CITY OF POMPANO BEACH

100 W Atlantic Blvd, Pompano Beach, FL 33060

WORK AUTHORIZATION NO: 28	**COPBFL Project Manager:** **Phone:** 954-786-5504 **Email:** Renuka.Mohammed@copbfl.com **COPBFL Procurement & Contracts:** **Phone: 954-786-4098** **Email: purchasing@copbfl.com**
Firm Name: Carollo Engineers, Inc., **Address: 2728 North University Drive, Bldg. 2700** **City/State/Zip: 33065**	**Firm's Contact Representative:** Angelica Gregory **Phone:** 954.837.0030 **Email:** agregory@carollo.com

In accordance with solicitation number RLI-E-23-20, Ordinance number ORD. NO. 2021-39 dated February 23, 2021, for Continuing Engineering Services the City of Pompano Beach hereby directs the firm to perform the services for the project as detailed in the attached scope of work, attached hereto and made a part of this Work Authorization for the amount specified below.

All terms and conditions of the Original Contract dated February 23, 2021, approved via Ordinance No. ORD. NO. 2021-39 remain unchanged and in full force and effect, and shall govern the work described herein to its completion, independent of the Original Contract's effective termination date.

Description:

Carollo Engineers, Inc. (Consultant) has been requested by the City of Pompano Beach (City) to update and calibrate the City's wastewater collection system hydraulic model to support system planning, redevelopment, and future growth. The updated model will be used to evaluate system performance, assess dry- and wet-weather conditions, and better understand tidal influences affecting the wastewater network.

As part of Phase 1 of the Wastewater Collection System Master Plan, the Consultant will update the existing model using current GIS data, convert it to a modern sewer modeling platform, and calibrate it using select SCADA data. The updated model will serve as a planning-level decision-support tool and form the basis for future scenario evaluation and development of a capital improvements plan, with a primary focus on lift stations and force mains.

As part of Phase 2 of the Wastewater Collection System Master Plan, the Consultant will apply the updated and calibrated wastewater hydraulic model to develop and evaluate future planning scenarios. This phase will incorporate population projections previously developed under the City's potable water system planning effort, dry- and wet-weather flow generation factors to project future system flows. The model will be used as a planning-level decision-support tool to assess system performance under future conditions and to identify capital improvement needs, with a primary focus on lift stations and force mains. The results of this phase will support development and prioritization of recommended capital improvement projects.

Total Work Authorization Amount: $ 486,922.00

CIP/Account No. (For City's internal use):

Firm/Contractor Approval:	**City of Pompano Beach Approval:**
Accepted by:	See Signature Page below
Firm Representative	Firm Representative
Title: Associate Vice President	Title:
Date: February 2, 2026	Date:
Accepted by:	Accepted by:
Firm Representative	Firm Representative
Title: Senior Vice President	Title:
Date: February 2, 2026	Date:

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed the day and year hereinabove written.

Attest: **CITY OF POMPANO BEACH**

_____ By:_____

KERVIN ALFRED, CITY CLERK REX HARDIN, MAYOR

APPROVED AS TO FORM: By:_____

GREGORY P. HARRISON, CITY MANAGER

_____

MARK E. BERMAN, CITY ATTORNEY

Scope of Work
City of Pompano Beach
Wastewater Collection System Master Plan – Phase I & II
January 21, 2026

PROJECT DESCRIPTION

The City of Pompano Beach (City) has requested that Carollo Engineers, Inc. (Consultant) update the City's most recent wastewater network model, originally developed in WaterCAD by Chen Moore and Associates (CMA) in 2021. The City has not completed a model update or calibration in approximately four years and intends to use the hydraulic model as a planning tool to evaluate system performance, support redevelopment and new development, assess future flow conditions, and identify capital improvement needs. The City also seeks to gain a better understanding of wet-weather impacts and tidal influences on its wastewater conveyance infrastructure to strengthen system resiliency.

To achieve these goals, the City is seeking to develop a Wastewater Collection System Master Plan (WWCS Master Plan) in two phases. The first phase includes the update of the model using the most current GIS database and software platform and to calibrate the model using select SCADA data for dry and wet weather conditions. The second phase would include using the hydraulic model to develop and evaluate scenarios and identify an actionable capital improvements plan (CIP). This Scope of Work (SOW) outlines the services that Carollo Engineers, Inc. (Consultant) understands are required by the City to complete both phases of the WWCS Master Plan. The scope also includes converting the model from Bentley WaterCAD (obsolete, water software) to Bentley SewerGEMS (state of the art, sewer software).

Model updates will rely primarily on available record drawings, while calibration will be informed by current SCADA data. The updated model is intended to serve as a decision-support tool, integrating telemetry from lift stations and supplemental data collected through independent data loggers. The primary focus of this effort will be lift stations and force mains, with the option to include larger-diameter gravity mains if appropriate to connect transmission force mains.

SCOPE OF WORK

Task 1: Project Management and Meetings

Consultant will provide overall project management. The Consultant's project manager will serve as the primary point of communication between its staff and the City staff as needed. The Consultant's project manager will track and manage the project budget, tasks, and schedule.

Monthly progress summaries that include an itemized list of work completed and anticipated work for the upcoming month will be prepared and submitted. These summaries will be provided in the form of a letter accompanying the monthly progress payment request. The Consultant will facilitate workshops to obtain City input and communicate project progress throughout the duration of the project. These meeting opportunities will be used to share information and results, solicit feedback, and support key decision-making at critical project milestones. The presentation material and brief meeting minutes will serve as documentation of topics discussed. Proposed Phase I and Phase II meetings include:

Phase I

- *Project kickoff meeting - to review goals and expectations, and to provide an initial data request list.*
- *Workshop #1- Data requirements for calibration*
  Workshop #2 – Wastewater Model Calibration Results.

Phase II

- *Workshop #3 – Planning Framework Update and Flow Projections.*
- *Workshop #4 – Master Planning Future Scenarios and Inclusion of Current City CIP.*
- *Workshop #5 – System Evaluation Results and Identification of Project Needs.*
- *Workshop #6 – Proposed CIP Review with City.*
- *Workshop #7 – Draft Wastewater Collection System Master Plan Report Review.*

The Consultant's project manager will also communicate routinely via bi-weekly project management phone calls with City staff to obtain necessary information on an as-needed basis.

