

**CITY OF CAMAS
WATER SYSTEM PLAN
SCOPE OF SERVICES**

The following Scope of Services has been developed to assist the City of Camas (City) with the 2016 update of its Water System Plan (Plan). The objective of this project is to update and review of all elements of the Plan document, in accordance with WAC 246-290-100 and State of Washington Department of Health (DOH) regulations. The following tasks under this Scope of Services have been prepared based on Carollo Engineers' (Consultant) current understanding of the proposed project, and on discussions with City staff.

1.0 PROJECT BACKGROUND

The City initiated this Plan recognizing the importance of planning, developing, and financing water system facilities to provide reliable and efficient service for existing customers and to serve anticipated growth. The Plan is designed to meet state, county, and local requirements. The City's last Water System Plan was completed and approved by DOH in 2010. This plan will be a substantial update to the 2010 Plan and will include an above-ground asset condition assessment and O&M manual update. The 2010 Plan will be incorporated into the updated Plan, as appropriate. This Plan is being developed in conjunction with an update to the City's Comprehensive Plan, creating a cohesive and complementary set of documents.

2.0 PROJECT ASSUMPTIONS

- Carollo Engineers, Inc. will be referred to as "Consultant" in this document.
- The City of Camas and its staff will be referred to as "City" in this document.
- FCS GROUP will be referred to as "FCS" in this document.
- Pacific Groundwater Group will be referred to as "PGG" in this document.
- All meetings will be held at City offices.
- Draft Chapters will be provided in electronic copy (PDF and/or Microsoft Word) transmitted via email or secure file transfer.
- Calculation tables will be provided in Microsoft Excel (.xlsx format).
- Consultant to prepare an agenda, presentation materials, and document discussions, including action items and decisions, in meeting minutes for Consultant lead meetings. Meeting notes and related materials will be transmitted electronically in MS Word and PDF formats via email.
- The City will print and produce additional copies of all documents as necessary for its use.
- The City will provide available information related to the project and as requested by the Consultant in a timely manner. The City shall furnish 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 the City or others in performing Consultant's services under this Agreement.

- The Consultant and City will develop the chapters for the Plan with the lead roles as described below.

Chapter / Appendix	Chapter Lead
Executive Summary Water System Plan	Consultant
Chapter 1: Introduction	Consultant
Chapter 2: Planning Considerations	Consultant
Chapter 3: Existing System	Consultant
Chapter 4: Operations and Maintenance	Consultant
Chapter 5: Water Requirements	Consultant
Chapter 6: Water Use Efficiency	City
Chapter 7: Water Quality	Consultant
Chapter 8: Water Resources	Consultant with PGG
Chapter 9: Water System Analysis	Consultant
Chapter 10: Capital Improvements Plan	Consultant
Chapter 11: Financial	FCS

TASKS

To meet the objectives of this scope of services, the Consultant shall complete the tasks as summarized in the table below and discussed in detail in the text that follows.

Task	Title
Task 100	Introduction
Task 200	Planning Considerations
Task 300	Existing System
Task 400	Operations and Maintenance
Task 500	Water Requirements
Task 600	Water Use Efficiency
Task 700	Water Quality
Task 800	Water Resources
Task 900	Water System Analysis
Task 1000	Capital Improvements

Task	Title
Task 1100	Financial
Task 1200	Plan Integration
Task 1300	Condition Assessment
Task 1400	O&M Manual
Task 1500	Project Management
Task 1600	Management Reserve

TASK 100 – INTRODUCTION

The objective of this task is to review and update the City’s introduction to the Plan. Chapter 1 documents important plan elements including purpose, objectives, ownership and management, and the approval process. This task will develop *Chapter 1 Introduction* of the Plan and includes the Project Kick-off meeting.

Task 100 Activities

101. *Data Request.* Develop and submit a request for data required for Chapter 2. The following data are anticipated to be required:
 - a. Notice of Determination of Non-Significance (DNS).
 - b. State Environmental Policy Act (SEPA) Checklist.
 - c. Agency Comment Letters and Responses.
 - d. Water System Plan Submittal Form.
 - e. Municipal Water Law – Water System Plan Government Consistency Review Checklist.
102. *Meeting No. 1 - Project Kick-off.* Summarize the DOH Kick-off meeting, the Plan outline, the Draft PMP, and the initial data request list for Tasks 100 through 400.
103. *Develop Introduction Information.* Develop information for Chapter 1 to introduce the Plan contents. Document the purpose, objectives, ownership and management, and the approval process, including environmental and Agency review comments and ordinances.
104. *Draft and Final Chapter 1 – Introduction.* Prepare draft Chapter 1 for City’s review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- It is anticipated the City will lead the environmental and agency Plan review and approval process. The City will provide all associated documentation to the Consultant.

City Deliverables

- Agency and adjacent purveyor review comments.

- Adopting resolution.
- Comments on draft Chapter 1 – Introduction.

Consultant Deliverables

- Project Kick-off Meeting Agenda, Materials, and Minutes.
- Draft Chapter 1 – Introduction.
- Final Chapter 1 – Introduction.

Meetings

- Meeting No. 1 - Project Kick-off.

TASK 200 – PLANNING CONSIDERATIONS

The objective of the chapter is to document the planning considerations that influence the Plan. These include the study area, policies, criteria, and related documents.

