2024

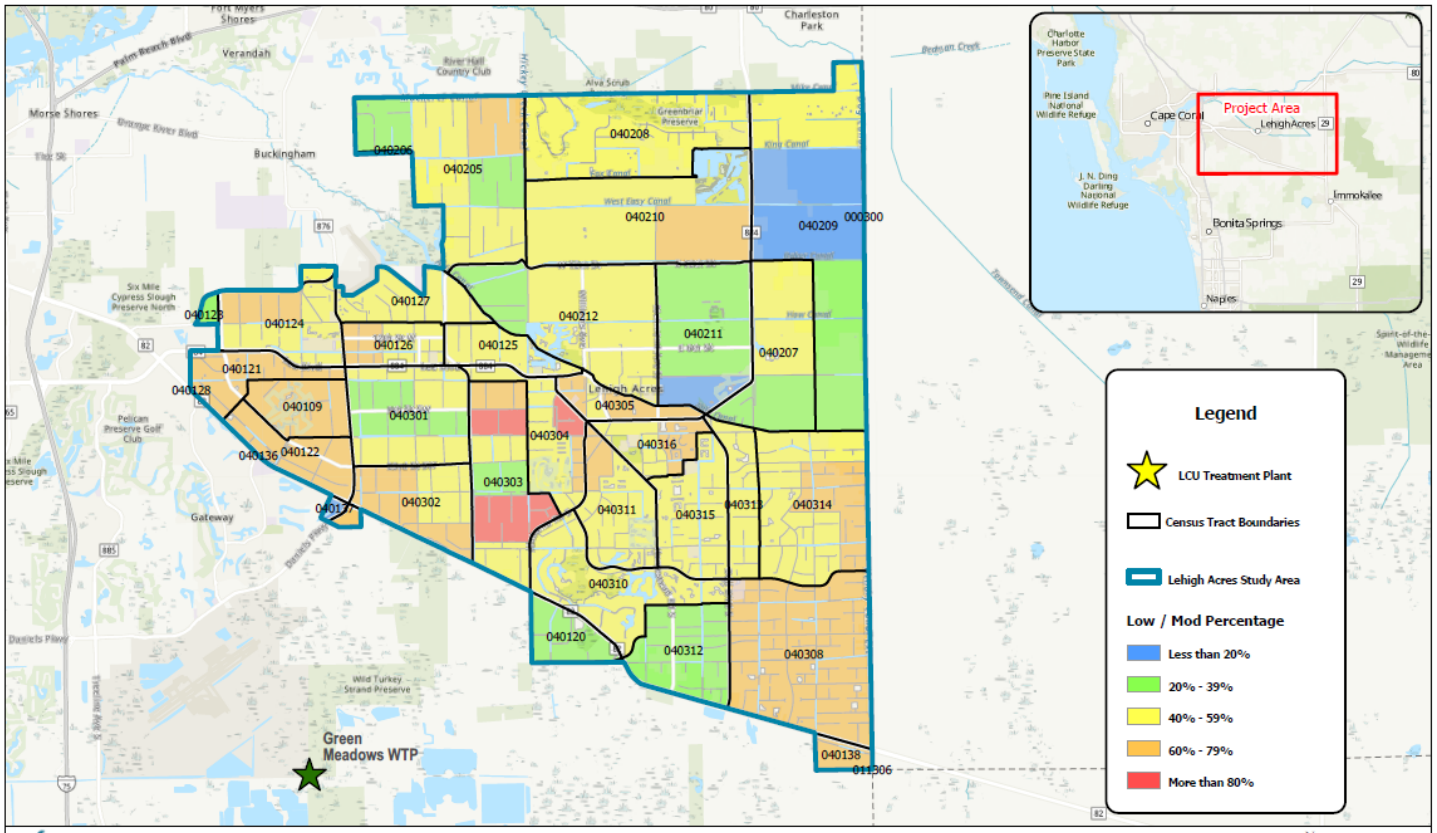
SCOPE OF PROFESSIONAL SERVICES for:
Regional Alternative Source Water Study - Lehigh Acres, Fl

Lee County Utilities

BACKGROUND

In recent years, Lee County has begun to experience limitations in source water availability and quality, which can constrain the facility's water production to be less than permitted. To meet the increasing water demand and overcome the water supply issues, Lee County Utilities (LCU) initiated in December 2021 the Comprehensive Hydrogeological Study for the Southeast (SE) Lee County Service area. This is a larger-scale effort to evaluate alternative water supply for this area, which encompasses the Olga Water Treatment Plant, the Green Meadows Water Treatment Plant, and the Corkscrew Water Treatment Plant. These three facilities are combined with the Water Management District's water use permit.