The Consultant's project manager will assign a quality manager who will perform quality assurance and quality control (QA/QC) on all deliverables to confirm they meet standards and requirements. The QA/QC review for this project will include a concept check for laying out the future scenarios and alternatives; a final model check after scenario development including both dry and wet weather scenarios; review of recommended CIP project cost estimates and assumptions; and a review of the written master plan documents and maps.

Task 1 Deliverables

- *Workshop agenda, presentation/materials, and minutes (electronic)*
- *Progress summary letters with invoice*

Task 2: Data Collection and Analysis

Subtask 2.1 – SCADA, telemetry, and independent data logger data

The Consultant will begin the project by requesting information, including:

a) Most up-to-date GIS sewer system database in .gdb or shapefile format (even if minimal changes.

b) Daily average influent flow to the Broward County Water and Wastewater Services (BCWWS) master lift station that receives the City's wastewater flow and conveys it to BCWWS's wastewater treatment facility, for the past five (5) years. Excel format is preferred.

c) Additional data on hourly basis for a dry and a wet historical period may be needed for calibration and will be requested following the initial analysis of the historical data.

d) Telemetry data and independent data logger information, where available.

e) Lift station SCADA data for the last year, or for the year with the highest flow within the past five (5) years (as identified by the Consultant from item b), including:

- Pump runtimes (daily frequency for tandem lift stations, hourly for master lift stations, as available).
- Pump status (daily frequency for tandem lift stations, hourly for master lift stations, as available).
- Pumped flow (daily frequency for tandem lift stations, hourly for master lift stations, as available).

f) Field-measured pump control levels, including float depths from the wet-well rim for tandem/submersible lift stations, and on/off/alarm elevations for master lift stations.

g) Most recent mechanical record drawings for each lift station.

h) Most recent record drawings of force main configurations, if the information is not reflected in the GIS database.

i) Excel files containing:

- Updated pump curves or pump manufacturer, model, and impeller diameter information for each lift station
- Pump design parameters such as horsepower, rated flow and head, number of pumps if updated, and connection size as available.
- A list of lift stations with jockey pumps.
- Operator notes describing preferred operating strategies (e.g., lead pump intended to run longer than jockey pumps). If unavailable, the Consultant will provide recommendations for efficient operations during calibration.
- Dated history of wet well overflows or instances where emergency operations were necessary to avoid overflows, as available.

The Consultant will provide an Excel log for City staff to easily populate the requested information.

j) Any recent changes in operating strategies related to redevelopment or system/valving modifications.

Where record information is not available, Carollo will work with the City to establish the most reasonable assumptions necessary to maintain progress on the project. Additional data may be requested as needed. This coordination is planned to occur during the bi-weekly phone calls and follow-up emails with the City Project Manager.

Subtask 2.2 – Data Collection for Dry and Wet Weather Flow Analysis

The Consultant will collect rainfall data from previously identified rain gauges or from the Next Generation Weather Radar (NEXRAD) online system. Using this information, the Consultant will classify the return interval and frequency of rainfall events that occurred during the periods of highest City effluent as recorded by SCADA in item b of Subtask 2.1. Dry periods will also be identified from these datasets.

For the identified dry periods, characteristic dry-weather flow volumes and diurnal patterns will be developed for each site with recorded lift station data (from items d and e in Subtask 2.1). Base sanitary flows (i.e., flows during dry periods) will be compared to billing data at master lift station basins to estimate the proportion of groundwater infiltration. These results will be incorporated into the dry-weather flow (DWF) scenarios of the hydraulic model. Tidal data, where relevant, will also be reviewed to confirm that the selected dry periods represent conditions free from tidal influence.

Wet-weather responses to the identified rainfall events will be analyzed for each site with available flow data, provided that the flow data covers both dry and wet historical periods. The inflow and infiltration (I/I) response for each test site will be documented and replicated in the wet-weather flow (WWF) existing scenario of the hydraulic model. For sites located near tidal waterways or subject to tidal backwater effects, the Consultant will evaluate whether elevated tidal stages contributed to observed I/I responses or

influenced lift station performance. Two rainfall events with significant impacts on total City effluent will be selected—one for use in hourly calibration and the other for verifying total daily flow.

Subtask 2.3 – Field Pressure Monitoring

A total of seven (7) Consultant-owned pressure loggers will be installed and uninstalled by The Consultant with help from City staff in the pressurized network to record specific pressures over a period that will be selected based on historical data. Pressure loggers are equipped with an adapter that can be screwed at the flowing side of air release valves (ARVs), therefore the presence of ARVs is a prerequisite of this subtask. The Consultant will develop a brief testing plan and coordinate with City staff to confirm that the selected locations have operable ARVs. Pressure records will be downloaded by the Consultant upon uninstallation of loggers. The collected data will be used in Task 4 – Wastewater Model Calibration and Existing Scenarios.

Subtask 2.4 – Sewer Exclusions from Water Service in Billing Data, Large Sewer Users, and Septic Areas Information

Sewer flows will be calculated as a percentage of the potable water consumption for accounts with both water and wastewater services, then adjusted for exclusions/inclusions of sewer collection service, large users, and septic tanks.

This calculation will be made using the same geographic distribution of population across the service area that was used in the latest Water Master Plan, which employed billing data and the location of each metered account to allocate water demand. Adjustments mentioned above will then be applied. The wastewater model will need to be loaded with flows generated at all points in the service area, even if the gravity collection system is not being simulated. All flows generated at locations upstream of simulated lift stations will be aggregated to be applied at the first lift station that is simulated in the model.

The following data will be requested, as applicable:

a. *A list that identifies accounts that only receive potable water service (that do not have a sewer connection).*
b. *Alternatively, a list of parcels on septic tanks from the Property appraiser's office tax roll database.*
c. *List of large wastewater customers and location of their connection.*

Subtask 2.5 – Wastewater Collection System CIP Data and Cost References

To support the evaluation of wastewater collection system improvements and associated cost development, the following data will be requested, as applicable:

a. *FY 2026 – FY 2031 CIP piping projects (both capital and R&R) and any accompanying schematics or markups.*
b. *Recent bid tabs for wastewater collection projects (pipeline and pump station projects).*

Additional data may be requested as needed. The Consultant's project manager will review applicable and available materials to gain a thorough understanding of the immediate and future plans for the City's collection system.

