

# TALLAHASSEE MASTER PLAN – SURFACE WATER (TMaPS): VOLUME 2

## BACKGROUND & APPROACH



**CITY OF  
TALLAHASSEE**



*Submitted by:*  
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**July 2025**

**Geosyntec**   
consultants

engineers | scientists | innovators



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# **BACKGROUND & APPROACH**

## **CITY OF TALLAHASSEE**

*Prepared for*

**City of Tallahassee**

300 South Adams Street  
Tallahassee, Florida 32301

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Project Number: FW7714

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# TMaPS: VOLUME 2

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The engineering material and data contained within the enclosed report was prepared by Geosyntec Consultants, Inc. for sole use by the City of Tallahassee. This report was prepared under the supervision and direction of the respective undersigned, whose seal as a registered professional engineer is affixed below.

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**Tallahassee Master Plan – Surface Water (TMaPS)**

Volume 1: Executive Summary

Volume 2: Background & Approach

Volume 3: Lake Munson Basin

Volume 4: Lake Jackson Basin

Volume 5: Lake Lafayette Basin

Volume 6: Wakulla Springs and Lake Talquin

Volume 7: Non-Structural and Structural Project Development

Volume 8: Regulatory Review

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## ACRONYMS AND ABBREVIATIONS

BMAP	basin management action plan
BMP	best management practices
City	City of Tallahassee
EMC	event mean concentration
EPA	U.S. Environmental Protection Agency
ET	evapotranspiration
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
GI	Green Infrastructure
GIS	geographic information system
IWR	Impaired Waters Rule
lb/yr	pounds per year
LID	Low Impact Development
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NWFWMD	Northwest Florida Water Management District
OSTDS	onsite sewage treatment and disposal system
TMaPS	Tallahassee Master Plan - Surface Water
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TSI	Trophic State Index
USGS	U.S. Geological Survey



## 2 BACKGROUND & APPROACH

The City of Tallahassee (City) can trace its roots back to the 16<sup>th</sup> century when Europeans colonized the region, making it part of Spanish Florida. In addition to being the capital city of Florida, the City is the seat of Leon County and is located in the northern part of the state, within the Panhandle and Big Bend regions of the state.

An important characteristic of the City is that it has several waterbodies throughout and around its jurisdiction that play an important role together in the region's history and ecology. Recognizing that water quality plays a vital role in preserving and enhancing the natural environment, the community implemented a Penny Sales Tax to raise money to improve local surface water quality. The Penny Sales Tax is expected to provide approximately \$42.5 million dollars over a period of 20 years (2020-2039) that is dedicated to addressing or mitigating surface water pollution, which is core to the City's mission and vision, and is reflected as such in the City's current Five-Year Strategic Plan. The City's only previous comprehensive surface water quality master planning effort related to stormwater runoff was completed in 1995.

To most efficiently and effectively mitigate surface water pollution, a comprehensive master plan based on sound data, science, and engineering is essential. To that end, the City contracted with Geosyntec Consultants, Inc. (Geosyntec) to perform this Surface Water Quality Master Plan, titled Tallahassee Master Plan – Surface Water (TMaPS). The plan is intended to identify water quality related studies and capital improvement projects that the City can implement over the next 20 years to mitigate surface water pollution. While many aspects of the plan are focused on stormwater runoff, other sources of surface water pollution are identified, quantified, and discussed where relevant.

### 2.1 Study Extent and Justification

Specifically, the City is located within the jurisdiction of Leon County and the Northwest Florida Water Management District (NFWFMD) (**Exhibit 2-1**), where an abundance of natural and manmade surface waterbodies, springs, wetlands, ditches, and creeks exist, some of which are the focus of this study. The City is a Phase I municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) permittee through the Florida Department of Environmental Protection (FDEP), which regulates the amount of pollutants that can be discharged to surface waterbodies throughout the MS4.

The City's stormwater infrastructure is typical of urban and suburban areas consisting of a mix of curb and gutter streets with piped conveyances and small conveyance ditches that discharge to larger conveyance ditches that convey stormwater to facilities that provide attenuation and treatment before discharging to one of the many surface water features. The City's incorporated areas are part of three major drainage basins, namely the Lake Munson basin, Lake Jackson basin, and Lake Lafayette basin. Additionally, the City contributes to Lake Talquin via the cooling water discharge from the City's power plant and is within the Wakulla Spring Springshed.

