	82.10	$376,481	$19,419,390
PC106	Lamont Dr (west)	Peavine Creek	1,754.6	80.81	$364,845	$19,784,235
PC113	West of Claremont Ave (north of Ponce)	Peavine Creek	401.5	80.81	$138,960	$19,923,195
PC103	Ridley Cir and Mockingbird Ln	Peavine Creek	1,987.2	80.81	$623,934	$20,547,128
SF102	Lucerne St (northeast)	South Fork Peachtree Creek	272.6	80.81	$85,777	$20,632,906
PC101	Westchester Dr	Peavine Creek	1,135.8	80.81	$348,999	$20,981,904
PC102	Chelsea Dr and Kathryn Ave	Peavine Creek	1,696.7	80.81	$491,475	$21,473,380
SF104	Church St at Medlock Rd	South Fork Peachtree Creek	501.5	77.06	$136,896	$21,610,276
SF110	Hillcrest Ave	South Fork Peachtree Creek	813.0	76.93	$175,365	$21,785,641
SH101	Lenore St	Shoal Creek	1,616.8	75.61	$887,020	$22,672,661
SH110	Avery Drive and Winnona St	Shoal Creek	6,240.3	84.00	$2,651,198	$25,323,858
SC107	Spring St and East Lake Dr	Sugar Creek	2,396.7	77.58	$741,431	$26,065,289
SF118	Candler St	South Fork Peachtree Creek	693.4	77.06	$218,093	$26,283,382
				5-Year Total	$8,329,537	
				Total with Inflation	$11,210,460	

Table 8-4: Proposed Projects – Fifteen to Twenty-year Implementation Horizon

Project Name	Location	Watershed	Length (feet)	Score	Project Cost ($)	Running Funding Total ($)
SC102	Madison Ave and Second Ave	Sugar Creek	2,914.3	75.14	$1,406,034	$27,689,416
SC103	Second Ave north of Oakview Rd	Sugar Creek	548.2	73.43	$161,913	$27,851,329
SC106	Spring St at Fayetteville Rd	Sugar Creek	426.2	73.30	$105,975	$27,957,304
SF117	E Ponce de Leon at Commerce Dr	South Fork Peachtree Creek	927.8	73.30	$230,689	$28,187,993
PC119	Woodlawn Ave	Peavine Creek	1,343.0	70.40	$423,987	$28,611,980
SH111	Kirk Crossing	Shoal Creek	546.8	67.73	$126,346	$28,738,326
PC128	Drexel Ave at Devonshire Ave	Peavine Creek	1,922.9	67.66	$526,786	$29,265,112
SH102	Ansley St at Jefferson Pl	Shoal Creek	818.0	67.66	$285,525	$29,550,637
PC124	Drexel Ave at Emerson Ave	Peavine Creek	1,153.7	67.66	$339,843	$29,890,480
PC127	Melrose Ave	Peavine Creek	1,239.5	67.66	$338,389	$30,228,869
PC129	Devonshire Ave at Landsdown Ave (southwest)	Peavine Creek	942.6	67.66	$257,331	$30,486,200
SF103	Eastland DR	South Fork Peachtree Creek	337.0	65.78	$83,797	$30,569,996
PC120	Clarion Ave	Peavine Creek	891.0	65.62	$243,244	$30,813,241
PC122	Pinetree Dr and Nelson Ferry Rd (west)	Peavine Creek	2,958.7	65.49	$960,176	$31,773,416
PC125	Parkwood Ln	Peavine Creek	2,189.6	62.79	$704,022	$32,477,438
SC105	5th Ave	Sugar Creek	614.7	62.75	$65,165	$32,542,603
PC121	Nelson Ferry Rd (east)	Peavine Creek	1,124.1	62.73	$324,496	$32,867,099
PC123	West Ponce de Leon between Drexel and Parkwood	Peavine Creek	1,329.7	62.72	$367,953	$33,235,052
SH105	Adams St south of Oakview Rd	Shoal Creek	393.8	62.02	$118,473	$33,353,525
PC126	Parkwood Rd	Peavine Creek	3,053.5	62.02	$460,632	$33,814,158
SC104	Maxwell St and Third Ave	Sugar Creek	990.5	62.02	$326,882	$34,141,040
SH104	Adams St north of Hancock St	Shoal Creek	1,211.3	62.02	$340,341	$34,481,381
SF105	Glenlake Commons	South Fork Peachtree Creek	380.9	60.14	$103,975	$34,585,356
SH106	Commerce Dr at Village Walk Drive	Shoal Creek	541.5	60.14	$155,195	$34,740,550
SH107	Commerce Dr south of College Ave	Shoal Creek	599.1	60.14	$129,948	$34,870,498
SC108	Fayetteville Rd	Sugar Creek	1,323.1	58.94	$310,350	$35,180,848