Task 2 Deliverables

- *Data Request List with sources, comments, and updates.*
- *Brief Testing Plan for System Pressure Monitoring*

Task 3: Wastewater Model Update/Development

The Consultant recommends that the City's wastewater hydraulic model be converted from its current software platform, Bentley WaterCAD, to Bentley SewerGEMS. The existing model was developed in a water-distribution environment and contains several limitations, including the absence of pumps and pump information, no defined outfall/discharge point, and a configuration suitable only for steady-state analysis rather than diurnal fluctuation. In addition, the model contains 17 tanks (at the location of the existing master lift stations) with no pumps or operational information, and 84 loads applied as negative demands (in gpm) at nodes (these nodes are in place of the existing lift stations). The existing model includes isolated and disconnected areas, and incorporates five "future" scenarios in which the only modification is a multiplier applied to the same 84 negative demands. No settings for wet weather simulations were defined in the existing model. The model also produces negative pressures when executed, further indicating accuracy issues.

These limitations collectively restrict the model's ability to represent wastewater system hydraulics. Under this task, the wastewater collection system will be simulated in SewerGEMS, which is software specifically designed for this purpose. With the use of SewerGEMS and through the labor under this task, the Consultant will properly represent wet wells, pumps, force mains, discharge points, operational controls, and extended period simulations (EPS) (diurnal flow variation), leading to realistic system hydraulics.

The Consultant will complete the modeling subtasks listed below as part of the wastewater model update.

Subtask 3.1 – Wastewater Collection Model Conversion and Update/Verification of Physical Attributes

In this subtask, the Consultant will first export all current physical attributes of the existing Bentley WaterCAD model into GIS and perform a comparison against the most current GIS database provided by the City.

Once the base infrastructure is transferred into SewerGEMS, the Consultant will:

- Update the master lift stations currently included in the model (a total of 17 existing "tanks").
- Add the 84 City lift stations, provided that 1)the information outlined in Task 2 is available for each of them and 2) if connected to the force main transmission system via gravity, all connecting manholes and their invert elevations are known.
- Update or verify force main and lift station connectivity.
- Update and assign a new vertical datum and elevations as needed. Where information is not available, typical depth/cover assumptions will be applied based on Broward County Design Standards.
- Perform topology checks to confirm model connectivity and validity.
- Review assumed roughness coefficients using the record drawings provided for locations with recent changes, or City staff knowledge. Model information will be modified if pipe materials or configurations have been updated due to recent projects, as such information becomes available.

Subtask 3.2 – Creation of Wastewater Sewersheds and Update of Sewer Flow Allocation

Sewershed polygons (catchments) will be created for the first time as part of this effort. Because the City now intends to characterize the impacts of rainfall-derived inflow and infiltration (I/I) on its collection system, a sewershed-based approach, where I/I is a function of land area, is necessary. As a result, a single sewershed polygon will be created for each lift station included in the model. The entire service area will be covered by

sewersheds, excluding areas served by septic systems. These polygons will become active model elements used to simulate rainfall-derived I/I.

Billing records gathered and analyzed in Subtask 2.4 will be geoprocessed in GIS and aggregated by sewershed to estimate average base sanitary flows at the lift-station level. Existing diurnal water-use patterns by account type (developed as part of the calibration of the City's potable water model) will also be captured, summarized by sewershed, and compared to actual influent flow data (both averages and diurnal patterns) at locations where flow monitoring data is available. The resulting relationships will be used to assign base flows and diurnal patterns to the corresponding catchment elements within the wastewater model.

Subtask 3.3 – Development of Sewer Lift Station Operational Attributes

Under this subtask, the Consultant will:

- Review and input pump curves based on the data collected in Task 2.
- Input pump control levels (on/off elevations).
- Develop and program logic controls and operational rules that reflect how operators currently operate the lift stations in the field.
- Analyze available lift station SCADA data, telemetry data, and independent data logger records, including flows, to determine existing pumping operations during wet-weather events when information is not available directly from operators. This analysis will be used to establish the logic controls and operational rules required to accurately represent system behavior in the model.

Task 3 Deliverables

» *Presentation/Demo of Updated Wastewater Hydraulic Model in SewerGEMS format*

Task 4: Wastewater Model Calibration

To obtain a hydraulic model that closely mimics the City's wastewater system and its operations, the hydraulic model needs to be reasonably calibrated. The Consultant strives to develop stable models that are over 95 percent accurate for flow predictions and within 2-7 psi for pressure, subject to the quality of the data. The resulting model would be useful for master planning as well as for operational decision-making. If the model is also able to replicate a range of existing operating conditions, based on field monitoring data and SCADA, telemetry, and independent data logger records, it can additionally serve as a valuable tool for conceptual design.

Subtask 4.1 – Wastewater Collection System Dry Weather Flow Calibration

In this subtask, the Consultant will adjust appropriate variables to calibrate the model to the following 24-hour extended period patterns:

- System effluent captured at the BCWWS master lift station that conveys the City's flow to the treatment facilities, as represented in the model under DWF conditions.
- Total daily flow at lift stations and hourly flow at master lift stations as informed by data collected in Task 2.
- Pressure collected in the field from accessible ARV locations per Task 2.

Subtask 4.2 – Wastewater Collection System Wet Weather Flow Calibration

In this subtask, The Consultant will adjust appropriate variables to calibrate the model to the following 72-hour extended period patterns:

- System effluent captured at the BCWWS master lift station that conveys the City's flow to the wastewater treatment facilities, as represented in the model during WWF conditions.
- Total daily flow at lift stations and hourly flow at master lift stations as informed by data collected in Task 2.
- Pressure collected in the field from accessible ARV locations per Task 2.

Maps, tables, and discussion of the calibration will be held during Workshop #2. Findings will be included in the project documentation (Task 9).

Task 4 Deliverables

- *Updated and Calibrated Wastewater Hydraulic Model in SewerGEMS format*
- *Presentation of Update and Calibration Results from Workshop #2*

Task 5: Planning Framework and Flow Projections

The planning framework generally includes an analysis of historical factors used to inform future conditions under which to master plan. This analysis will evaluate historical wastewater per capita generation rates and trends, seasonal flow variations, peaking factors, and diurnal wastewater generation patterns by customer type. These indices, once identified, are used as City-own standards that may be adopted and updated every master planning cycle to reflect actual consumer and system activities.