The Lake Munson basin is located in the southcentral part of Leon County. The basin has a total area of approximately 42,500 acres (66.5 square miles), of which approximately 40,400 acres (63.1 square miles) is land while the remaining 2,100 acres (3.3 square miles) is water. A total of

approximately 19,000 acres (29.7 square miles) of the basin is located within the City's incorporated limits (**Exhibit 2-1**).

The Lake Munson basin drains generally south through a network of drainage ditches to Lake Munson, which then flows to Ames Sink. The northern and eastern part of the basin are heavily urbanized and include a large portion of the City. Six primary waterbodies were identified for evaluation within this basin, namely, Lake Munson, Munson Slough, the Bradford Chain of Lakes (Lake Bradford, Lake Hiawatha, and Cascade Lake), and Silver Lake.

The Lake Jackson basin is located in the north-central part of Leon County and includes only small portions of the northern part of the City. The basin has a total area of approximately 27,340 acres (42.7 square miles), of which approximately 20,948 acres (32.7 square miles) is land while the remaining 6,392 acres (10.0 square miles) is water. A total of approximately 6,014 acres (9.4 square miles) of the basin is located within the City's incorporated limits (**Exhibit 2-1**).

The Lake Jackson basin generally drains through a number of drainage ditches, channels, creeks, and other surface water features to Lake Jackson. The basin is largely undeveloped with the exception of the portions of the southern and eastern regions, which are a mix of suburban and urban areas. Nine primary waterbodies were identified for evaluation within this basin, namely, Lake Jackson, Carr Lake, Summerbrook Chain of Lakes (Lake Alyssa, Somerset Lake, and Shelly Pond), Summerbrook Creek, Lake Overstreet, Lake Hall, and Lexington Creek.

The Lake Lafayette basin is located in the northeastern part of Leon County. The basin has a total area of approximately 54,170 acres (84.6 square miles), of which approximately 51,212 acres (80.0 square miles) is land while the remaining 3,958 acres (6.2 square miles) is water. A total of approximately 27,810 acres (43.5 square miles) of the basin is located within the City's incorporated limits, see **Exhibit 2-1**.

The Lake Lafayette basin generally drains through a number of drainage ditches, creeks, and surface water features to Upper Lake Lafayette. A key hydrologic feature of Upper Lake Lafayette are numerous sinks, the largest of which is located on the north side of the lake, such that flows into Upper Lake Lafayette ultimately discharge into the groundwater system through the sinks and the porous lake bottom. Eleven primary waterbodies were identified for evaluation within this basin, namely Lafayette Chain of Lakes (Upper Lake Lafayette, Piney Z Lake, Lower Lake Lafayette, Alford Arm), Killearn Chain of Lakes (Lake Kinsale, Lake Killarney, Lake Kanturk), Lake Tom John, Shakey Pond, Lafayette Creek, and Lake Leon.

Lake Talquin is an approximately 8,127-acre lake located between Leon County and Gadsden County (FDEP, 2021). Specifically, the lake is located along the western part of Leon County, west of the City limits (**Exhibit 2-1**). The City's interest in this waterbody is due to the Arvah B. Hopkins Generating Station, which is a natural gas power station that discharges its cooling water to Beaver Creek, which flows into the upper portion of Lake Talquin (FDEP, 2021). Wakulla Spring is located south of the City in Wakulla County (**Exhibit 2-1**), within the Ocala Karst District of the Woodville Karst Plain, and is the primary source of water to the Wakulla River (FDEP, 2018). The City's interest in the spring is due its entire jurisdictional boundary being located within the springshed. **Table 2-1** presents a list of the reports reviewed.



**Table 2-1: Executive Summary and Background & Approach Reference List**

Report Name	Author	Year
Upper Wakulla River and Wakulla Spring Basin Management Action Plan	FDEP	2018
Final Report Nutrient TMDLs for Lake Talquin (WBIDs 1297X, 1297Y, and 1297Z) and Documentation in Support of the Development of Site-Specific Numeric Interpretations of the Narrative Nutrient Criterion	FDEP	2021

## 2.2 Purpose

The intended use of this plan is multi-faceted. The plan provides documentation of past efforts, characterization of water quality, recommendations for data collection projects and water quality improvement projects for each waterbody, and detailed recommendations for updates to City codes and ordinances that support stormwater and surface water quality improvement. Water quality assessments within the plan are in reference to nutrients, namely nitrogen and phosphorus species, and to a lesser extent, bacteria. The data collection projects are intended to provide guidance to the City on what data is needed to better understand the stressors that are having the most significant impact on resultant water quality and which data collection efforts the City should prioritize. Similarly, the water quality improvement projects are a prioritized list of projects that are ranked based on favorability of the project cost benefit. This list of projects provides the City with a roadmap of projects to implement to help improve the water quality and protect the beneficial use of the City surface waterbodies.