Task 200 Activities

201. *Data Request.* Develop and submit a request for data required for Chapter 2. The following data are anticipated to be required:
 - a. Clark County’s Coordinated Water Service Areas.
 - b. City’s Retail Water Service Area (RWSA) boundary.
 - c. Service Area agreements.
 - d. Interlocal agreements with adjacent purveyors.
 - e. Related studies.
202. *Study Area.* Summarize the system background, including history, geology, water resources, and adjacent purveyors.
203. *Identify Legislation, Regulations, and Permits:* Identify and summarize key legislation, regulations, and permits relating to the City's water system.
204. *Review and Update of Policies and Criteria.* Review and update the policies and criteria in Chapter 2 of the 2010 Plan to reflect the latest information and reformat to maintain consistency throughout the Plan. Recommend areas where new policies or criteria may aid the City. Incorporate changes into draft Chapter 2 for the City’s review and approval.
205. *Meeting No. 2 - Policies and Criteria.* Review and discuss existing policies and criteria, as well as recommendations.
206. *Summarize Related Documents:* List City, County, and Regional Planning documents related to the Plan. Summarize information that is important to the operation of the City's water system. It is expected that this will include the City and Clark County Comprehensive Plan Clark County Coordinated Water System Plan, adjacent purveyor water system plans, Watershed Assessment Water Resource Inventory Area (WRIA) 28, etc.
207. *Draft and Final Chapter 2 – Planning Considerations.* Prepare draft Chapter 2 for City’s review and approval. City comments and Consultant responses will be tracked in the

Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- The City will provide the necessary related documents.

City Deliverables

- Requested data.
- Comments on draft Chapter 2 – Planning Considerations.

Consultant Deliverables

- Meeting No. 2 Agenda, Materials, and Minutes.
- Draft Chapter 2 – Planning Considerations.
- Final Chapter 2 – Planning Considerations.

Meetings

- Meeting No. 2 - Retail Water Service Area/Policies and Criteria.

TASK 300 – EXISTING SYSTEM

The purpose of this task is to document the City's existing water system, including supply, storage, booster pump stations, interties, treatment, and distribution. This task will develop *Chapter 3 – Existing System* of the Plan.

Task 300 Activities

301. *Data Request.* Develop and submit a request for data required for Chapter 3. The following data are anticipated to be required:
 - a. System tables for City to review/complete
 - b. Coordinate with City to obtain the most up-to-date GIS information.
 - c. Water Facilities Inventory Form.
 - d. Updated facilities information from 2010 Plan, including Summary Engineering and DOH Report of the Slow Sand Filtration Treatment Plant (SSFTP).
302. *Review and Update of Existing System.* Review and update Chapter 3 of the 2010 Plan to reflect the latest information and maintain consistency throughout the Plan, including storage, booster pump stations, and treatment. Facilities will be updated, as required, based information from the City and from Task 1500 - Condition Assessment. Prepare existing hydraulic profile of the existing system with new SSFTP.
303. *Draft and Final Chapter 3 – Existing System.* Prepare draft Chapter 3 for City's review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- City will provide pertinent information for missing or updated facility data.

- Chapter 3 will be developed in conjunction with Task 1500 - Condition Assessment.

City Deliverables

- Requested data.
- Comments on draft Chapter 3 – Existing System.

Consultant Deliverables

- Draft Chapter 3 – Existing System.
- Final Chapter 3 – Existing System.

Meetings

- None.

TASK 400 – OPERATIONS AND MAINTENANCE

The purpose of this task is review, update, and evaluate the City's Operations and Maintenance (O&M) Program and document in *Chapter 4 – Operations and Maintenance* of the Plan. This chapter will be developed in conjunction with Task 1400 - Operation and Maintenance Manual. An evaluation of the O&M programs will provide recommendations for new or updated maintenance programs, as needed.

Task 400 Activities

401. *Data Request*. Develop and submit a request for data required for Chapter 4. The following data are anticipated to be required:
 - a. Water System organization chart and operator certifications.
 - b. Coliform Monitoring Plan.
 - c. Boil Water Notices.
 - d. Public Works Emergency Response Plan.
 - e. Cross-Connection Control Program (or enabling ordinance).
 - f. Routine and preventive maintenance schedules for major system components.
402. *O&M Analysis*. Conduct O&M analysis to identify deficiencies and recommendations. Summarize the current operations and maintenance programs. Programs may include Operator certificates and training, lead free, routine, and preventive maintenance, Cross Connection Control Program, and Public Notification Plan/Procedures. Review current operation and maintenance program in relation to state and national water operation standards, including AWWA G200-09 Standards. Propose recommendations and develop CIPs, if needed, based on the review.
403. *Remaining Useful Life (RUL)*. Evaluate the remaining useful life of water pipes considering age and material. City to review and update estimate of the assumptions of useful life and RUL based on the City's experience. Prepare annual pipeline replacement schedule based on the results.
404. *Draft and Final Chapter 4 – Operations and Maintenance*. Prepare draft Chapter 4 for City's review and approval. City comments and Consultant responses will be tracked in

the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- Chapter will be conducted in conjunction with Task 1400 - Operations and Maintenance Manual.

City Deliverables

- Requested data.
- Comments on Chapter 4 – Operations and Maintenance.

Consultant Deliverables

- Draft Chapter 4 – Operations and Maintenance.
- Final Chapter 4 – Operations and Maintenance.

Meetings

- None.

TASK 500 – WATER REQUIREMENTS

The purpose of this task is to perform a demographic and demand analysis to predict current and future demands within the City's RWSA. Six (6)-year, 10-year, and 20-year planning horizons will be evaluated using the best available information. This task will develop *Chapter 5 - Water Requirements* of the Plan.

