NAPA SANITATION DISTRICT

HAZEN AND SAWYER - TASK ORDER No. 9
WASTEWATER TREATMENT PLANT MASTER PLAN
(CIP 20706)

Date: _____

Issued under Professional Services Agreement dated September 19, 2018.

To: HAZEN AND SAWYER

Project Description:

Engineering Services for preparation of a Wastewater Treatment Plant Master Plan (CIP 20706).

Description of Scope of Services to be performed by Consultant under this Task Order:

See Attachment 'A' – Scope of Services

Description of Services to be Provided by District:	See Attachment 'A' –Scope of Services
Deliverables:	See Attachment 'A' –Scope of Services
Consultant Project Manager:	Marc Solomon, PE
Consultant Quality Control Manager:	Paul Pitt, PhD, PE, BCEE
Schedule to Perform Services:	July 2020 – December 2021
Time & Materials Not-to-Exceed Cost Limit:	$1,513,605 See Attachment 'B' – Project Fee Estimating Sheet

APPROVALS:

HAZEN AND SAWYER

By: _____ _____
Authorized Representative Date

NAPA SANITATION DISTRICT

By: _____ _____
Purchasing Agent Date

NSD Account No.: CIP 20706

ATTACHMENT A

Scope Of Services

The goal of the Wastewater Treatment Plant (WWTP) Master Plan (MP) is to provide NapaSan with strategic planning guidance and in-depth analysis of key focus areas. NapaSan intends to produce an actionable and strategic master plan that supports decision making over the next five-to-ten years while maintaining a 20-year planning horizon.

The Tasks Associated With The Scope Of Services Are Detailed Below:

Task 1 Project Management

This following is the scope of services for the Project Management task. Services to be provided by the Hazen Team include the following tasks as delineated below:

1.1 Overall Project Management

The Hazen Team will provide project management services to accomplish the work associated with the project. This is defined as: coordination of the project team, development and delivery of project schedule, invoicing, meeting agendas, meeting minutes, and presentations.

1.2 Project Meetings

Anticipated meetings:

1. Kick-off Meeting: with the District to discuss project goals, long-term strategy drivers and considerations, project steps and delivery schedule.
2. Biweekly Check-in Project Management Calls: with the project management team to update the District on the project activities completed, activities planned, issues, scope, schedule and budget.

1.3 Quality Management Plan

Quality management reviews will be conducted by Hazen Team's staff for every deliverable prior to submission to the District. A QC plan will be developed and provided at the start of the project that outlines the anticipated QC schedule along with the identified QC reviewers.

Task 2 Introduction,BasisofPlanning,and Overview of Existing Facilities

The following is the scope of services for the Introduction, Basis of Planning, and Overview of Existing Facilities task. The Hazen Team will outline the Master Plan's, goals and objectives as well as identifying current and projected regulatory requirements that will be included in the basis of planning for the Master Plan over the planning horizon. Services to be provided by the Hazen Team include the following tasks:

2.1 Historical Data Review

The Hazen Team will review historical wastewater treatment plant flow and concentration data, effluent concentration data, and biosolids hauling data, to develop an accurate and defensible basis for flow and load projections and peaking factors. This will include a review of hourly flow data to fully understand peak flow conditions and hydraulic requirements.

2.2 Review of Existing Record Drawings

The Hazen Team is familiar with the record drawings through work on other projects and will use this knowledge to develop overview and status of the existing facilities.

2.3 Flow and Load Projections

The Hazen Team will develop flow and load projections for the planning horizon. Flow projections to be guided by the Collection System Master plan. Load projections to be based on projections from historical estimates and trends based on conservation, etc.

2.4 Review of WWTP Best Practices

The Hazen Team will review the existing industry and peer wastewater agencies best practices to incorporate any practices that should be part of the Basis of Planning.

2.5 Regulatory Review

The Hazen Team will review the existing state and local regulatory framework and requirements that govern the current treatment plant as well as anticipated changes in future requirements that could impact the treatment plant's ability to comply with future effluent, biosolids, recycled water and air regulations. This review will include both contaminants of emerging concern (CECs) as well as legacy contaminants.

2.6 Introduction, Basis of Planning, and Overview of Existing Facilities TM

The Hazen Team will prepare a TM draft and final summarizing the assumptions, findings of the Introduction, Basis of Planning, and Overview of Existing Facilities. Comments and direction from the review meeting will be incorporated into the final Introduction, Basis of Planning, and Overview of Existing Facilities TM.