Project Name	Location	Watershed	Length (feet)	Score	Project Cost ($)	Running Funding Total ($)
SC101	East Lake Dr	Sugar Creek	1,199.8	58.26	$218,639	$35,399,487
SH103	Kings Highway	Shoal Creek	1,039.4	56.38	$357,572	$35,757,059
SH112	Kirk Rd	Shoal Creek	425.3	56.38	$373,235	$36,130,294
				5-Year Total	$9,032,573	
				Total with Inflation	$13,252,647	

8.2 Financial Planning

The storm water utility budget covers costs associated with the below categories:

- Personnel (includes staff salary and fringe benefits)
- Other services and charges (include maintenance, contracts, professional services, etc.)
- Supplies (includes office and field materials, ex: landscape supplies)
- Capital outlay (includes infrastructure, property, and vehicles)

To project future storm water utility needs, the existing budget categories were examined for the dates 2012-2020 to form a baseline and to identify potential future increased needs. While some categories like supplies and building costs should remain relatively constant, from a review of the budget items with the City staff, future potential increases in the existing budget will be needed to account for:

- Implementation of additional capital improvement projects,
- Increases in maintenance needs for future infrastructure
- Increases to staffing, and
- Inflation.

A projection of future storm water utility funding needs was performed and is included in **Appendix O.** This projection was based on averaging the SWU category budgets from 2012-2020, and escalation of some category budgets per the below:

- Capital improvement projects
  - Tier A and B projects are recommended for implementation over the next 20 years, as identified in **Section 6.2**. The present-day costs of these projects were escalated over the next 20 years considering a 2% annual inflation to determine the future budget needs,
- Maintenance
  - Maintenance budgets were increased proportionally to the proposed infrastructure to be acquired from the Feasibility Study (See **Section 5.2**), since these existing systems are of unknown condition it was assumed, they would have some level of maintenance, upgrade, or replacement necessary.
- Increases to staffing
  - Staffing increases will need to be made relative to the system size and growth. Although these changes will be slowly phased in over time, it is assumed that ultimately a 50% staff increase will be needed given the projected growth of the system (ultimately 195% increase in the system).

With the above budget needs, $3.5 Million per year is projected as the future SWU system budget needs in present dollars, this includes the suggested $1.8 Million in CIP storm water investment required to implement Tier A and B projects. To adequately predict future budget needs CIP project costs must be escalated to include inflation. A 2% annual inflation figure was added to the annual estimated project budget planning horizons (5-year, 10-year, 15-year, and 20-year). This total was used to determine annual storm water capital improvement budget needs.

8.2.1 Revenues

Recommendations to modify the ERU structure were made in **Section 7.2.** A financial analysis was completed using the proposed structure with an annual revenue goal of $3.5 million annually. Based on this goal, an ERU rate of $285 per year was required, see **Appendix O** for details.

The breakdown of residential rates for the proposed tiers is included in **Table 8-5** and a summary of projected revenues for various land use types are included in **Table 8-6** and **Figure 8-1**.