Task 500 Activities

501. *Data Request.* Develop and submit a request for data required for Chapter 5. The following data are anticipated to be required:
- a. Growth rates by customer class through the end of the water supply planning horizon. The rates should be consistent with regional planning and may be population and employment projections on a Transpiration Analysis Zones (TAZ) basis.
 - b. Historical connection and water use information by customer class for the past 6 to 10 years.
 - c. Historical Production from each source for the past 6 to 10 years, including annual volume and maximum day production.
 - d. Largest customer locations on a map and annual consumption by customer class.
 - e. Accounted-for Non-Revenue Water for the past 6 to 10 years.
 - f. Identify infill capacity and areas of redevelopment. Specific emphasis will be placed on those areas with a high potential for large scale residential or commercial development, as well as new industrial customers.
 - g. GIS Data: land use and zoning data, vacant and redevelopable land, TAZ boundaries.

502. *Demographics Projections.* Demographic projections will be developed to project the future growth in customers.
- a. Use data from Clark County and the City to calculate rates of growth for each TAZ and each pressure zone. High, low, and average number of accounts will be prepared for the 6-year, 10-year, and 20-year by pressure zone, if sufficient data is available.
 - b. Generate build-out, or ultimate, accounts by pressure zone, based on approved land use. Accounts per acre will be developed based on existing densities.
503. *Demand Projections.* Demand projections will be for the 6-year, 10-year, 20-year, and build-out planning horizons.
- a. Develop the historical average day demands (ADD) and maximum day demands (MDD), the accounted-for revenue water uses, estimated water loss and leakage planning values, and establish equivalent residential unit (ERU) values for the different customer classes.
 - b. Estimate the future ADD and MDD water demand for each pressure zone based on the demographic projections and historical ERU demand. Estimates of the future water demand will be determined. The range will be based on the statistical variation in the historical ERU demand, leakage values, conservation goals, and the high and low ranges of the demographic projection and the effects of climate change. The City's largest connections, potential large scale industrial demands and future wholesale water customers will be evaluated and projected separately and added to other projected system demands. Peak hour demand (PHD) will be calculated using City specific peaking factors.
504. *Meeting No. 3 – Water Requirements/WUE Program Review.* Review demographic analysis and demand projection results. Confirm allocation of demand across customer classes and pressure zones. Review WUE program and conservation volumes.
505. *Draft and Final Chapter 5 – Water Requirements.* Prepare draft Chapter 5 for City's review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- Current retail water service area and pressure zones are correctly delineated and do not require updating.
- No meeting will be held directly with Clark County.

City Deliverables

- Requested data.
- Comments on Chapter 5 – Water Requirements.

Consultant Deliverables

- Meeting No. 3 Agenda, Materials, and Minutes.

- Draft Chapter 5 – Water Requirements.
- Final Chapter 5 – Water Requirements.

Meetings

- Meeting No. 3 - Water Requirements/WUE Program Review.

TASK 600 – WATER USE EFFICIENCY

The City will lead the Water Use Efficiency (WUE) Chapter, which summarizes the WUE program, estimate the water savings from measures in the past 6 years, and project future conservation water demand. The City will author *Chapter 6 – Water Use Efficiency* of the. The City will summarize the existing and future WUE program, including program measures, effectiveness, costs, and benefits. The Consultant will develop future demand projections with the WUE program and review and format Chapter 6. The WUE work efforts will be presented as part of Meeting No. 3 - Water Requirements/WUE Program Review.

Task 600 Activities

601. *Data Request.* Develop and submit a request for data required for Chapter 6. The following data are anticipated to be required:
- a. Word Document of Chapter 6 - Water Use Efficiency
 - b. Electronic version of figures and large tables.
 - c. Conservation goals.
 - d. Water Use Efficiency Public Meeting Minutes.
602. *Future Conservation Water Demand.* Calculate conservation demands (both MDD and ADD) based on the established conservation goals provided by the City. MDD and ADD conservation demands will be developed in the same demand years used in demand projections. Demands will be transmitted electronically to the City.
603. *Final Chapter 6 – Water Use Efficiency.* Review the City prepare draft Chapter 6 and provide comments electronically for City review and acceptance. Word process the Final Chapter 6 for consistency with other Chapters. Consultant comments and City responses will be tracked in the Comment Response Log.

Assumptions

- None.

City Deliverables

- Requested data.
- Draft Chapter 6 – Water Use Efficiency.

Consultant Deliverables

- Comments on draft Chapter 6 – Water Use Efficiency.
- Final Chapter 6 – Water Use Efficiency.

Meetings

- None.

TASK 700 – WATER QUALITY

The purpose of this task is to summarize the water quality regulations and reporting requirements, evaluate water quality against the regulations, summarize any water quality violations, and recommend improvements if necessary to meet anticipated or future water quality regulations. This task will develop *Chapter 7 - Water Quality* of the Plan. The water quality work efforts will be presented as part of Meeting No. 4 - Water Supply Analysis/Water Quality.

Task 700 Activities

701. *Data Request.* Develop and submit a request for data required for Chapter 7. The following data are anticipated to be required:
- a. Water Quality Monitoring Plan.
 - b. Summary of water quality test results, including data from well water, treated water, and the distribution system.
 - c. Testing Waivers.
702. *Water Quality Summary.* Summarize the City's water quality programs and activities. Identify key requirements of applicable water quality regulations.
703. *Water Quality Analysis.* Summarize water quality within the distribution system and existing treatment plant. Review City's compliance with current federal and state water quality regulations. Summarize the current treatment process types, capacity, overall performance and treatment system conditions. Evaluate City's ability to meet future potential water quality regulations. Identify improvements required to the City's water treatment systems to meet current and/or future regulations.
704. *Draft and Final Chapter 7 – Water Quality.* Prepare draft Chapter 7 for City's review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- This task does not include review or update of the City's Water Quality Monitoring Plan and other water quality programs and plans.
- This task does not include a blending study between surface water and groundwater.