Subsequently, the South Florida Water Management District (SFWMD) identified historic low water levels to be a critical issue within a six-square-mile area in the Southeastern portion of Lehigh Acres, north of the Green Meadows wellfield, where the Sandstone Aquifer has fallen below the Maximum Developmental Limits (MDL). This situation demands a thorough assessment of the reliability and sustainability of available water sources for Lehigh Acres and the Green Meadows water treatment plant (WTP) public water supply (PWS), and an analysis of the potential water treatment alternatives to mitigate the impacts of overextending water withdrawals on the local shallow aquifers within the study areas (Figure 1).



The study will include extensive groundwater flow modeling, aquifer performance testing, and plotted-out test wells to ensure proper placement of additional production wells to improve wellfield production, reliability, and resiliency and to continue to meet future demands.

SCOPE OF SERVICE

The following tasks are proposed to be completed by the CONSULTANT to conduct a comprehensive water supply study to assess reliability as a sustainable water source for Lehigh Acres public water supply (PWS). The area covered for this comprehensive hydrogeologic evaluation extends from the northern limits of the Green Meadows wellfield and within the Lehigh Acres area bound by LCU service are limits to the north and west, S.R. 80 to the south, and the Hendry County line to the east. The proposed scope of work will include coordination, meetings, and project management; compilation, review, and evaluation of all available surface and hydrogeologic source water data; consulting for the installation of up to three (3) clusters of test wells; corresponding aquifer performance tests (APT) for the Sandstone (SSA), Mid Hawthorn (MHA) and Upper Floridan (Lower Hawthorn and Suwannee) aquifers; detailed hydrogeologic mapping for the aquifers and confining units; groundwater flow and solute transport computer modeling; water treatment alternatives based on available and reliable water source; wellfield operation regime and protocols; and completion reports detailing the data collected, evaluation, and applicable conclusions. A more detailed description of the scope of work is provided below and in the following pages.

TASK 1: COORDINATION, MEETINGS, AND PROJECT MANAGEMENT

The Scope of Services for this task includes general project management for the duration of the contract.

A. Project Management

This task includes overall management of the project including project setup, planning, development of a project management plan, legislative/regulatory management, budget management, schedule management, invoicing, project status meeting, monthly status reports, coordination with LCU, coordination with any sub-consultants, and coordination with other municipalities and stakeholders.

B. LCU Staff Meetings

The goals of the meetings are to seek LCU staff input on the plan of execution for upcoming work tasks and submitted items, discuss data and information needs, review costs, and develop consensus on the approach to the development and completion of each chapter of the study. The first meeting will serve as the project kickoff meeting. During the kickoff meeting, the following will be discussed:

- Project purpose and objectives
- Project scope
- Schedule for completion
- Project team roles and responsibilities
- General overview of information needs
- Appropriate contact people for each information need and overall communication plan
- Action items to be completed before the next meeting

In the remaining meetings, CONSULTANT will review initial results and findings, and gather LCU's input on growth projection scenarios, modeling results, and water treatment alternatives based on available/reliable water sources.

CONSULTANT will plan and prepare for meetings by developing agendas, figures, tables, data summaries, and/or graphics to make the best use of meeting time.

Task 2: ALTERNATIVE POTABLE WATER SOURCES

Task 2A: Hydrogeologic Alternative Water Supply Feasibility

The CONSULTANT will identify and characterize the groundwater resources available for Lehigh Acres, evaluating sustainability in terms of quality, quantity, wellfield potential, and treatment plant process optimization and/or requirements.