Based on these indices and using population projections previously developed as part of the Water Supply Facilities Work Plan under a past work assignment (for consistency among planning efforts), wastewater flow projections for use in modeling scenarios will be developed. The planning framework will be implemented within the wastewater hydraulic model, together with performance criteria to be established under this task, to evaluate the adequacy of the existing and proposed system infrastructure.

To accomplish this, the Consultant will complete the following subtasks:

Subtask 5.1 – Historical and Current Wastewater Flow Analysis

(a) Wastewater Generation Factors

The Consultant will perform a high-level analysis of historical and current wastewater flows within the service area. For each year in which historical daily flow and population data are available, through the end of 2025, per capita or per ERU wastewater flow generation factors (expressed in gallons per capita per day or gallons per ERU per day) will be calculated. Historical trends in per capita or per ERU wastewater generation will be evaluated in the context of planning drivers and targeted future levels of service and reviewed with the City. The Consultant will work with the City to establish a standard flow generation factor, or a set of factors (e.g., by master basin or areas of I/I influence), to be used in estimating wastewater flows associated with future growth or redevelopment or future efforts to reduce I/I.

(b) Seasonality, Diurnal Curves, and Peaking Factors

Under this Scope of Work, the Consultant will calculate and evaluate wastewater seasonality factors, diurnal curves, and peaking factors using available historical flow data. This analysis will be based on records of total flow to Broward County WWS as available, and will include an evaluation of peaking behavior at the master lift stations within each master collection basin. The calculated seasonality factors, diurnal curves, and peaking factors will be evaluated in the context of planning drivers and land use characteristics associated with future development scenarios and will be used to support development of future wastewater flow projections and planning analyses.

Subtask 5.2 – Wastewater Flow Projections

Based on population projections previously developed as part of the Water Supply Facilities Work Plan, and based on the findings of Subtask 5.1, the Consultant will develop dry weather flow (DWF) and wet weather flow (WWF) projections for the service area at each planning period, including immediate-term (2026), short-term (2030), medium-term (2035), and long-term (2045).

For the geographic distribution of future service, the Consultant will utilize the wastewater service distribution developed as part of Subtask 2.4 as a starting point (year 2025). Flow from planned growth will be assigned to applicable sewer basins, where an existing or a future lift station will assume the flow. The result of the flow projections subtask will be a shapefile that includes projection fields corresponding to the immediate-term (2026), short-term (2030), medium-term (2035), and long-term (2045) planning scenarios, at the applicable existing and future basins that will hold lift stations.

For the future scenarios, the spatially distributed population by sewershed will be multiplied by flow generation factors developed under Task 5.1 to calculate DWF. Projected WWF components will be based on factors other than population and will be modeled and quantified using the selected storms and the hydraulic model. Medium-term and long-term scenarios may differ in WWF factors applied to the projections, as utility management decisions (such as indices to account for targeted efforts to reduce I/I), may be reflected in the models if desired by the City.

The medium-term scenario (or other, as City prefers) will assume that septic systems are converted to central sewer service. For the detailed location of septic systems, the Consultant will rely on available geographic information from sources such as the South Florida Water Management District (SFWMD), the City's Planning and Development Department, the Appraiser's Office records, or the Florida Department of Health. If septic system data from these sources are unavailable or insufficient, the Consultant will apply a planning-level target reduction in septic system usage over the planning horizon, consistent with goals outlined in the Comprehensive Plan and applicable regulations, as available.

Projected wastewater flows will be allocated to representative lift stations and their sewersheds. The City may provide input regarding sewershed naming conventions. Development of lift station elements, associated infrastructure, and operating parameters within the hydraulic model is not included under this task and will be addressed under Task 6. However, flow projections developed under this task will be transferred into DWF and WWF datasets for future scenario modeling.

Wastewater flow projections will incorporate known developments/redevelopments as of the completion of Task 4. No additional updates to the flow projections will be incorporated into the hydraulic models or the master plan following this milestone.

Subtask 5.3 – Definition of System Evaluation Criteria

The Consultant will review the City's standard performance criteria, including pump station performance (i.e., runtimes or number of cycles per hour) and maximum force main velocities. The Consultant will discuss recommended changes to the standard performance criteria. These criteria will be used to identify capacity deficiencies and propose and size future improvement projects.

Subtask 5.4 – Planning Framework Results and Summary Documentation

The Consultant will compile data from Task 5 into a summary spreadsheet and brief letter memorandum highlighting the key results of the analysis. The letter memorandum will then be incorporated as a chapter of the Wastewater Collection System Master Plan report. The results will also be presented to the City in Workshop #3.

During Workshop #3, the Consultant and the City will also discuss results of the flow projections developed in Subtask 5.2. Potential need for strategies to balance flows among the system to maximize the advantageous use of infrastructure will be identified and discussed with the City. If any of these strategies is considered a need by City staff, the potential changes in the flow scheme will be included by the Consultant in the model in Tasks 6 and 7 as needed.

After review of the spreadsheet, brief letter memorandum, and workshop materials, the City will confirm agreement with the presented flow projections to be used as the basis for future tasks, and no additional changes will be made in order to complete the WWCS Master Plan in a timely manner.