## 2.3 Tasks Performed

The work conducted to achieve the purpose outlined above included data collection, waterbody data review and summary, water quality assessment, water quality project identification and prioritization, structural best management practice (BMP) identification and prioritization, non-structural BMP identification, as well as review of existing City regulations. Detailed descriptions of the work completed under each task is provided in the following sections.

### 2.3.1 Data Collection

The data collection task included the collection, review, and organization of available information pertinent to development of this plan as provided by the City. A list of the types of data/information collected and reviewed is presented below. In particular, a review of previous studies and master plans was performed to identify and understand available information relevant to the plan. All geographic information system (GIS) data, provided by the City and otherwise acquired by Geosyntec from various sources, was reviewed for completeness and accuracy and organized into geodatabases.

- Previous studies and master plans
- Historical flow and water quality data
- Historical stormwater runoff water quality data
- City-specific event mean concentration (EMC) data
- Relevant watershed/contributing area GIS coverages
- Land use GIS coverages
- Soils GIS coverages

- Drainage infrastructure GIS coverages
- City stormwater regulations
- Historical rainfall data
- Historical evapotranspiration (ET) data
- Wastewater discharge reports and GIS data
- Onsite sewage treatment and disposal system (OSTDS) GIS data
- Waterbody bathymetry
- Groundwater data
- Biological data

Additional data sources, beyond the data provided by the City, included the following:

- FDEP Impaired Waters Rule (IWR) database
- Adopted, verified, delist, study, and master lists for the Ochlockonee-St. Marks basin
- FDEP and U.S. Environmental Protection Agency (EPA) total maximum daily load (TMDL) reports
- Basin Management Action Plan (BMAP) for Wakulla Springs; 303(d) list supporting documentation from FDEP
- United States Geological Survey (USGS) and NFWFMD precipitation, stage, and flow data

Additionally, each of the subject waterbodies and other significant features were visited in the field to observe current conditions. A written summary of the field investigation was submitted to the City prior to the plan (see **Attachment A**).

### 2.3.2 Waterbody Data Review and Summary

The waterbody data review and summary task included a review and summary of the data and information collected in the previous task and an evaluation of each waterbody based on its existing water quality conditions and general health as defined by state water quality criterion (62-302, 62-303), trophic state index (TSI), and/or equivalent waterbody health metrics. The available surface water quality data along with available reports and supporting GIS information were analyzed to provide qualitative assessments of potential pollutant sources to the primary waterbodies identified in Section 2.2. The qualitative assessments addressed specific potential sources, which included:

- Stormwater runoff
- Septic systems
- Internal recycling and seepage
- Wastewater
- Atmospheric deposition
- Interconnected flows (connections to upstream waterbodies)

No new field data collection was performed as part of this planning effort; therefore, the plan is based on previously available data. However, data and information gaps were identified to support development of future studies and gain a better understanding of the primary stressors for each waterbody.

Where sufficient data or other information allowed, qualitative determinations were made on the potential for each of the sources to contribute to degradation of the waterbody of interest, which provided an initial evaluation of specific sources to focus on for each of the waterbodies and guided the development of structural and non-structural project development and recommended additional data collection and future studies.

### **2.3.3 Water Quality Assessment**

Where sufficient data existed, total nitrogen (TN) and total phosphorus (TP) loading estimates for each of the potential sources were developed. Each of the potential sources were evaluated relative to the other sources and to each waterbody as part of a hot spot analysis, which was used to identify areas within each drainage basin to prioritize for potential water quality improvement projects or data collection studies.

### **2.3.4 Water Quality Study Identification and Prioritization**

The results of the previous tasks were used to support the identification and prioritization of potential water quality improvement studies needed to address identified data gaps and/or better improve understanding of a particular waterbody. The studies included, but were not limited to, data collection recommendations, specific stressor studies, whole lake studies, potential in-lake water quality improvement project studies, and small area studies.

For each of the basins, studies were prioritized based on a decision matrix that considered the priority of the waterbody for restoration, the ranking of the source being evaluated by the study, the extent of missing data, the potential restoration benefits, and the estimated study costs. Study recommendations included identification of the data to be collected and general guidance on the work to be performed.

### **2.3.5 Structural BMP Identification and Prioritization**

As defined within this plan, structural BMPs include any water quality treatment structure or facility that is intended to provide a water quality benefit. Examples include stormwater treatment BMPs such as stormwater ponds and filters, as well as baseflow treatment systems, such as alum injection, OSTDS abatement, and offline filtration.