City Deliverables

- Requested data.
- Comments on draft Chapter 7 – Water Quality.

Consultant Deliverables

- Draft Chapter 7 – Water Quality.

- Final Chapter 7 – Water Quality.

Meetings

- None.

TASK 800 – WATER RESOURCES

The purpose of this task is to evaluate the current and future water resources to identify potential deficiencies and proposed improvements. Evaluations will consider current water rights, Water Resources Inventory Areas (WRIA), and coordinated regional water system plans. This task will develop *Chapter 8 - Water Resources* of the Plan.

Task 800 Activities

801. *Data Request.* Develop and submit a request for data required by Chapter 8. The following data are anticipated to be required:
 - a. Existing water rights certificates/permits and pending water rights applications.
 - b. Existing well pump tests, surface water diversion capacity, and other evaluations and/or characterizations of supply capacity.
 - c. Known limitations in supply transmission or treatment capacity.
 - d. Electronic information for the City's existing monitoring wells and sampling protocol.
 - e. Information required by PGG for updating the Wellhead Protection Report.
 - f. Source Water Protection Plan.
802. *Water Supply Summary.* Review and summarize the existing sources of supply for the City's RWSA, including all surface water, groundwater, and interties. The "ability to pump" of each source will include an evaluation of capacity, water right, treatment capacity, auxiliary power, and other limitations. Identify the criticality of each source.
803. *Water Rights Assessment.* Summarize water right permits, claims, certificates, and pending water right applications and change applications. Complete DOH Water Rights Self-Assessment Tables 1, 2, and 3 for the existing, 6-year, and 20-year planning years, respectively.
804. *Water Supply Analysis.* Evaluate the City's ability to provide water supply in accordance with the City's confirmed reliability and supply criteria for the 6-, 10-, 20-year, and buildout projected demands within the whole system. Additional supplies or improvements will be identified and summarized, as needed. Summarize the City's water supply strategy plan and recommend program modifications, if needed, to meet all system demands for the planning period. The strategy will include consideration of the proposed Steigerwald regional well field. The ability to supply individual pressure zones will be addressed in the system analysis.
805. *Meeting No. 4 – Water Supply Analysis/Water Quality.* Present the supply, storage, pump station, and distribution system analysis results for the City's review and approval.

806. *Wellhead Protection Program Update.* Update City's Wellhead Protection Plan to maintain compliance with all requirements of the Washington State's wellhead protection rules.

Work will be performed by PGG and will include the following subtasks:

1. **Wellhead Protection Capture Zone Delineations.** PGG previously modeled the City's wellhead capture zones at full buildout conditions (i.e. total water rights) for the lower Washougal well field area and do not anticipate the need for any updates to the those delineations in the 2015 WSP, therefore, were not included in the budget.
2. **Assess Environmental Threats and Risk Reduction Strategies.** Inventory and map potential and confirmed contaminant sources within the delineated capture zone areas using current data contained within Ecology Environmental Information Management (EIM) database system. Evaluate and rank potential risks to the City's supply sources and assess management strategies that can be employed to minimize risk.
3. **Prepare Contingency Supply Plans.** Prepare a contingency supply plan that considers the potential loss of the City's largest supply source due to groundwater contamination including options to use interties from the Cities of Vancouver and Washougal and use of the Camas surface water diversions on Boulder and Jones creeks.
4. **Prepare Notification Letters.** Prepare notification letters that will need to be sent to hazardous waste handlers, first responders, and regulatory agencies as required by WAC 246-290-135. The letters will include maps showing the locations of the wellhead protection capture zones, transportation corridors where spills might be of concern, and waste storage and handling sites. It is assumed that the City will transmit the letters using their letterhead. Electronic versions of the documents and mailing lists will be provided to the City for their transmittal. Copies of the letters will be provided for inclusion in the WSP.
5. **Provide Assistance with Steigerwald Wellfield Supply Options and Analysis.** PGG will assist with integrating information from the Steigerwald water supply work that we have completed to date as needed for the 2015 WSP. Up to two days of staff time has been included in the budget.
6. **Prepare Wellhead Protection Plan Summary Report.** Prepare a letter report which summarizes the findings of Subtasks 1 - 5. The document will serve as an appendix to the City's WSP document which will be submitted to DOH.
7. **PGG Project Management.** Conduct internal communication and management of personnel in accomplishing the project tasks. PGG will communicate regularly with City staff and other project team members to keep them informed on project status and will solicit input, as needed. PGG will prepare and submit invoices on a monthly basis.

807. *Meeting No. 5 – Wellhead Protection.* Present the Wellhead Protection results for the City's review and approval.

808. *Draft and Final Chapter 8 – Water Resources.* Prepare draft Chapter 8 for City’s review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- The City will provide assumptions on future sources and quantities of supply
- City staff will field-verify hazard sites.
- No sensitivity analyses have been budgeted.

City Deliverables

- Requested data.
- Field verification of hazard sites.
- Comments on draft Chapter 8 – Water Resources.

Consultant Deliverables

- Meeting No. 4 Agenda, Materials, and Minutes.
- Meeting No. 5 Agenda, Materials, and Minutes.
- Wellhead Protection Plan Report Update.
- Draft Chapter 8 – Water Resources.
- Final Chapter 8 – Water Resources.

Meetings

- Meeting No. 4 – Water Supply Analysis/Water Quality.
- Meeting No. 5 – Wellhead Protection.