A. Data Collection

CONSULTANT shall compile, review, and evaluate all available reports, master plans, and hydrogeological data within the project area (Figure 1). Hydrogeological data will include lithology, geophysical logs, aquifer parameters, and water quality. The hydrogeologic data will be used to prepare up to two cross-sections for each area and will be integrated into a series of subsurface maps for the SSA, and UFA. The maps will include a subsurface structure contour map of the top of the Cape Coral Clay, the top of the SSA, the top of the MHA, the top of the LHA, and the top of the Suwannee formation of the UFA. Thickness contour maps will include the Cape Coral Clay, the SSA, the Fort Myers Clay, the MHA, the LHA, and the confinement below the LHA. A map showing available aquifer parameters will also be prepared. All wells located within approximately 96 square miles area of review will be used for the mapping. The mapping data will be updated after the drilling and testing are completed and will be integrated into the groundwater flow/solute models developed for each wellfield area.

B. Consulting for Installation and Testing of Three Well Site Clusters

CONSULTANT shall support the COUNTY to develop Technical Specifications and a testing plan for installing three (3) well site clusters. Each well site cluster shall be composed of one 8-inch diameter test well to 1,000' BLS and plug back to the bottom of the LHA, one 8-inch diameter test well completed in the Mid Hawthorn, one 8-inch diameter test well completed in the SSA, and one 2-inch diameter piezometer completed in the upper sand unit of the WTA. Drilling contract oversight shall include assistance with Davis-Bacon and Related Acts (DBRA) labor standards.

C. Consulting for Conducting Two SSA Performance Tests

Two 48-hour constant-rate APTs for the SSA will be conducted in the general area of the three clusters of wells. It is anticipated that the existing permanent pump of a nearby existing SSA production well can be used for the APTs. COUNTY will provide the instrumentation to collect water levels. Water levels will be collected in the newly installed test wells and existing nearby SSA wells. CONSULTANT will be responsible for the installation and programming of the instrumentation. Each test, in addition to the 48-hour pumping portion, includes a minimum of 24 hours of background and 24 hours of recovery water level data. The existing production wells in the proximity of the pumping well will need to be turned off or used at a constant rate during the 4-day duration of the APTs. CONSULTANT shall analyze the pumping and recovery water level data obtained from the APTs using standard analytical methods to determine representative aquifer parameters which will then be input into the three-dimensional groundwater flow model.

D. Consulting for Conducting One UFA Performance Test

One 48-hour constant-rate APT for the UFA will be conducted. It is anticipated that the existing permanent pump of one of the existing UFA production wells can be used for the APT. COUNTY will provide the instrumentation to collect water levels. Water levels will be collected in the newly installed UFA test wells and existing UFA wells. CONSULTANT will be responsible for the installation and programming of the instrumentation. Each test, in addition to the 48-hour pumping portion, includes a minimum of 24 hours of background and 24 hours of recovery water level data. The other existing UFA production well will need to be turned off during the 4-day duration of the APT. CONSULTANT shall analyze the pumping and recovery water level data obtained from the APT using standard analytical methods to determine representative aquifer parameters which will then be input into the three-dimensional groundwater flow model.

E. Update of the Hydrogeologic Mapping with the Testing Program Data

The maps prepared as part of Task 2A of this investigation will be updated with the hydrogeologic data collected with the installed wells and with the aquifer parameters collected with the APTs. Hydrogeologic data will include aquifer and confining unit tops and thickness, sand content, the transmissivity of aquifers, and leakance through confining units.

F. Update and Calibrate a Groundwater Flow Model for the Shallow Aquifers (SSA)

CONSULTANT shall use and update the model previously prepared for the SSA. The groundwater model will be calibrated with APTs conducted as part of this investigation and the operational data 24 months prior to conducting simulations to evaluate the capacity and safe yield of the SSA.

G. Develop and Calibrate a Groundwater Flow/Solute Transport Model for the UFA

A new groundwater flow and solute transport model for the UFA in the study area will be developed. The model will use the available hydrogeologic and aquifer parameter data and will be calibrated to the existing APTs for the UFA and the operational data collected. Thereafter, the model will be used to evaluate areas for the potential expansion of the UFA wellfield and/or the feasibility of the development of a UFA wellfield.

Task 2B: Surface Water Resource Feasibility

The CONSULTANT shall identify and characterize all surface water resources available for Lehigh Acres, evaluating sustainability in terms of quality, quantity, any potential seasonal variability, and treatment plant process optimization and/or requirements.