Based on the results of the previous tasks and input from the City, more than 50 locations were identified and assessed for potential BMP projects across all drainage basins. The sites were evaluated based on potential water quality benefit across all drainage basins and then for each drainage basin. The top 10 potential locations included four locations with projects currently underway and six locations without. The currently underway projects were summarized while proposed projects for the remaining six locations were further evaluated for specific BMP concepts and/or pilot projects, estimated water quality benefit, and estimates of probable cost. The proposed project sites were summarized in a fact sheet format. An additional eight projects that scored high, but were not within the top 10 potential locations, were also developed and summarized, and should be considered after the top 10 projects have been implemented.

### **2.3.6 Non-Structural BMP Identification**

As defined within this plan, non-structural BMPs are those that do not have a physical or structural component. Examples include ordinances, educational outreach, pet waste programs,

street sweeping programs, minor enhancements (such as inlet baskets), etc. The City already performs several non-structural BMPs, so limited new potential BMPs were identified. The non-structural BMPs the City already performs and new recommendations provided were assessed using a benefit-cost process with estimated removal amounts/credits, where data were available.

### 2.3.7 Review of Existing City Regulations

A review of the City's existing regulatory framework as it relates to stormwater management and water quality treatment was performed and encompassed the following elements:

- Reviewed and summarized City stormwater regulations to determine sufficiency and recommended revisions and/or enhancements
- Reviewed stormwater management criteria (Comprehensive Plan, Code or Ordinances, Land Development Code, NPDES MS4 permit, etc.)
- Checked for concurrency of water quality treatment standards with FDEP, NFWMD, Florida Department of Transportation (FDOT), and the County
- Reviewed challenges associated with new development and redevelopment
- Performed comparisons to four other municipalities regulations
- Performed check of building code for potential conflicts to Low Impact Development (LID) and Green Infrastructure (GI) principles
- Performed check for code inhibitions, constraints, and/or challenges to application of LID/GI
- Determined the applicability of the BMP Trains Model as a tool to demonstrate compliance

The results of these reviews included recommendations for deletions, edits, and new text in the documents discussed above. The recommendations were summarized in a final report submitted to the City prior to completion of this plan, but are included again within the plan under Volume 8, Regulatory Review. However, the review was completed prior to FDEP's adoption of new stormwater rules for land development in 2024 and, accordingly, several recommendations are outdated.