TASK 900 – WATER SYSTEM ANALYSIS

The purpose of this task is to evaluate the distribution system using the City’s calibrated InfoWater hydraulic model. Improvements will be developed for identified deficiencies. Improvements identified in other tasks will be incorporated into the model, as appropriate, to determine the effect of comprehensive improvements. It is assumed that the City’s most recent Innowyze InfoWater hydraulic model will be available. Operational changes identified in the system analysis will be reflected in O&M Manual update and vice versa. Identified improvements will be reviewed as part of Meeting No. 7 - Capital Improvements.

Task 900 Activities

901. *Data Request.* Develop and submit a request for data required for Chapter 9. The following data are anticipated to be required:

- a. Potential future supplies or interties, including locations.
- b. Potential location for future storage facilities.
- c. SCADA data for diurnal curve development and calibration.

902. *Updated Hydraulic Profile.* Update the previous hydraulic profile according to data provided in the hydraulic model. Prepare a hydraulic profile figure for review by City.
903. *Storage Analysis.* Identify the storage volume required for each pressure zone based on the established storage criteria for equalizing, fire flow, operational and standby volumes. The storage analysis will be performed for the 6-, 10-, and 20-year projected demands. If storage deficiencies are identified, additional storage volume requirements will be identified by pressure zone and capacity. Potential storage size and location specifically identified by the City will be utilized if future storage needs are identified.
904. *Pump Station Analysis.* Identify the pumping capacity requirements per City specified criteria. Compare requirements to current pump station capacity to identify any deficiencies for the 6-, 10-, and 20-year projected demand scenarios. Required upgrades, modifications, or operational changes will be recommended, as necessary.
905. *Update Hydraulic Model.* The existing calibrated InfoWater hydraulic model will be updated with latest pipes and demands for the 6-, 10-, and 20-year conditions.
- a. Compare existing calibrated InfoWater model with the City's GIS and recent as-built drawings. It is assumed that the existing model was updated in the last year and does not require calibration. Complete limited updates to the model as required.
 - b. Apply the estimated existing demands to nodes in the model using geocoding. Scale demands per pressure zone such that the total demand per pressure zone matches the demand projections. Demands for the 6-, 10-, and 20-year conditions will be applied in the model using a scaled multiplier.
 - c. Review diurnal curves in the model and update using historical SCADA data. Apply diurnal curves into model. Calibrate model based on an extended period simulation (EPS) using a separate validation period. It is anticipated that the diurnal curves will be developed for up to four operating areas that may span multiple pressure zones.
 - d. Review and update Fire flow requirements (FFR) assigned to the model nodes based on the latest land use data. In addition, a specific FFR will be assigned to the single node in each zone representing the account with the highest FFR.
 - e. Establish settings and initial levels for seasonal operation of the system. The model will be updated to simulate the hydraulic changes due to supply from surface water versus groundwater sources.
906. *Fire and System Pressure Analysis.* Using the hydraulic model, perform steady state analysis of the system evaluating fire flow and system pressures per DOH regulations and guidelines based on the City's water system criteria. Identify improvements to address deficiencies under the MDD plus fire flow simulations and the peak hour simulations for the 6-year, 10-year and 20-year scenarios. The model will also be used to identify minimum system pressures and velocities during peak-hour demands. Operational changes will be recommended in addition to physical improvements. The System Analysis will focus on distribution capacity deficiencies for pressure, velocity, and flow. The analysis will be conducted for both supply scenarios

907. *Meeting No. 6 - Desktop and System Analysis.* Present the Storage and Pump Station Analysis results for the City's review and approval. Discuss and validate, if possible, the deficiencies identified during the fire and system pressure analysis with City staff. Prepare figures showing pressure and fire flow deficiencies.
908. *Identification of Water Improvement Projects.* Identify improvements to address identified transmission/distribution deficiencies. Identified supply, storage, treatment, and water quality improvements included will be sized to meet 20-year demand conditions. Incorporate results from in Task 1300 - Condition Assessment. Incorporate water system projects in the existing CIP and summarize changes to projects, if required. Prepare figures showing results of pressure and fire flow after implementing recommended improvements.
909. *Draft and Final Chapter 9 – System Analysis.* Prepare Chapter 9 for City's review and approval. Document the methodology and results of the System Analysis of the system deficiencies and improvements. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- Existing Innovyze Hydraulic Model that is up-to-date and well calibrated.

City Deliverables

- Requested data.
- Comments on draft Chapter 9 – System Analysis.

Consultant Deliverables

- Meeting No. 6 Agenda, Materials, and Minutes.
- Draft Chapter 9 – System Analysis.
- Final Chapter 9 – System Analysis.

Meetings

- Meeting No. 6 - Desktop and System Analysis.

TASK 1000 – CAPITAL IMPROVEMENTS

This Task will summarize the recommended improvements for the sources of supply, storage, distribution and transmission, and pressure zones in accordance with the City's Policy and Criteria. Total project costs will be developed for each recommended improvement and ranked by priority. This task will develop *Chapter 10 - Capital Improvement* for the Plan.

Task 1000 Activities

1001. *Cost Estimates.* Develop opinions of project cost for pipe replacement, pump station, reservoir, treatment, and other improvement projects identified by City. Summarize the recommended system improvements for the 6-year, 10-year, and 20-year terms. Costs

will be presented in current dollars and represents an American Association of Cost Engineering (AACE) Class V estimate.

