



March 8, 2023

Mr. Nick Bartsch
City of Visalia
Public Works Department
336 North Ben Maddox Way
Visalia, CA 93292

Subject: Water Reclamation Facility - Condition Assessment, Facility Plan and Master Plan Update

Dear Mr. Bartsch:

Enclosed is a Scope and Fee prepared by Carollo Engineers, Inc. (Carollo), to evaluate the existing City of Visalia (City) Water Reclamation Facility (WRF) and prepare a Facility Plan and WRF Master Plan Update. In discussions with City staff, influent industrial flow loadings for BOD/TSS have increased drastically over the past few years. With the current higher loadings, it causes strains and upsets on the solids handling system including thickening, digestion, and dewatering. Staff has indicated that the aeration basins along with the primary clarifiers have also been impacted due to the increase in solids loading. Staff indicated that the headworks needs to be retrofitted and updated due to the age and corrosion of the facility. A new or upgraded headworks will be evaluated as well as emergency storage ponds that can be used to divert flow during peak or high flows, maintenance of the plant, or be used for an area to clean out digesters. The WRF discharge currently meets effluent limitations, however, the long-term impacts on the plant and its ability to maintain discharge limits are of concern.

Due to the poor condition of some process areas and the increased loading at the WRF, along with several other operational and maintenance issues, the City has requested a Facility Plan to evaluate the current flows, loads, and facility conditions and identify near-term WRF improvements, and a Master Plan Update to serve as a strategic planning guide that will 1) identify long-term improvements needed to address condition, redundancy, and resiliency at the WRF; 2) establish the path forward to meet current growth commitments and plan for build-out conditions within the City's Sphere of Influence; and, 3) meet future anticipated regulatory changes. The Facility Plan will provide a 6-year strategy for near-term improvements, and the Master Plan Update will include a 20-year roadmap to plan for build-out growth conditions and long-term improvements at the WRF.

PROJECT TEAM

We have selected a team that is both familiar with the City of Visalia and can provide specialized expertise in wastewater. Our team will provide you a technically sound and comprehensive plan to guide future WRF improvements. **Ryan Sellman** is the proposed principal-in-charge and will lead the project team. He brings extensive wastewater treatment experience and is familiar with handling facilities with similar operational and maintenance challenges. The project manager will be **Reace Fisher**, who will be responsible for day-to-day communication with the City and the project team. Reace will be supported by a team of qualified staff essential to meeting the project goals. **Doug Wing**, who has worked in wastewater treatment for the last several decades, will serve as the project's technical advisor. He has served hundreds of clients with wastewater design projects throughout California that have occurred over the last 40 years.

Jennifer Pratt is our project engineer and has also worked with similar facilities in wastewater treatment, as well as Facility Plan and Master Plan development. **Ray David** who has over a decade of experience in wastewater treatment will be responsible for the biological model development and analysis and will be supported by technical lead **Andre Gharagozian** who has over 25 years of experience and specializes in nutrient removal evaluation and studies. **Rashi Gupta** will be the technical lead for the solids handling evaluation and has specialized in solids handling, biosolids management, and wastewater treatment with over 20 years of experience. To support the condition assessment of the WRF technical leads **Mike Dadik** and **Eric Bahneman** will perform the structural and electrical evaluations and assessments, respectively.

APPROACH

Through discussions with City staff, the highest items of concern at the WRF are the condition of the headworks and solids handling facilities and the current influent industrial loads to the facility. As part of the condition assessment and Facility Plan Report Carollo will focus on the critical near-term needs of the facility and provide the groundwork for development of the Master Plan Update with a 20-year horizon.

An accurate assessment of the existing facilities will be important to lay the framework for evaluating both near and long-term improvements for the WRF. Carollo will work closely with plant staff to identify flow data necessary for development of a biological model for the facility and evaluate the current condition of the WRF infrastructure with a primary focus on some of the aging infrastructure and how the facility is operated. Historical flow data will also be reviewed to determine any capacity challenges of the facility, and if there are changes in capacity based on seasonal flow. The comprehensive condition assessment will be conducted by Carollo's technical discipline experts and will be coupled with workshops with leadership and staff to attain understanding, institutional knowledge of the facilities, and refine the strategies used to determine criticality of improvements.

With the results of the biological model and full condition assessment of the WRF, Carollo will work with the City to discuss the best options to improve the system and then operational alternatives can be simulated with the biological model to determine what improvements the City would like to make to improve the WRF process. Improvements may include both operational and maintenance projects (i.e. sludge drying technology options or improvements, headworks improvements, digester rehabilitation, dewatering improvements to reduce flow to the digesters, and maintenance access).