Task 5 Deliverables

- *Summary spreadsheet and brief letter memorandum*
- *Presentation of Workshop #3.*

Task 6: Development of Master Planning Scenarios

As part of Phase I, the wastewater hydraulic model will be developed in the selected modeling platform, updated to reflect current system infrastructure, and calibrated. To further set up the hydraulic models for master planning, new model scenarios that are children to the calibrated scenarios need to be created. Components developed as part of the Planning Framework, projected into the future, will be used in the creation of dry weather flow (DWF) and wet weather flow (WWF) scenarios. From each of these two children, a series of future planning scenarios will be developed, that will make use of the flow projections developed in Task 5, including:

From Calibrated DWF:

- DWF Immediate-Term (includes most recent infrastructure updates and planned development that will be online by 2026, as available)
- DWF Short-Term (includes planned and projected development by 2030)
- DWF Medium-Term (includes projected development by 2035)
- DWF Long-Term (includes transmission infrastructure to serve general infill by 2045 and beyond)

From Calibrated WWF:

- WWF Immediate-Term (includes most recent infrastructure updates and planned development that will be online by 2026)
- WWF Short-Term (includes planned and projected development by 2030)
- WWF Medium-Term (includes projected development by 2035)
- WWF Long-Range (includes transmission infrastructure to serve general infill by 2045 and beyond)

In SewerGEMS, an 'Alternative" is defined as a data set that defines the differences among scenarios. Without Alternatives, no input variations are possible. There are different kinds of Alternatives that will be developed in the hydraulic model:

- The future scenarios (Short-Term, Medium-Term, and Long-Term) will initially contain that topology (infrastructure alignment) of the Immediate-Term scenario. However, alternative topologies will need to be created as infrastructure is added to the model to serve new development. A hierarchical set of topology alternatives will be developed to carry pre-existing alignments into future scenarios and allow the modeler to test different what-if alignments for additional major transmission and operating schemes.
- In addition, two physical alternatives (infrastructure sizing options) will be created for each scenario, as follows:
    - Existing/immediate (infrastructure size present by 2026)
    - With Improvements
- The size of the infrastructure in the "With Improvements" physical alternative will be iterative and will not be final until after the scenario evaluations are completed in Task 7.
- Because base sanitary flows are population-dependent, each planning period (and its scenarios) will need a base sanitary flow alternative that is consistent with the flow projections developed in Task 5. As a result, four base sanitary flow alternatives (flow sets) will be created and populated in the model.
- WWF scenarios will be different than the DWF scenarios in that the WWF scenarios will have a hydrology alternative to route the rainfall-derived component of the flow that was compiled in other subtasks into the lift station wet wells. Allocation of the rainfall-derived component of flow for immediate-term scenarios will be consistent with the calibration and I/I reduction goals.
- Furthermore, there will be a set of operational alternatives (settings assigned to larger pump stations and valves) developed for each scenario to help test and propose operational changes needed as the system experiences change through the planning horizon.
- Lastly, upon completion of Subtask 5, where the system's capacity will be compared against projected flows for the existing service area, one alternative routing will be developed and applied to a new child of the DWF Medium-Term scenario and to a new child of the WWF Medium-Term scenario. These children will inherit all properties from their parent scenarios, except for the topology, which will be modified to include changes in connectivity necessary to reroute flows.

For control purposes, work described under this task will be grouped and executed in the following order:

Subtask 6.1 – Creation of Immediate-Term Scenarios and Alternatives

In addition to the items described above, this subtask may include the addition of lift stations identified after the most recent model update and prior to execution of this task. If required, these lift stations will be incorporated directly into the Intermediate-Term scenarios and alternatives. The number of lift stations to be

added is currently unknown and will be determined based on information available at the time of model development.

Subtask 6.2 - Creation of DWF Future Scenarios and Alternatives

Includes items described above for DWF Future Scenarios.

Subtask 6.3 - Creation of WWF Future Scenarios and Alternatives

Includes items described above for WWF Future Scenarios. Time under this Subtask also includes the modification of rainfall-derived flow parameters or factors if a sewershed will have a change in imperviousness or if the collection infrastructure within the sewershed will be replaced or modified as part of a planned improvement project (in which case inflow and infiltration is typically reduced).

Subtask 6.4 – Inclusion of City CIP Projects in the Model

Current CIP projects which are planned to be completed within the next five years (FY 2026 though FY 2031) will be included in the short-term and beyond future scenarios. These new future infrastructure alignments will be manually digitized in the model based on planning-level schematics provided by the City. If/when no schematics are available, the project descriptions in the FY 2026-2031 CIP will be used, and approximate alignments assumed. It shall be noted that even though the assumed alignment may differ from actual future design, the model accuracy would not be compromised because flows and pressures will be based on the size (not the alignment) of the infrastructure. New infrastructure by developers (to serve new developments) will be limited to the City's transmission system and the main pump station and force main being proposed by the developer. The City will provide the planned location of future pump stations and force main to connect to the City's transmission system when known. If development plans have not yet been provided to the City, the Consultant will assume that the development will be served by a single pump station located in the center of the development and a force main connecting the pump station to a logical place on the City's transmission system. When redevelopment replaces an existing lift station, the change will be included in the corresponding term/scenario.

Master planning tasks beyond Task 6 cannot be initiated without Task 6 being complete. For Task 6 to be completed on time, the "pencils down" date for flow projection purposes shall be at the completion of Task 5. The "pencils down" date for updates to infrastructure layout shall not be any later than two weeks before Workshop #4.

Task 6 Deliverables:

- *Presentation of Master Planning Scenarios and Inclusion of Current City CIP (Workshop #4).*

Task 7: Hydraulic Performance and Condition Assessment with Identification of System Improvement Needs

This task consists of a desktop assessment of the capacity and performance of the wastewater collection systems subject to the conditions of each model scenario as developed in Task 6. This work authorization does not include field assessments and investigations by the Consultant, as condition of some limited infrastructure will be provided by the City using methodologies suggested by the Consultant. The objective of the capacity and performance assessments is to identify hydraulic and performance deficiencies that lead

to capital improvement projects or enhancements. The Consultant will use the performance and efficiency criteria developed as part of the Task 5 deliverable and condition scores determined by City staff.

The system evaluation will include the following subtasks:

Subtask 7.1 – Immediate Term System Evaluation

This subtask will be divided into two primary components: (1) an evaluation of hydraulic performance of simulated infrastructure and (2) a condition and age assessment of the master lift stations using City input. The hydraulic performance evaluation will consist of a desktop assessment of the wastewater collection system assets, with a focus on force mains and all modeled lift stations. The condition and age assessment of the master lift stations will be informed primarily by available City staff input and institutional knowledge.

Hydraulic Performance

The Consultant will perform an analysis of the City's service area collection systems using the hydraulic model DWF Immediate Term and WWF Immediate Term scenarios. These evaluations will focus on existing and immediate term infrastructure analysis under 2026 wastewater loads, and will include:

- Lift station capacity exceedance in the immediate term scenario (if pump design capacity data is absent to compare against influent flow, station capacity will be evaluated based on simulated risk of overflows, pump runtime, and number of pump starts per hour)
- Force main capacity under wet weather and dry weather conditions (as represented by velocity of flow).
- Capacity of major gravity main connecting the force main network (as represented by the pipe percent full and/or surcharging of manholes).