Task 3 Facility Condition Assessment

This following is the scope of services for the Facility Condition Assessment task. Services to be provided by the Hazen Team include the following tasks:

3.1 Investigation Plan

The Hazen Team will establish and develop an investigation plan based on the current 2W/3W pilot project that will describe the methodology and guide the desktop condition assessment and asset management framework to be used for the Facility Condition Assessment. The Hazen Team will conduct a meeting to review the draft Investigation Plan before finalizing.

3.2 Asset Inventory and Data Consolidation

The Hazen Team will build on the asset management processes being followed for the 2W/3W asset management pilot project and familiarity the existing CMMS database to complete development of the District's asset inventory list that will be used for the condition assessment. This asset inventory will cover all plant processes including the IPS, headworks, primaries, aeration basins, secondary clarifiers, solids handing, digestion and gas systems, recycled water facilities, ponds, and all piping and utilities. The following are included under this subtasks:

Review data - The Hazen Team is familiar with data in the District's CMMS database containing approximately 2,500 assets from our previous work and will utilize this along with as-builts, design drawings, O&M manuals, SOPs, photos and videos of the existing facility, and institutional knowledge as the foundation of a centralized inventory database.

Asset Registry - The Hazen Team will use NapaSan's existing asset registry with attributes as the starting point for the above ground assets based on the District's CMMS. Our team proposes to compile the existing pipeline asset data into a GIS database that will also be used for the risk model for the pipelines. It is assumed that CAD drawings are not available, and that the asset inventory will be limited to major pipes that are 8" diameter or larger.

Data Review Meeting and Gap Closure Workshop - Hazen Team will conduct a Data Review and Gap Closure Workshop with the District to review the preliminary asset inventory, assess data gaps and capture institutional knowledge to close some of the data gaps. Working with the District staff, we will develop strategies to close the data gaps. Any remaining data gaps (missing assets and attributes) identified, will be closed during the field condition assessment.

3.3 Focused Condition Assessment

To streamline the process, the Hazen Team will develop a risk-based approach for the condition assessment - a desktop prioritization process that combines structural scores, service defects and criticality of unit processes and pipe segments. The risk-based approach minimizes the District's business risk exposure, provides excellent credibility, and benefits overall operations. Risk is the probability of an event (i.e., a failure) occurring combined with consequence of failure should it occur. This task includes the following subtasks:

Asset Register Updated with Desktop Condition Assessment Results - Similar to the 2W/3W condition assessment, the Hazen Team will develop criteria and scoring for the assets to for the desktop

condition assessment and review the results with the District.

Risk Assessment Workshop - Our team will build upon the process-level CoF methodology already developed as part of the 2W/3W piping and the WWTP 12kV electrical system studies. To determine the asset-level CoF, the Hazen Team will discuss with the District operations staff knowledge of items that are critical to the operations and a workshop will be conducted with a broader range of District staff to gain further input.

Asset Register Updated with Risk Results - The Hazen Team will update the asset register with the risk results. This will be presented to and reviewed with the District in a workshop. Based on comments from the workshop these risk results will be finalized and used to provide initial recommendations for maintenance and renewal of assets.

Condition Assessment Strategy Meeting - Following the high-level facilities evaluation, initial functional evaluation of the WWTP's processes and the risk assessment, a list of critical above-ground assets at the treatment plant selected for a "focused" Level 1 visual condition assessment evaluation will be submitted to the District for review (approx. 20-25% of the assets). This would be equivalent to approximately 500 assets (the District has a total of approximately 2,700 assets) but can be tailored based on the risk assessment results to include assets from different risk thresholds for a more representative look at the assets.

Electronic Condition Assessment Forms - Prior to conducting the field condition assessment activity, Hazen will develop electronic condition assessment forms for each asset class. Hazen's electronic assessment forms improve efficiency and consistency of data collected. These forms will be available for NapaSan to use in the future.

Focused Level 1 Visual Condition Assessment - The Hazen Team will conduct a focused Level 1 visual assessment of approximately 20 – 25% of the assets. This will be based on the most critical areas as identified in the desktop condition assessment or a more tailored approach as indicated above and will consist of major mechanical, electrical, I&C, structural, and HVAC condition assessment. All data collected for each asset, including photographs of facility assets, the inspectors' notes, condition scores, inspection checklists, etc., are stored digitally and can be exported to a variety formats that can be merged into the District's CMMS and uploaded to the District's GIS which will be the District's centralized location for the asset data.