In addition to the evaluation of improvements needed to meet the flow and loading requirements of the WRF, staff has expressed interest in evaluating options for environmental opportunities for the facility. Specifically, Carollo will include a discussion of options to:

- Provide and deliver recycled water by evaluating potential customers and delivery opportunities;
- Production plan for development of Class A Biosolids without extensive testing; and
- Improve energy opportunities and assess power needs through an evaluation of the existing cogeneration facilities and existing energy study.



SCOPE OF WORK

TASK 1: CONDITION ASSESSMENT AND FACILITY PLAN REPORT

Task 1.1 - Project Management and Meetings

Project Management will include supervision of the project team, making sure the project is adequately staffed, and communication with the City staff. This task also includes management of the project budget and schedules, preparation of a monthly progress report, and incorporating Carollo's quality management oversight and quality control to document processing and deliverables.

Meetings will be hybrid meetings or virtual meetings, where Carollo staff will call in virtually. Meetings will include:

1. Project Kick-off Meeting (1 meeting) (PIC, PM, and PE onsite, other staff virtual).
2. Biological Process Model Kick-off Meeting and Update Meetings (4 meetings) (PIC, and PM onsite, other staff virtual).
3. CIP Evaluation Workshops and Final CIP Review Meeting (3 meetings) (PIC, and PM onsite, other staff virtual).

Deliverables

- Monthly progress reports, including budget and schedule updates. Meeting agendas and minutes. (All provided in PDF format).

Task 1.2: Data Collection & Review

Carollo will review the background information for this project, which should include the following. If more information is available, the City should provide it to Carollo.

1. Previous master plan documents.
2. Previous hydraulic models, if any.
3. Record drawings for the facilities, including plant design criteria.
4. Current NPDES and WDR permits.
5. Plant data and sampling plans.
6. Previous reports and analysis completed for the facility.
7. Current General Plan and projected land use and growth updates.
8. Projected flows (e.g., peak flow, dry weather flow, etc.) and loadings from future land use and growth estimates.

Task 1.3: Flow Projection Analysis

Carollo will review, evaluate, and summarize historical flow data for the WRF. Flows and associated peaking factors will be evaluated on an average day annual, average day maximum month, and peak hourly basis. Carollo will evaluate existing process capacities and bottle-necks through the facility. This evaluation will be used to evaluate hydraulic conditions throughout the treatment plant based on projected wastewater flows. Also under this task, Carollo will update the influent flows and loads based on the Sanitary Sewer Master Plan that is being developed.

Task 1.4: Biological Process Model

This task includes the development of a steady-state biological process model of the WRF using a process modeling simulation software package (e.g., BioWin or GPS-X). The model will be used to assess solids accumulation and reduction through the plant process, predict nutrient concentrations, and evaluate the capacity of the secondary and solids handling facilities. Carollo will provide a list of additional data that is needed to develop the process model for the facility. This task will include review of existing flow (coupled with Task 1.3) and load data, assessment of operating conditions, completion of a capacity assessment of WRF process units to identify bottlenecks; evaluation of up to three (3) alternatives to remedy/reduce the bottlenecks, and determination of projects. This task will include preparation of a sampling plan, including testing location, constituent, type of testing, and frequency of testing. This sampling plan will be provided to the City and the City will perform (or contract) the testing. The sampling plan will summarize recommended data collection that is in addition to data normally collected by City staff. The primary purpose of collecting additional data is to have sufficient information to properly calibrate the process model. During the Master Plan development, this model can be used to simulate the plant under various loading conditions and used to establish design and sizing information for long-term operating and treatment alternatives.

The key constituents/parameters that are anticipated to be needed for the evaluation include:

- **Soluble and Total COD, BOD5, TSS, TS, VSS, and VS.** Key components to assess process performance, NPDES discharge compliance, sludge production, aeration demands, and overall mass balance.
- **Nitrogen species (NH₃, NO₂, NO₃, TKN).** Key components to assess overall process performance and aeration demands.
- **Phosphorus (Orthophosphate, Total Phosphorus).** Evaluate Phosphorus removal.
- **Alkalinity and pH.** Indicator of process upsets or operation under sub-optimal conditions. Insufficient alkalinity will suppress nitrification.
- **Effluent Turbidity.** Title 22 Reuse compliance.
- **Salinity and Metals.** NPDES Permit compliance.
- **Final Effluent Coliform Count, UV Transmittance (UVT), and Power Usage.** Assess the UV system performance and the power required for disinfection. UVT is a measure of transmittance and how efficient UV disinfection is per unit energy input.
- **Anaerobic Digester %TS, %VS, digester gas flow, and volatile acids.** Assess overall digestion process.
- **Operational Setpoints such as DO, recycle rates, and chemical usage rates.** Information would supply information that would override default settings in the model or eliminate assumptions to be made on the setpoints.

The sampling plan will include location, frequency, and composite/grab sample information for the above constituents/parameters, but it is anticipated that locations would include influent, primary sedimentation basins' effluent, primary sludge, aeration basin influent, membrane tank's effluent, WAS/RAS, and effluent.