The WWF Immediate Term scenario of the hydraulic model will be based on routing the calibration storm through the hydraulic model. Results of the evaluations under DWF will be presented and compared to those obtained in the WWF by means of maps. The results of the existing/immediate term system evaluation and maps of areas not meeting the selected performance criteria will be presented to the City in Workshop #5.

Master Lift Stations – Condition and Age Assessment

A limited condition and age assessment of the master lift stations will be performed. The Consultant will facilitate structured comprehensive forms to evaluate master lift stations to identify condition rating and risk factors. The spreadsheets and checklists will be used by the City and will be provided to the Consultant with scoring. These scores will be processed by the Consultant along with hydraulic capacity results from the model to obtain a project priority matrix for the master lift stations.

Subtask 7.2 – Future System Evaluation

The Consultant will perform analyses of the City's service areas collection systems using the hydraulic model DWF Short-Term, DWF Medium-Term, DWF Long-Term, and WWF Short-Term, WWF Medium-Term, WWF

Long-Term scenarios. These evaluations will focus on existing and future infrastructure under short-term (5-year), medium-term (10-year), and long-term (20-year) wastewater loads, and will include:

- Capacity exceedance of existing lift stations when subject to future loads (if pump design capacity data is absent to compare against future loads, station capacity will be evaluated based on simulated risk of overflows, pump runtime, and number of pump starts per hour).
- Force main capacity of existing force mains under wet weather and dry weather conditions (as represented by velocity of flow).
- Capacity of major existing gravity main connecting the force main network (as represented by the pipe percent full).
- Analysis of the impact of the conversion from septic-to sewer on the collection system.

The WWF scenarios of each hydraulic model will be based on routing the calibration storm through the hydraulic model, when the system is subject to projected growth (which includes both rainfall-derived flow and base sanitary flow). Results of the evaluations under WWF will be presented and compared to those obtained in the DWF by means of maps. The results of the future system evaluation and maps of areas in need of capital improvement to accommodate growth will be presented to the City in Workshop #5.

Subtask 7.3 – Determination of Infrastructure Improvement Needs and Sizing of Future Major Transmission Infrastructure

Each scenario will be iteratively run to identify both existing collection system deficiencies and future infrastructure sizing needs per the established hydraulic performance criteria. Improvements to existing infrastructure and sizing of new infrastructure will both be designed to accommodate Medium-Term (by 2035) flows. Because the City strives to budget for a 5-year cycle and plan for a 10-year horizon, infrastructure sizing needs beyond the Medium-Term (2035) scenario will only be identified but not proposed as improvements for CIP consideration.

Future need for lift stations (master or regular) will be evaluated based on the relative size of the future target flow clusters (from redevelopment) and simulated system pressure, among other considerations. Other proposed improvements may include changes to operational schemes (open and closed valves) and/or pump improvement projects to meet the selected performance criteria for the transmission system.

Identified deficiencies will be used to propose improvement projects for each scenario as needed. Where new force main is necessary to serve large flow clusters, sizing of the transmission pipelines and the corresponding lift station emitting the flow will be provided.

The results of this task will be included in the Draft and Final Wastewater Collection System Master Plan report and will consist of detailed project rationale and descriptions, tabulated summaries that would include pipeline diameter, length of pipe, location of lift station, and year recommended; and corresponding maps to identify the proposed project location. The Consultant will aim to include as much information as to be able to produce planning-level cost estimates (which will be developed in Task 8).

The preliminary recommended improvements will be discussed with the City in Workshop #5.

Master planning tasks beyond Task 7 should not be initiated without Task 7 results being reviewed and approved by the City. City comments or changes to proposed improvements presented and discussed during Workshop #6.

Task 7 Deliverables:

Presentation with System Evaluation Results and Identification of Project Needs – including results of the hydraulic and condition assessment of the master lift stations(Workshop #5).

Task 8: CIP Development

Major infrastructure recommendations resulting from the analyses in Task 2 through Task 7 will be scheduled into a Capital Improvement Plan (CIP) in order of priority. Priority will be assigned to transmission capital projects based on severity of the deficiency and/or potential operational cost savings or efficiencies. Developer driven and funded projects will not be given a cost nor included in the CIP. However, transmission pipes and lift stations to serve planned development and potential development corridors will be sized per Task 7 and included in the CIP, unless identified as a long-term project.

Planning level cost estimates (Level 5) will be calculated for the recommended projects. The cost development methodology will be discussed with the City for consensus and City staff input. The City will provide its current wastewater CIP, which will be contrasted against any projects proposed as part of the Wastewater Collection System Master Plan.

Projects in the proposed CIP will be classified into immediate term (recommended for priority funding), short-term (projects to complete in each of years 2027 through 2031), and medium-term (projects to complete in each of years 2032 through 2036). Long-range projects (by 2045) will be identified in Task 7 and located in a master map for City reference, however their probable cost will not be determined in Task 8, nor they will be included in the proposed CIP schedules.

Capital expenditures of proposed and existing projects will be totalized per year from 2027 through 2036. No cost escalation will be included. Projects identified for the long-term period will be listed but not included in the CIP, nor their cost estimated.

Because no field condition assessment is included in this work authorization, the Master Plan will include projects necessary to mitigate existing hydraulic deficiencies and to serve future growth; however, does not include analysis or recommendations for replacement of infrastructure due to useful life or condition.

The final CIP project recommendations and cost estimates will be presented to the City in Workshop #6. Input on the project cost estimation and other City comments may be received during this Workshop #6 and up to a period of three weeks after Workshop #6, at which time Consultant will consider the proposed CIP as accepted and will proceed to incorporate it in the Draft Wastewater Master Plan Report under Task 9.