A. Data Collection

CONSULTANT shall compile, review, and evaluate all available reports, masterplans, and any available data within the project area. Examples of available reports and masterplans containing relevant data:

- Lee County Department of Community Development, Concurrency Report
- Lee County Land Development Code and Lee Plan
- SFWMD, Lower West Coast Water Supply Plan
- Lee County Water Supply Facilities Work Plan
- Lee County Utilities, Engineer of Record Report
- Lee County Utilities, Master Plans
- City of Fort Myers, Master Plans (Water and Wastewater)
- Lehigh Acres Water and Wastewater Master Plans
- Florida Governmental Utility Authority North Fort Myers, Master Plan

B. Surface Water Resource Characterization

CONSULTANT shall request, obtain, and review historical flow, available surface water quality data, and adopted minimum flow levels, as available in digital format from SFWMD, the USACOE, FDOH, and Lee County. The source water characterization should include, but not limited to, the following:

- Water Source Identification: Determine the specific water source(s) for Lehigh Acres, such as the Caloosahatchee River and/or available reservoirs.
- Water Quantity and Availability: Assess the availability and sustainability of the surface water source, including its flow rates, recharge rates, and potential risks of depletion.
- Climate and Weather Patterns: Consider the local climate and weather patterns, as they can influence the quantity and quality of water available.
- Regulatory and Policy Framework: Review existing regulations and policies that govern water quality and management in the area by SWFWD.

Task 3: LEHIGH ACRES CENTRAL UTILITY ASSESSMENT

Less than 50% of Lehigh Acres is served with FGUA public water and approximately 38 percent is served with central wastewater. The remaining property owners will not be served by water or wastewater services in the foreseeable future unless an expansion project is developed and implemented. Most residents in Lehigh Acres are served with domestic wells and septic tanks. Task 3 analyses central water needs for improvement and the potential for distribution system expansion to mitigate historic groundwater lows and septic systems' impacts on natural systems.

Task 3A: Population, Demand, and Flow Projections

Population projections and corresponding demand and flow projections will need to be developed and will be the basis for the evaluation of the potable water system's need for improvements and/or expansion.

Population Estimates and Projections

Historic Population Estimates – The CONSULTANT will review data from the OWNER's previous planning documents, current planning documents, and population estimates from the 2020 US Census and BEBR for the study area for the last 10 years building upon the information in the last available Master Plans to determine the historic population and demographics.

Service Area Population Projections – The CONSULTANT will gather and review available population projection data for the existing and future service areas to determine population projection qualities in 5-year increments from 2025 through 2045.

Water Demand Estimates and Projections

Existing System Demands – The CONSULTANT will summarize the existing FGUA Water Treatment Plants (WTPs) flow records for each WTP and water pump station within the Lehigh Acres service area.

- Average annual daily demand (AAD), sometimes referred to as average daily demand.
- Maximum month daily demand (MMDD)
- Maximum day demand (MDD)
- Peak Hour Demand (PHD)
- Non-Revenue Water (NRW)

Future System Demands – The CONSULTANT will apply the per capita demands and various peaking factors determined above to the projected population estimates to calculate the projected water demands in 5-year increments from 2025 through 2045.

Task 4: Distribution System Capacity Assessment

CONSULTANT will evaluate treatment and residual disposal options based on available source water for an expanded and improved central water and sewer system. The goals of the evaluation were to identify cost-effective, robust, and sustainable long-term treatment and disposal alternatives, for further piloting and design, that will address current source water and treatment limitations.

Water Treatment Plant Alternatives and/or Improvements

CONSULTANT will need to complete an extensive evaluation of the existing FGUA plant operations. This shall include, but not be limited to, an assessment of all existing treatment facilities, influent flow, buildings and structures, electrical components, backup power supply, chemical storage capacities, chemical feed line sizes, pumps, underground piping, and ground storage tank capacities.

Following the analysis, the CONSULTANT shall submit a comprehensive Technical Memo for the County's review and approval. This will contain the results, including any assumptions or clarifications necessary, for the County to understand and improve the condition of the FGUA potable water facilities. The analysis shall detail the recommendations for any repairs, replacements, or upgrades to the plant that are needed to support current and future population demands while maintaining compliance with all federal, state, and local regulations, policies, and ordinances.