1002. *Project Prioritization*. Obtain project prioritization criteria from City. Prioritize all projects into 6-year, 10-year, and 20-year schedules based on evaluation during the Plan. Projects not identified in the Plan will be identified by the City and included for prioritization during this task.
1003. *Meeting No. 7 - Capital Improvements*. Review CIP projects and develop project prioritization. Review and confirm all CIP project costs.
1004. *Electronic CIP*. Develop an electronic CIP spreadsheet tool to include a full sheet on each project and a summary CIP for all projects. Project costs and timing will be linked such that City staff may revise costs and timing and the CIP will automatically be updated.
1005. *Draft and Final Chapter 10 – Capital Improvements*. Prepare draft Chapter 10 for City's review and approval. City comments and Consultant responses will be tracked in the Comment Response Log. Comments on this chapter will be incorporated into the final Plan.

Assumptions

- City provides bid costs of recent projects, if available.

City Deliverables

- Comments on draft Chapter 10 – Capital Improvements.

Consultant Deliverables

- Meeting No. 7 Agenda, Materials, and Minutes.
- Draft Chapter 10 – Capital Improvements.
- Final Chapter 10 – Capital Improvements.
- Electronic CIP.

Meetings

- Meeting No. 7 - Capital Improvements

TASK 1100 – FINANCIAL

The purpose of this task is to develop Chapter 11 – Financial Plan, which will be conducted by FCS. Chapter 11 will identify the total cost of providing water service, assure that the utility improvement schedule will be implemented, and assist in establishing adequate fees for service. The financial program will be coordinated with the CIP. Specific tasks to be performed for the financial program will include the following:

1101. *Data Collection / Review*. Prepare an initial data request identifying financial and operational documents pertinent to the performance of the study. The Consultant will provide the CIP and relevant draft WSP chapters. Review, analyze, and validate data as necessary for use in formulating the technical analysis. Follow up with requests for any additional items or explanations as necessary.

1102. *Historical Financial Performance Review.* Review and document the financial operations (revenue and expenses) and financial condition (assets and liabilities) of the water utility for the previous six-year period. Summarize noteworthy financial trends.
1103. *Fiscal Policy Review.* Review the City's current fiscal policies for operating and capital reserves, system reinvestment funding, debt management, and debt service coverage.
1104. *Capital Financing Plan.* Evaluate capital funding options, and develop a capital financing plan for the six-year and 20-year Capital Improvement Programs (CIP). The analysis will include a forecast of capital funding needs, borrowing requirements, and associated cash flows and cash balances over the study period. Evaluate and recommend an appropriate balance of funding from cash, System Development Charges (SDCs), bonds, low interest loans and/or other available funding sources. Depending upon preliminary results, FCS will work closely with the Consultant and the City to perform sensitivity analyses for alternative scheduling of capital projects in order to smooth customer rate impacts. The budget provides for up to three (3) scenarios.
1105. *Operating Forecast.* The City's current water operating budgets will be used as the baseline for forecasting ongoing operating and maintenance (O&M) costs, debt service, and other financial obligations of the water utility over the six-year and 20-year study periods. Incorporate engineering planning growth forecasts and establish economic factors for cost escalation. Integrate additional O&M expenses, if any, resulting from the CIP and any other known changes in operational requirements.
1106. *Revenue Needs Assessment.* Integrate fiscal policies, capital financing impacts and the operating forecast, and develop an operating cash flow projection for the six-year and 20-year study periods. Compare forecasted financial requirements against forecasted revenue under existing rates to determine annual and cumulative revenue adjustments needed to ensure financial sustainability over time.
1107. *Rate Forecast & Affordability Test.* Develop a rate forecast for the six-year period. Apply annual rate adjustments to the City's existing water rate structures "across-the-board" to each rate class and rate charge (fixed and variable). Note: this scope does not include changes to the City's existing water rate structure. The Financial Chapter will include a narrative discussion of potential rate structure enhancements, if necessary.
- Perform an affordability test as an indication of a residential customer's ability to pay the existing and forecasted rates. This includes an analysis and comparison of the water system's existing and forecasted average residential bills to 1.5 percent of the median household income. This test will be conducted for the six-year and 20-year study periods.
1108. *Meeting No. 8 - Financial Analysis.* Review results before finalizing the Financial Chapter. Meeting will be attended by FCS and Carollo.
1109. *Documentation.* Draft Financial Chapter for Consultant and City staff review. An electronic copy of the draft Financial Chapter and Excel-based tables will be provided to Consultant for incorporation into the WSP document. Incorporate requested changes, as appropriate, and submit the final version of the Financial Chapter.

Assumptions

- City can provide elements listed under Task 1101.
- This scope does not include changes to the City's existing water rate structure or SDC.

Deliverables

- Meeting No. 8 Agenda, Materials, and Minutes.
- Draft Chapter 11 – Financial.
- Final Chapter 11 – Financial.

Meetings

- Meeting No. 8 – Financial Analysis.

TASK 1200 – PLAN INTEGRATION

The purpose of this task is to integrate comments on the Plan into a clear and comprehensive Water System Plan document. The City Draft Plan will be prepared, including an Executive Summary. This task also includes incorporating comments and developing the Agency Review Draft Plan and Final Plan.

1201. *Executive Summary.* Prepare an executive summary, summarizing each element of the Water System Plan.

1202. *City Draft Plan.* Prepare Cover Sheet, Table of Contents, and Executive Summary. Compile Chapters and develop Appendices. Prepare one PDF of City Draft document for City Staff review.

1203. *Meeting No. 9 - City Draft Plan.* Meet with City to discuss comments of draft document. Incorporate comments to be included into Agency Draft Plan.

1204. *Additional Meetings.* Up to two additional meetings for Plan review as determined by City staff. Aid City staff in preparing technical materials for meetings.

1205. *Agency Draft Plan.* Incorporate City comments into an Agency Draft plan to be submitted for agency review. Eight notebook binders, one camera-ready set, and one PDF will be developed for City reproduction and distribution of Plan to Agencies and Adjacent Purveyors.