Task 8 Deliverables:

- *Presentation with proposed CIP (Workshop #6).*

Task 9: Wastewater Collection System Master Plan Report and Documentation

The Consultant will prepare the Draft Wastewater Collection System Master Plan Report based on information developed in previous tasks. The anticipated content of the report will be as follows:

- Executive Summary
- Chapter 1 - Introduction and Background
- Chapter 2 - Study Area Overview and Existing System Components
- Chapter 3 - Planning Framework
- Chapter 4 – Model Development, Calibration, and Modeling Scenarios
- Chapter 5 – Immediate-Term (2026) System Capacity Evaluation
- Chapter 6 – Evaluation of Future Scenarios and Infrastructure Needs
- Chapter 7 – Capital Improvement Plan
- Chapter 8 – Conclusions and Recommendations
- Appendices

The Draft Wastewater Collection System Master Plan Report will be provided to City staff for review and comment. The Consultant will attend a progress meeting to review comments. The Consultant will incorporate the City's comments into the Draft Wastewater Collection System Master Plan Report, at which point the final version of the Wastewater Collection System Master Plan Report will be issued for approval and adoption. For project control purposes, this task will be broken down into Subtask 9.1 - Draft Wastewater Collection System Master Plan Report and Subtask 9.2 - Final Wastewater Collection System Master Plan Report.

Task 9 Deliverables

- *Draft Wastewater Collection System Master Plan Report (electronic pdf).*
- *Presentation for Draft report review (Workshop #7).*
- *Final Wastewater Collection System Master Plan Report (electronic pdf).*
- *Hydraulic Model with existing and future scenarios.*
- *Updated GIS and maps created throughout the project.*

CITY RESPONSIBILITIES AND ASSUMPTIONS

Because of the nature of this project, certain assumptions apply to this Scope of Services. To the extent possible, these assumptions are stated within this document and are reflected in the budget.:

- The Consultant shall be entitled to rely upon the accuracy of the data and information supplied by The City without independent review or evaluation.
- The City shall attend all workshops and review meetings to maintain the progress of the project according to the schedule.
- The City will provide The Consultant with access to facilities/sites for data gathering and data validation if/as needed.
- The City will assist with field testing as necessary, including making personnel available for the installation of pressure/data loggers.
- The City will provide all required information within reasonable time, which is considered no longer than 2 weeks, after data request. The schedule is based on timely receipt of data and may shift due to

data requirements. The City shall review deliverables and provide comments to The Consultant within a two-week period.

- The City shall furnish the Consultant available studies, reports, and other data pertinent to Consultant's services; obtain or authorize Consultant to obtain or provide additional reports and data as required; furnish to Consultant services of others required for the performance of Consultant's services hereunder, and Consultant shall be entitled to use and rely upon all such information and services provided by City or others in performing Consultant's services under this Scope of Services.
- In providing opinions of cost, financial analyses, economic feasibility projections, and schedules for potential projects, Consultant has no control over cost or price of labor and material; unknown or latent conditions of existing equipment or structures that may affect operation and maintenance costs; competitive bidding procedures and market conditions; time or quality of performance of third parties; quality, type, management, or direction of operating personnel; and other economic and operational factors that may materially affect the ultimate project cost or schedule. Therefore, Consultant makes no warranty that City's actual project costs, financial aspects, economic feasibility, or schedules will not vary from Consultant's opinions, analyses, projections, or estimates.

PROJECT SCHEDULE

A detailed project schedule will be provided at the project Kickoff Meeting. It is anticipated that the effort will be completed in forty-five (45) to fifty (50) weeks from Purchase Order (PO) issuance to the Consultant, assuming that necessary data is provided expeditiously (2 to 3 weeks from PO).

Milestone/Deliverable	Approx. No. of weeks after PO
Kickoff Meeting and Start of Data Collection	1
Task 2 » *Data Request List with sources, comments, and updates. Will be divided in 2:* • *Data Collection for Model Update, and* • *Data Collection for Calibration* » *Brief Testing Plan for System Pressure Monitoring.*	1
City to Complete Data Collection for Model Update	4
Task 3 » *Presentation/Demo of Updated Wastewater Hydraulic Model in SewerGEMS format*	14
City to Complete Data Collection for Calibration	14
Task 4 » *Updated and Calibrated Wastewater Hydraulic Model in SewerGEMS format* » *Presentation of Update and Calibration Results*	22 22
Task 5 » *Summary spreadsheet and Planning Framework brief letter memorandum* » *Presentation of Workshop #3.*	25 25
Task 6 » Presentation of Master Planning Scenarios and Inclusion of Current City CIP (Workshop #4).	28
Task 7 » *Presentation with Current and Future System Evaluation Results and Identification of Project Needs – including results of the hydraulic and condition assessment of the master lift stations. (Workshop #5).*	35
Task 8 » *Presentation with proposed CIP (Workshop #6).*	38
Task 9 » *Draft Wastewater Collection System Master Plan Report (electronic pdf).* » *Presentation for Draft report review (Workshop #7).* » *Final Wastewater Collection System Master Plan Report (electronic pdf).* » *Hydraulic Model with existing and future scenarios.* » *Updated GIS and maps created throughout the project.*	43 46 48 48 48

COMPENSATION

We propose to conduct the requested work for the total lump sum fee of $486,922.00. Breakdown by task is presented in the table below. Attachment A provides the level of effort estimated for each task and subtask.

Payment will be billed to the City based on Ordinance 2021-39 for Consulting/Professional Services between the City and Consultant for Continuing Contract for Engineering Services.

Master Plan Phase	Task	Fee
Phase 1 and 2 combined	Task 1: Project Management and Meetings – Phase 1 and Phase 2 Combined	$46,822.00
Phase 1	Task 2: Data Collection and Analysis	$45,432.00
	Task 3: Wastewater Model Update/Development	$66,692.00
	Task 4: Wastewater Model Calibration	$52,004.00
Phase 2	Task 5: Planning Framework and Flow Projections	$62,148.00
	Task 6: Development of Master Planning Scenarios	$82,240.00
	Task 7: Hydraulic Performance Evaluations and Identification of Improvement Needs	$58,780.00
	Task 8: CIP Development	$17,880.00
Phase 1 and 2 combined	Task 9: WWCS Master Plan Report and Documentation	$54,924.00
	Total	**$486,922.00**

Reimbursables are included in the above totals, and will be billed as follows:

- Project equipment, communication technology, and printing expenses (PECE) are to be reimbursed at $14.00/hour.