Distribution Systems Capacity Assessment

Update the Hydraulic Model - The CONSULTANT will update any existing hydraulic model(s) using the service area system maps (GIS) and inventory data to add any missing potable water mains and facilities. The CONSULTANT will also update the model demands based on existing demand analysis.

Calibration Plan - CONSULTANT will develop a hydraulic model(s) calibration plan including identification of needed system operations data (i.e., SCADA and potential pressure monitoring locations using CONSULTANT-provided pressure loggers) as well as the timing/duration of data collection. The model calibration plan will include the identification of strategic pressure monitoring locations, if necessary, based on current monitoring locations and input from the OWNER's staff. The calibration plan will include the identification of the calibration period, necessary data, pressure monitoring locations, calibration goals, and expected accuracy. The CONSULTANT will prepare and submit to the OWNER a Draft Calibration Plan for review and comment. The CONSULTANT will address OWNER comments on the Draft and submit a Final Calibration Plan.

Distribution System Assessment & Improvements

Pumping and Storage Capacity - CONSULTANT will conduct spreadsheet capacity assessments of the distribution system storage and pumping facilities for each planning year (2025, 2030, 2035, 2040, and 2045) to evaluate the adequacy of existing facilities and to identify any deficiencies in capacity based on the performance criteria. Additional assessments will be completed in the following subtask to identify any sub-regions of the system that may not have sufficient storage or pumping capacity available due to hydraulic limitations in the distribution system.

Transmission and Distribution Capacity Assessment - The CONSULTANT will use the hydraulic model, demands, and diurnal patterns developed in previous tasks to analyze the capacity adequacy of the water storage, transmission, and distribution system under peak demand conditions (MDD with PHD and MDD+FF) using steady state (SS) and extended period simulations (EPS) for each planning year (2025, 2030, 2035, 2040 and 2045). This analysis will result in the system capacity improvements needed to meet the needs of the future system. The distribution system evaluations will consider and evaluate the expansion of the FGUA infrastructure, including potential interconnects with LCU.

Task 5: CIP Improvement Plan

CONSULTANT will develop an improvement plan summarizing the recommended transmission systems and Water Treatment Plants (WTPs) improvements to be implemented based on the source water analysis, hydraulic and hydrogeologic analysis, including timeframe, the total project costs, and annual O&M costs for the improvements. The improvements include water treatment plant expansions and/or potential construction of new treatment plants. The work associated with this effort may include identifying potential locations for new plants and conveying flow from/to other treatment plants (new or existing) for treatment.

Each capital cost will be based on a planning-level opinion of probable construction cost plus a percentage to account for professional services (e.g., preliminary design, permitting, final design, geotechnical, survey, service during construction, compliance, legal/fiscal) along with any property cost and any other administrative costs. The capital cost will be based on FY 2024 dollars. Annual O&M cost will also be based on FY 2024 dollars. CONSULTANT shall summarize the methods used to develop the costs.

Task 6: Source Water Regional Study Report

- Draft Master Plan Update Report – CONSULTANT will document the project in a draft report. The report will incorporate the final versions of the various technical memoranda prepared and the outcomes of the various workshops during previous phases of work. The report will describe the evaluations performed, the resulting recommendations, a detailed summary of the recommended improvements and identify needs for additional investigations and testing. The report will provide year-by-year recommendations for system and facility improvements between 2025 and 2030 and also define longer-term improvements recommended through 2045. System maps and figures to support the recommendations and summarize the proposed improvements will be provided. Three (3) hard copies and one electronic copy of the draft Master Plan Update Report will be provided. All of the updated hydraulic models and CIP planning tools will also be provided with the draft report.

- Draft Master Plan Update Report Workshop – CONSULTANT will facilitate a 3-hour workshop with the OWNER's staff to present the draft report and receive comments. The CONSULTANT will a) Prepare an agenda before the workshop and b) Prepare meeting minutes to distribute to meeting attendees after the workshop.

- Final Master Plan Report – CONSULTANT will incorporate comments from the review workshop and update the Master Plan Report to address these comments. One electronic copy of the final report will be provided.