1206. *Final Plan.* Consultant will review agency review letters for incorporation into the Final Plan. Delivery of the Final Plan will include one PE-stamped original notebook binder, one PE-stamped original camera-ready set, 7 PE-stamped reproduction notebook binders, one PDF, and all electronic files.

Assumptions

- City provides required documents for appendices, including acceptance ordinances.
- It is anticipated that City will distribute the Plan to DOH, County agencies, and adjacent purveyors review for approval. The City will collect public and agency review comments

and deliver to Consultant. City will develop written responses received during Agency Review process.

City Deliverables

- City Comments.
- Public and Agency Review Comments.

Consultant Deliverables

- Executive Summary.
- City Draft Plan - One PDF.
- Meeting No. 9 Agenda, Materials, and Minutes.
- Additional Meetings Agenda, Materials, and Minutes.
- Agency Draft Plan - Eight notebook binder, one camera-ready, and one PDF.
- Final Plan - Eight notebook binder, one camera-ready, and one PDF.

Meetings

- Meeting No. 9 - City Draft Plan.
- Up to two additional meetings.

TASK 1300 - CONDITION ASSESSMENT

The purpose of this task is to conduct a condition assessment on the City's above ground infrastructure. Condition assessment will field verify above-ground water system features, with the exception of water reservoirs, Pressure Reducing Valves (PRVs), and all surface water treatment facilities. Additionally, below-ground infrastructure will be assessed based on a Remaining Useful Life (RUL) analysis. The condition assessment will be made of other features on reservoir sites. Prepare a prioritized condition assessment with recommendations on system repair, replacement. Develop cost estimates for recommendations.

Task 1300 Activities

1301. *Compile Facility Information.* Compile existing information on facilities, including size, material, manufacturer, age, and known issues. Incorporate reservoir condition assessments into facility information from City and valves information from GC Systems. Prepare facility evaluation worksheets to aid in facility tour. It is assumed that all surface water treatment facilities are in acceptable condition and will not be assessed.
1302. *Meeting No. 10 – Facility Tour.* Coordinate a tour of the supply, treatment, pumping, and storage facilities listed in the below table. Verify and document infrastructure, including pictures and GPS coordinates. Note general condition of infrastructure for use in condition assessment. As a part of this scope of work, facility tours assume 16 hours for four (4) professionals.
1303. *Condition Assessment.* Prepare a high-level condition assessment of all above ground facilities using data gathered during Meeting No. 10. Complete evaluation worksheets for

each facility. Develop recommendations for the repair, replacement, or upgrade of facilities. With the City, establish overall RUL of each facility to aid in calculating risk and prioritizing recommendations.

1304. *Cost Estimates*. Develop opinions of project cost for recommended repair, replacement, or upgrade projects identified in the Condition Assessment. Costs will be presented in current dollars and represents an AACE Class IV estimate.

1305. *Meeting No. 11 – Condition Assessment and Prioritization*. Discuss the results of the condition assessment. Discuss estimate of risk for above-ground facilities based on facility RUL and criticality. Criticality will be established during the Condition Assessment meeting by City Staff using a scale of low, medium, and high. A numeric estimate will be based on RUL multiplied by Prioritize recommendations based on input from the City into the 6-year, 10-year, and 20-year planning horizons. Review and update prioritization of recommendations.

1306. *Draft and Final TM 1 – Condition Assessment*. Document condition assessment activities in Technical Memorandum (TM). Provide collected data electronically, including facility location in an ESRI ARCGIS compatible file format.

Assumptions

- City will provide available information on facilities.
- City will provide access to facility locations.
- Facilities listed in the below table will be evaluated.
- GPS coordinates will be made using consumer grade GPS devices. No survey grade equipment will be used.

City Deliverables

- Requested Data.
- Input on project prioritization.

Consultant Deliverables

- Meeting No. 10 Agenda, Materials, and Minutes.
- Meeting No. 11 Agenda, Materials, and Minutes.
- Additional Meetings Agenda, Materials, and Minutes.
- Draft TM 1.
- Final TM 1.

Meetings

- Meeting No. 10 - Facility Tour.
- Meeting No. 11 - Condition Assessment and Prioritization.

Facilities to be Evaluated			
Facility Type	Name	Facility Type	Name
Well/Treatment Facility	Well 5	Pump Station	Forest Home
Well	Well 6	Pump Station	Old Gregg
Well	Well 7	Pump Station	New Gregg
Well	Well 8	Pump Station	Lower Prune Hill
Well/Treatment Facility	Well 9	Pump Station	Lacamas
Well	Well 10	Pump Station	Angelo
Well	Well 11	Pump Station	Upper Prune Hill
Well	Well 12	Storage Facility	Butler
Well/Treatment Facility	Well 13	Storage Facility	Lower Prune Hill
Well/Treatment Facility	Well 14	Storage Facility	Upper Prune Hill
Treatment Facility	Main Chemical Feed Building	Storage Facility	Gregg
Pump Station	Butler	Storage Facility	Lacamas

TASK 1400 - O&M Manual

The purpose of this task is to update the City's existing O&M Manual. It is not anticipated that the task will require major revisions to O&M Manual.