Based on the availability of the data, additional (filtered) data may be included in the sampling plan (e.g. filtered TKN) that would allow the team to more accurately model mixed liquor growth kinetics and nutrient concentrations.

Carollo will conduct four meetings with the City to review the model assumptions and results. Carollo will share key advantages and considerations of the BioWin and GPS-X process modeling software packages during the Kick-off Meeting and will provide a recommendation to the City. The City will subsequently select which software they would like the project to use.

Page 5

Deliverables

- Sampling plan, biological process model, and Biological Process Model Technical Memo.

Task 1.5: Condition Assessment

Carollo will perform a visual condition assessment of all above-ground assets including structural, mechanical, electrical/ instrumentation equipment at the WRF. The condition assessment will evaluate the conditions of each asset (That can be taken offline by the City, or assessed safely while it is in operation) to identify system deficiencies and will be used to identify rehabilitation and replacement (R&R) needs and projects. The assessment team will consist of specialists in structural, mechanical, and electrical/instrumentation disciplines and the findings will be used to report condition, near and long-term R&R needs, and expected remaining service life.

Deliverables

- Condition Assessment Findings Technical Memo.

Task 1.6: Evaluation of Environmental Opportunities

Carollo will evaluate the following potential environmental project options to include in the Near-Term and Long-Term CIPs. This task is looking at big picture issues and not detailing out each opportunity into a feasibility study.

- Provide and deliver recycled water by evaluating potential customers and delivery opportunities that are near the plant and large use customers;
- Production plan for development of Class A Biosolids (the facility currently produces Class B Biosolids); and
- Improve energy opportunities and assess power needs through an evaluation of the existing cogeneration facilities and existing energy study. This will evaluate the amount of excess digester gas that may be available and options to use that gas as well as if there is a large enough demand at the facility to determine if other alternative sources of energy such as wind or solar would be feasible.

Deliverables

- Findings of Environmental Project Opportunities Technical Memo.

Task 1.7: Near-Term Project Descriptions

Under this task Carollo will work with City staff to develop descriptions for Near-Term Projects with a 6-year horizon. In a workshop with City staff, Carollo will present the findings from the evaluation of Environmental Opportunities (Task 1.6), issues identified from the biological process model (Task 1.4), and the condition assessment (Task 1.5), along with proposed initial solutions, and will work with staff to prioritize Near-Term Projects for further evaluation. A second workshop will be conducted by Carollo to present the final CIP evaluation, which will include pros and cons of the potential projects and initial planning level costs, and proposed rating of projects, and will work with City staff to develop a final project descriptions to be included the Near-Term CIP.

Deliverables

- Near-Term Project Descriptions Memo.

Task 1.8: Development of Near-Term Capital Improvement Program (CIP)



Page 6

A 6-year horizon CIP will be prepared based on the Near-Term Project Descriptions developed from the workshops performed in Task 1.7. The Near-Term CIP will include planning level cost estimates and schedule. Carollo will conduct several meetings with City staff to review the final Near-Term CIP and adjust as needed.

Deliverables

- Near-Term CIP Technical Memo.

Task 1.9: Project Financing Opportunities

Under this task Carollo will evaluate potential funding sources for implementing the Near-Term CIP and provide an overview of the fund sources, implementation requirements, and City cost-share requirements. It should be noted that this task does not include assistance with grant or loan applications but provides a list of funding options that the City can evaluate further.

Deliverables

- Near-Term CIP Financing Opportunities Technical Memo/List.

Task 1.10: Prepare Facility Plan Report

The findings, recommendations, and comments received from the previous tasks will be combined and presented in a Facility Plan Report. The final report will be provided to the City in electronic format. This task will include a draft and final report after receiving comments from the City.

Deliverables

- Draft and final report, electronic format copy.

TASK 2: MASTER PLAN UPDATE

Task 2.1: Project Management and Meetings

Project Management will include supervision of the project team, and communication with the City management staff. This task also includes management of the project budget and schedules, and preparation of a monthly progress report. Meetings will include:

1. Buildout Process Performance Evaluation Kick-off Meeting (1 meeting).
2. CIP Evaluation Workshops (2 meetings).
3. Final Master Plan CIP Review (1 meeting).

Deliverables

- Monthly progress reports, including budget and schedule updates.

Task 2.2: Buildout Process Performance Evaluation

Using the historical flow data for the WRF and the calibrated biological model, Carollo will evaluate the WRF process performance under buildout conditions. Much of the WRF analysis will be completed in the Facility Plan phase, and as such the level of effort for this task will be based on the evaluation model up to four (4) scenarios of the facility under Master Plan buildout flow and load conditions. Carollo will conduct a kick-off meeting for this task to review future flow and loads and discuss model scenarios to be considered for further evaluation.