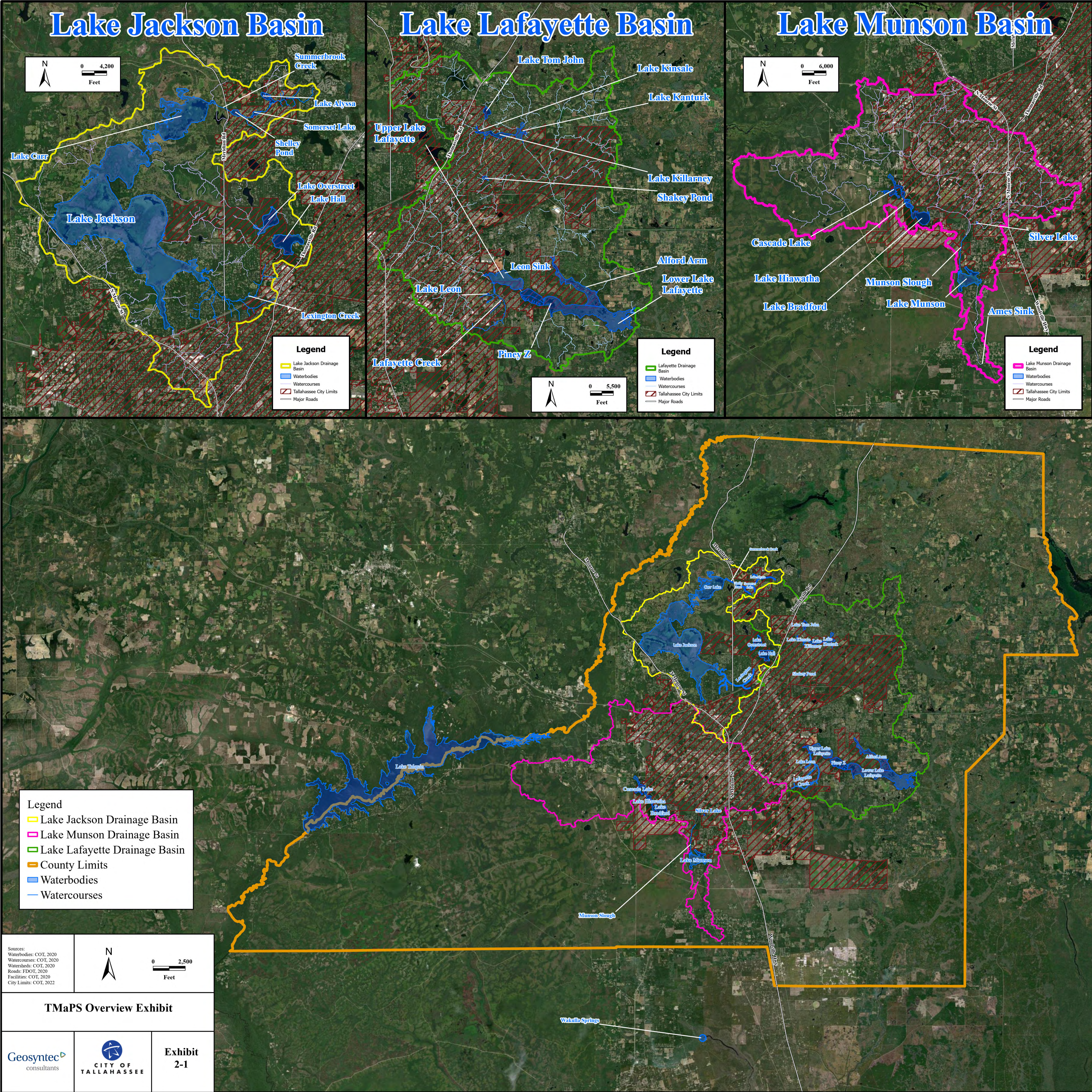
## 2.4 Plan Organization

This plan is known as TMaPS and is a voluminous summary of the work described in Section 2.4. TMaPS is organized as follows.

- Volumes 1 and 2: Executive Summary and Background & Approach, which includes a high-level summary of the work performed and introduces the plan objectives, background, and intended use.
- Volumes 3, 4, 5, and 6: Basin reports outlining the data collection, waterbody data review and summary, water quality assessment, and water quality study identification are presented in these volumes. There is one volume for each of the major drainage basins identified and one volume for the waters outside of the primary drainage basins. Specifically, the primary drainage basins include Lake Munson (Volume 3), Lake Jackson (Volume 4), and Lake Lafayette (Volume 5), while the waterbodies outside of the drainage basins include Wakulla Spring and Lake Talquin (Volume 6).

- Volume 7: Non-Structural and Structural BMPs are presented in this volume. A summary of recommendations to help improve water quality within the subject waterbodies is also provided.
- Volume 8: The previously completed Regulatory Review is presented as a summary report in this volume. A description of the current and proposed techniques aimed at reducing the stormwater impacts of new development and areas of significant redevelopment is presented. A description of innovative stormwater planning techniques recommended for possible future incorporation into the codes and regulations (beyond what may be currently in draft) is also presented. However, the review was completed prior to FDEP's adoption of new stormwater rules for land development in 2024 and, accordingly, several recommendations are outdated.





# Lake Jackson Basin

# Lake Lafayette Basin

# Lake Munson Basin

**Legend**

- Lake Jackson Drainage Basin
- Waterbodies
- Watercourses
- Tallahassee City Limits
- Major Roads

**Legend**

- Lafayette Drainage Basin
- Waterbodies
- Watercourses
- Tallahassee City Limits
- Major Roads

**Legend**

- Lake Munson Drainage Basin
- Waterbodies
- Watercourses
- Tallahassee City Limits
- Major Roads

**Legend**

- Lake Jackson Drainage Basin
- Lake Munson Drainage Basin
- Lake Lafayette Drainage Basin
- County Limits
- Waterbodies
- Watercourses

Sources:  
Waterbodies: COT, 2020  
Watercourses: COT, 2020  
Watersheds: COT, 2020  
Roads: FDOT, 2020  
Facilities: COT, 2020  
City Limits: COT, 2022

**TMaPS Overview Exhibit**

Exhibit  
2-1



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Geosyntec is a specialized consulting and engineering firm that works with private and public sector clients to address their new ventures and complex problems involving the environment, our natural resources, and our civil infrastructure. Geosyntec has a staff of over 2,000 engineers, scientists, and related technical and project support staff located in more than 90 offices throughout the U.S. and in Canada, Sweden, Australia, and the United Kingdom.

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