Task 1400 Activities

1401. *Meeting No. 12 – O&M Workshop.* Facilitate a workshop to discuss and document existing system operations with City Staff. Prepare exhibits to aid in the workshop. Workshop discussions will serve as the basis for updating the O&M Manual.
1402. *Update Existing Information.* Update Chapters 1 through 5 and Appendixes A through J of the 2009 O&M Manual. Update photographs and figures used in the document. Incorporate operational changes from other tasks, including the System Analysis.
1403. *Add New Water System Components.* Add new water system components to the O&M Manual. This is expected to include Wells 9 and 14. The Slow Sand Filtration Treatment Plant will not be added to the O&M Manual.
1404. *Meeting No. 13 – O&M Manual.* O&M Manual will be provided prior to meeting for City review. Discuss comments and confirm updates to the O&M Manual.
1405. *Draft and Final O&M Manual.* Produce three notebook binder copies and one PDF copy of Draft O&M Manual for City review and comment. Address City comments in a Final O&M Manual. Three notebook binder copies, one camera-ready, and one PDF of the Final O&M Manual will be developed for City reproduction.

Assumptions

- City will provide the existing O&M manual electronically.
- City will provide needed manufacturer information, maintenance schedules, screen shots, and other information needed to update O&M Manual.

City Deliverables

- Review of O&M Manual.

Consultant Deliverables

- Meeting No. 12 Agenda, Materials, and Minutes.
- Meeting No. 13 Agenda, Materials, and Minutes.
- Draft O&M Manual - Three notebook binder copies and one PDF copy.
- Final O&M Manual - Three notebook binder copies and one PDF copy.

Meetings

- *Meeting No. 12 - O&M Workshop.*
- *Meeting No. 13 - O&M Manual.*

TASK 1500 - PROJECT MANAGEMENT

The purpose of this task is to direct all activities within the Plan as assigned by the City and maintain the project within the contracted scope, schedule, and budget. This includes project administration, monthly invoicing, client and team coordination and quality assurance/quality control review necessary to successfully complete the assigned chapter of the Plan to the City's expectations. Additionally, the Consultant will develop a Project Management Plan (PMP) and lead the initial team kick-off meeting.

Task 1500 Activities

1501. *Monthly Progress Reports and Invoices.* This subtask includes assisting the project team members in the implementation of the task items, reviewing the work-in-progress reports and monthly invoices. Prepare and submit monthly activity reports showing current project scope, budget and schedule status and identifying key issues or elements of the project that will need to be addressed in the proceeding weeks. An electronic version of the monthly progress reports and invoices will be sent to the City for review and approval.

1502. *Project Management Plan.* Prepare a Project Management Plan (PMP) that describes project roles and responsibilities, lists contact information for the project team, describes communications protocols, quality management, and including the scope of services, schedule, and budget. Quality Management includes, but is not limited to, the following elements:

- a. Project Manager overview of all primary documents to verify technical consistency and compliance with contract requirements.

- b. Designate and assign qualified consultant staff to develop assigned project deliverables, and manage consultant staff for schedule, quality and budget relative to assigned deliverables.
- c. Develop a proposed timeline for project deliverables with a target DOH Plan submittal by June 2016.
- d. Resolution of all review comments with a memorandum summarizing key comments and the manner in which each was addressed in the work.

The PMP will be introduced and discussed with the Consultant and the City project team at the Project kick-off meeting. A revised final PMP will be delivered after the Project Initiation Meeting.

1503. *Client Coordination*

- a. Manage the consultant project team to track time and budget, work elements accomplished, work items planned for the next period, manpower, scope changes, time and budget needed to complete the project.
- b. Create and maintain a working project schedule based on the schedule in the PMP.
- c. Review project status, including scope, budget, and schedule.

Assumptions

- The PMP will be updated with full incorporation of review comments after City review of the draft PMP.
- The total length of the project is eighteen (18) months.
- City provides required documents for appendices.

City Deliverables

- Team member contact information.
- PMP review for completeness.
- Receive, review, and process Consultant invoices in a timely manner.
- Respond to data request in a timely manner.

Consultant Deliverables

- Data request list.
- Draft Plan outline.
- Draft PMP.
- Final PMP.
- Eighteen (18) monthly progress reports and invoices.

Meetings

- None.

SUMMARY

The following tables provide a summary of the meetings and deliverables anticipated for this scope of services.

Meetings	Title
Meeting No. 1	Project Kickoff Meeting
Meeting No. 2	Policies and Criteria
Meeting No. 3	Water Requirements/WUE Program Review
Meeting No. 4	Water Supply Analysis/Water Quality
Meeting No. 5	Wellhead Protection
Meeting No. 6	Desktop and System Analysis
Meeting No. 7	Capital Improvements
Meeting No. 8	Financial
Meeting No. 9	City Draft Plan
Meeting No. 10	Facility Tour
Meeting No. 11	Condition Assessment and Prioritization
Meeting No. 12	O&M Workshop
Meeting No. 13	O&M Manual
Additional Meetings	Up to 2 additional Plan Review Meetings TBD by City

Deliverables
Project Management Plan
All Meeting Agendas & Minutes
Monthly Progress Reports (with invoices)
Data Request Spreadsheet
Executive Summary
Draft & Final Chapter 1 – Introduction
Draft & Final Chapter 2 – Planning Considerations
Draft & Final Chapter 3 – Existing System

Deliverables

Draft & Final Chapter 4 – Operation and Maintenance

Draft & Final Chapter 5 – Water Requirements

Comments on Draft Chapter 6

Final Chapter 6 – Water Use Efficiency

Draft & Final Chapter 7 – Water Quality

Draft & Final Chapter 8 – Water Resources

Wellhead Protection Plan

Draft & Final Chapter 9 – System Analysis

Draft & Final Chapter 10 – Capital Improvements

Electronic CIP

Draft & Final Chapter 11 – Financial

Draft & Final TM1 Condition Assessment

Draft & Final O&M Manual

City Draft Plan

Agency Draft Plan

Final Plan & All Electronic Files