Deliverables

- Buildout Process Performance Evaluation Memo.
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Task 2.3: Regulatory Requirements Review and Strategic Plan Development

Current and future discharge requirements will be reviewed as they pertain to impacts on treatment needs and discharge requirements. Under this task, Carollo will identify existing and potential future regulations that may require a change in the overall plan of the City's treatment and disposal. Current and future biosolids disposal requirements will also be reviewed with this and the impact of potential regulatory changes on biosolids disposal options will be assessed. A strategic plan will be developed to serve as a guide for the possibility of these changes. The plan will be developed for the following constituents:

- Effluent percolation/irrigation requirements.
- Salinity.
- Contaminants of emerging concern (CECs).
- Nutrient (nitrogen and phosphorus) control.

Deliverables

- Regulatory Requirements Review and Strategic Plan Memo.

Task 2.4: Update Descriptions of Existing Facilities

The existing facility descriptions will be updated to include the new upgrade since 2014. The facility descriptions will include an updated site plan and process flow diagram.

Deliverables

- Updated facility descriptions, site plan, process flow diagram.

Task 2.5: Master Plan Project Descriptions

Under this task Carollo will work with City staff to develop descriptions for Long-Term Projects with a 20-year planning horizon. In a workshop with City staff, Carollo will present the findings from the Buildout Process Performance Evaluation (Task 2.2) and the Regulatory Requirements Review and Strategic Plan Development (Task 2.3), along with proposed initial solutions, and will work with staff to prioritize Master Plan Projects for further evaluation. A second workshop will be conducted by Carollo to present the final CIP evaluation, which will include pros and cons of the potential projects and initial planning level costs, and proposed rating of projects, and will work with City staff to develop final project descriptions to be included the Master Plan CIP.

Deliverables

- Master Plan Project Descriptions Memo.

Task 2.6: Update Master Plan Capital Improvement Program

A 20-year horizon CIP will be prepared using the analysis performed in the previous tasks to identify required future improvements. The Master Plan CIP will include planning level cost estimates, schedule, and phasing program. Carollo will conduct a meeting with City staff to review the final Master Plan CIP.



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City of Visalia
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Page 8

Deliverables

- Master Plan CIP Technical Memo.

Task 2.7: Prepare Master Plan Update

The findings, recommendations, and comments received from the previous tasks, as well as the information from the Facility Plan Report, will be combined and presented in a Master Plan. An executive summary will be included in the master plan and will present the WRF findings and recommendations. The final report will be provided to the City in electronic format. This task will include a draft and final report after receiving comments from the City.

Deliverables

- Draft and final report, executive summary, responses to comments, electronic format copy.

Based on our experience with similar studies and discussions with City staff, we estimate a project timeline of approximately nine (9) months. This includes six (6) months to complete the Condition Assessment and Facility Plan and nine (9) months to complete the Master Plan Update. Work will be completed on a Lump Sum basis and billed by percent complete for each task provided in the attached fee proposal.

Sincerely,
CAROLLO ENGINEERS, INC.



Ryan Sellman, PE
Principal-in-Charge



Reace Fisher, PE
Project Manager

RS:sm

Attachments:

- Fee Proposal



FEE

**WATER RECLAMATION FACILITY - CONDITION ASSESSMENT, FACILITY PLAN AND MASTER
PLAN UPDATE
CITY OF VISALIA**

March 2, 2023

Task	Task Description	Total Cost ^(1,2)
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Task 1: Condition Assessment and Facility Plan Report		
1.1	Project Management and Meetings	\$40,100
1.2	Data Collection and Review	\$22,600
1.3	Flow Projection Analysis	\$22,200
1.4	Biological Model	\$42,700
1.5	Condition Assessment	\$26,000
1.6	Evaluation of Environmental Opportunities	\$23,700
1.7	Near-Term Project Descriptions	\$25,700
1.8	Development of Near-Term Capital Improvement Program	\$34,600
1.9	Project Financing Opportunities	\$15,400
1.10	Prepare Facility Plan Report	\$50,300
Condition Assessment and Facility Plan Total Costs:		\$303,300
Task 2: Master Plan Update		
2.1	Project Management and Meetings	\$22,400
2.2	Buildout Process Performance Evaluation	\$32,000
2.3	Regulatory Requirements Review and Strategic Plan Development	\$17,900
2.4	Update Descriptions of Existing Facilities	\$14,100
2.5	Master Plan Project Descriptions	\$49,700
2.6	Update Master Plan Capital Improvement Program	\$43,500
2.7	Prepare Master Plan Update	\$32,500
Master Plan Update Total Costs:		\$212,100
Total Project Costs:		\$515,400

Notes:

1. Budget is based on an estimated level of effort based on our interpretation of the project requirements based our discussions with the Owner.

2. Budget is based on a 9-month overall project completion schedule.