ATTACHMENT A

Pompano Beach
Wastewater Model Update and Calibration
Budget Detail

1/21/2026

	Task and Subtasks	Labor Hours and Costs								PECE	Estimated Labor Cost and PECE Total
	Staff Classification	Senior Professional	Lead Project Professional	Project Professional	Professional	Assistant Professional	Document Processing	Hours	Labor Cost	$14.00	
		$298.00	$289.00	$272.00	$197.00	$160.00	$125.00				
1	**Project Management and Communication**										
	1.1: Project Management and Controls	4	60	40	40	32	14	190	$44,162.00	$2,660.00	$46,822.00
	Task 1 Totals =	***4***	***60***	***40***	***40***	***32***	***14***	***190***	***$44,162.00***	***$2,660.00***	***$46,822.00***
2	**Data Collection and Analysis**										
	2.1: SCADA, telemetry, and independent data logger data	0	8	12	24	0	0	44	$10,304.00	$616.00	$10,920.00
	2.2: Data Collection for Dry and Wet Weather Flow Analysis	0	6	12	24	8	0	50	$11,006.00	$700.00	$11,706.00
	2.3: Field Pressure Monitoring	0	6	12	24	16	0	58	$12,286.00	$812.00	$13,098.00
	2.4: Sewer Exclusions from Water Service in Billing Data, Large Sewer Users, and Septic Areas Information	0	4	12	24	0	0	40	$9,148.00	$560.00	$9,708.00
	2.5: Wastewater Collection System CIP Data and Cost References										
	Task 2 Totals =	***0***	***24***	***48***	***96***	***24***	***0***	***192***	***$42,744.00***	***$2,688.00***	***$45,432.00***
3	**Wastewater Model Update**										
	3.1: Wastewater Collection Model Conversion and Update/Verification of Physical Attributes	0	10	48	40	0	0	98	$23,826.00	$1,372.00	$25,198.00
	3.2: Creation of Wastewater Sewersheds and Update of Sewer Flow Allocation	0	10	24	60	0	0	94	$21,238.00	$1,316.00	$22,554.00
	3.3: Development of Sewer Lift Station Operational Attributes	0	12	24	40	0	0	76	$17,876.00	$1,064.00	$18,940.00
	Task 3 Totals =	***0***	***32***	***96***	***140***	***0***	***0***	***268***	***$62,940.00***	***$3,752.00***	***$66,692.00***
4	**Wastewater Model Calibration and 2026 Scenarios**										
	4.1: Wastewater Collection System Dry Weather Flow Calibration	0	20	40	24	0	0	84	$21,388.00	$1,176.00	$22,564.00
	4.2: Wastewater Collection System Wet Weather Flow Calibration	0	24	48	40	0	0	112	$27,872.00	$1,568.00	$29,440.00
	Task 4 Totals =	***0***	***44***	***88***	***64***	***0***	***0***	***196***	***$49,260.00***	***$2,744.00***	***$52,004.00***
5	**Planning Framework Update And Flow Projections**										
	5.1: Historical and Current Wastewater Flow Analysis	0	8	12	30	0	0	50	$11,486.00	$700.00	$12,186.00
	5.2: Wastewater Flow Projections	0	8	12	30	8	0	58	$12,766.00	$812.00	$13,578.00
	5.3: Definition of System Evaluation Criteria	0	8	12	30	16	0	66	$14,046.00	$924.00	$14,970.00
	5.4: Planning Framework Results and Summary Documentation	0	4	12	30	60	0	106	$19,930.00	$1,484.00	$21,414.00
	Task 5 Totals =	***0***	***28***	***48***	***120***	***84***	***0***	***280***	***$58,228.00***	***$3,920.00***	***$62,148.00***
6	**Development Of Master Planning Scenarios**										
	6.1: Creation of Immediate-Term Scenarios and Alternatives	0	8	12	40	36	0	96	$19,216.00	$1,344.00	$20,560.00
	6.2: Creation of DWF Future Scenarios and Alternatives	0	8	12	40	36	0	96	$19,216.00	$1,344.00	$20,560.00
	6.3: Creation of WWF Future Scenarios and Alternatives	0	8	12	40	36	0	96	$19,216.00	$1,344.00	$20,560.00
	6.4: Inclusion of City CIP Projects in the Model	0	8	12	40	36	0	96	$19,216.00	$1,344.00	$20,560.00
	Task 6 Totals =	***0***	***32***	***48***	***160***	***144***	***0***	***384***	***$76,864.00***	***$5,376.00***	***$82,240.00***
7	**Service Areas Hydraulic Performance Evaluations And Improvement Needs**										
	7.1: Immediate Term System Evaluation	6	12	18	40	40	0	116	$24,432.00	$1,624.00	$26,056.00
	7.2: Future System Evaluation	0	8	12	30	24	0	74	$15,326.00	$1,036.00	$16,362.00
	7.3: Determination of Infrastructure Improvement Needs and Sizing of Future Major Transmission Infrastructure	0	8	12	30	24	0	74	$15,326.00	$1,036.00	$16,362.00
	Task 7 Totals =	***6***	***28***	***42***	***100***	***88***	***0***	***264***	***$55,084.00***	***$3,696.00***	***$58,780.00***
8	**CIP Development**										
	7.1: CIP Development	0	8	12	24	40	0	84	$16,704.00	$1,176.00	$17,880.00
	Task 8 Totals =	***0***	***8***	***12***	***24***	***40***	***0***	***84***	***$16,704.00***	***$1,176.00***	***$17,880.00***
9	**Master Plan Report and Documentation**										
	9.1: Draft Wastewater Collection System Master Plan Report	2	6	10	36	0	40	94	$17,142.00	$1,316.00	$18,458.00
	9.2: Final Wastewater Collection System Master Plan Report	2	4	6	20	0	24	56	$10,324.00	$784.00	$11,108.00
	9.3: Updated GIS and maps created throughout the project.	0	2	8	24	100	0	134	$23,482.00	$1,876.00	$25,358.00
	Task 9 Totals =	***4***	***12***	***24***	***80***	***100***	***64***	***284***	***$50,948.00***	***$3,976.00***	***$54,924.00***
	Total Project Hours/Dollars	**14**	**268**	**446**	**824**	**512**	**78**	**2,142**	**$ 456,934.00**	**$29,988.00**	**$486,922.00**