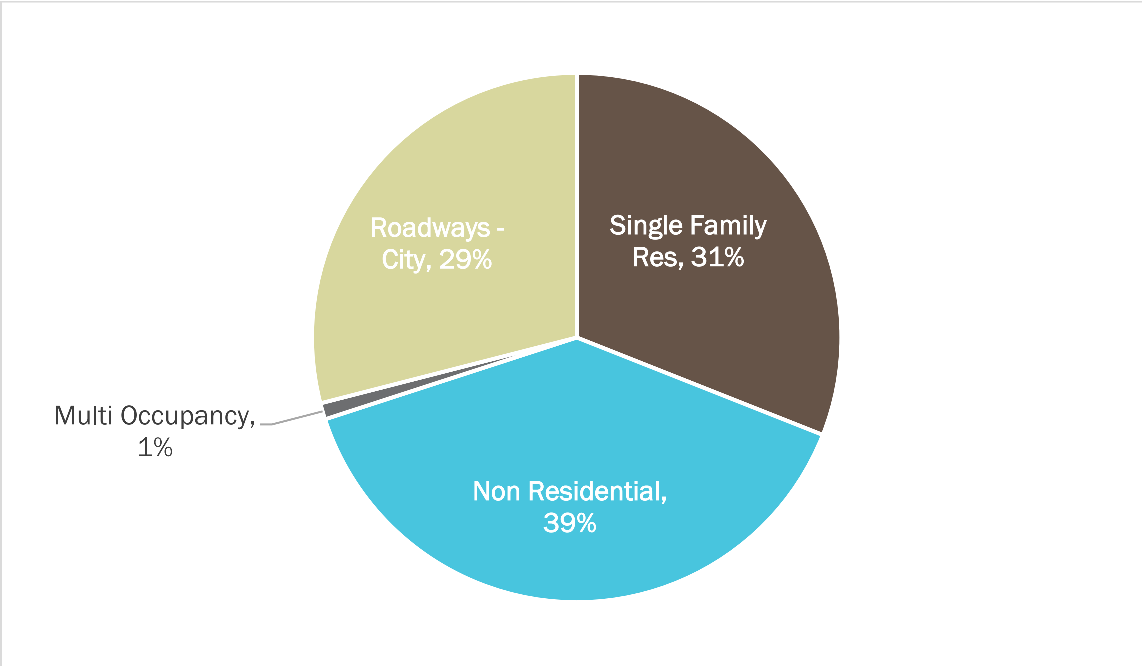
Table 8-5: Proposed Residential Tier Rates

		Imp Area (square feet)	ERU ratio	Fee
Tier 1	Less than or equal to	2,500	0.4	$114
Tier 2	Less than or equal to	4,000	0.7	$200
Tier 3	Less than or equal to	5,000	1.0	$285
Tier 4	Greater than	5,000	1.4	$399

Table 8-6: Summary of Land Uses and Revenues

	Total Imp	Percentage	ERUs	Revenue	Percentage
Single-family Residential	18,507,000	35%	4,031	$1,149,000	31%
Non-Residential	16,688,000	31%	4,973	$1,417,000	39%
Multi Occupancy	611,000	1%	153	$44,000	1%
Roadways - City	15,042,000	28%	3,760	$1,072,000	29%
Roadways - GDOT	2,395,000	4%	599	$0	0%
Totals	**53,243,000**	**100%**	**13,517**	**$3,682,000**	**100%**

Figure 8-1: Percent Revenue by Land Use



9. REFERENCES

City of Decatur Storm Water Master Plan, 2004

City of Decatur, Community Transportation Plan, 2007

City of Decatur, Livable Centers Initiative Study, 2011

Decatur 360 Comprehensive Plan Update, 2016

Decatur Environmental Sustainability Plan, 2012

Decatur Preservation Corridor Master Plan, 2004

2010 Strategic Plan, City of Decatur, Georgia

Georgia Storm Water Management Manual, 2016 edition

NOAA Weather Scorecard Peachtree City, GA (https://www.weather.gov/ffc/rainfall_scorecard)