Assessment of Flood, Sea Level Rise, Wildfire, Extreme Temperature and High Wind Risks - The Hazen Team will incorporate climate change resiliency into the condition assessment by assessment of existing vulnerabilities and mitigation measures, and through a review of relevant data for current and projected risks associated with climate threats such as flood, wildfire, extreme weather conditions such as high temperature and high wind conditions that are now prevalent in Northern California. This results will also be incorporated into the Vulnerability Assessment (Task 7).

Asset Register Updated with Condition Scores, and Risk Results - The Hazen Team will update the registry based on the results of the field condition assessment and climate change assessment.

3.4 Remaining Useful Life

Along with the condition of the asset, the Hazen Team will perform a Failure Mode Analysis. The imminent failure mode (i.e., capacity, level of service, mortality, and financial efficiency) will be used to determine the remaining useful life, investment needs and respective management strategies. This task includes the following sub tasks:

Asset Register Updated with Remaining Useful Life - The Hazen Team will calculate the remaining useful life of assets by first determining the realistic and customized useful life of each asset. We will start with industry best practices (e.g., WERF, AWWA, EPA), experience from local and similar projects, and on-site condition assessment. The Hazen Team will customize the standard useful lives in the industry by weighing each of these factors in determining the remaining useful lives of the District's WWTP assets.

Draft Prioritized Near-Term, Intermediate-Term and Long-Term Renewal and Rehabilitation Needs TM - The Hazen Team will develop a draft TM that summarizes findings of the condition assessment for the District review.

Final Prioritized Near-Term, Intermediate-Term and Long-Term Renewal and Rehabilitation Needs TM - The Hazen Team will revise the draft TM based

on comments from the District and finalize the TM.

Task 4 Renewable Energy Production and Energy Management

This following is the scope of services for the Renewable Energy Production and Energy Management task. Services to be provided by the Hazen Team include the following tasks:

4.1 Linear Magnetic Generator Evaluation

The District wants to evaluate whether a linear magnetic generator is a viable option for the District. The Hazen Team will in collaboration with the District's Energy Consultant review the information and conduct a Linear Magnetic Generator Feasibility Analysis. The analysis will look at whether this would be a beneficial way to use digester gas and determine the potential power production and payback.

4.2 Digester Gas Production Capacity

The Hazen Team will review the performance of and evaluate the existing digester gas production capacity detailed by the following steps:

- Use solids mass and energy balance with the current flows and loads developed under the Biosolids Task.
- Determine the existing digester gas production capacity.
- Determine the available capacity for HSW (food waste, winery waste) that can be processed as well as needed to achieve energy self-sufficiency. For winery waste, the Hazen team will determine the best location to receive at the plant and the costs and benefits
- Determine the feasibility of algae co-digestion.
- Determine the cost effectiveness of biogas filtering.
- Determine the feasibility of vehicle fueling on-site.
- Determine the best long-term use of digester gas and a trigger to add the second digester.

4.3 EBAT Model Development

The Hazen Team will build an EBAT energy model that is based on the existing WWTP energy profile. This model will be used to further develop a holistic energy/ economic model to evaluate the balance between energy demands/production and costs/revenue for the current and future biosolids management and energy recovery strategies. This model will be used in subsequent phases to easily evaluate the risks and benefits and long-term economic outcomes for the multiple biosolids management and biogas utilization strategies evaluated in this study.

4.4 Organic Waste Market Assessment

The Hazen Team will conduct a HSW and Winery Waste Survey as detailed by the following steps but also look at the risks and benefits associated with HSW, Winery Waste and biogas utilization:

1. Gather Background Information
   - Survey other utilities in the region and/or review websites to get program information about practices, tipping fees, volumes, types of HSW accepted, and haulers.
   - Define HWS categories / characteristics and their relationship to treatability and biogas production including food waste, fats oils and grease, and winery waste.
   - Provide summary of area programs and HSW categories and Winery Waste.
2. The Hazen Team will conduct HSW and Winery Waste Market Survey
   - Identify HSW and Winery Waste generators within a 50-mile radius of the WWTP.
   - Develop key questions for HSW and Winery Waste survey.
   - Contact HSW generators and, haulers, Wineries etc. by telephone or email.
   - Establish number and characteristics of HSW generators (by category) and Winery Waste within the delivery area of Napa San.
   - Establish current practices and costs of by-product generators
   - Establish energy potential of each HSW category and Winery Waste.
   - Use the EBAT model to develop financial models for each type of evaluation of HSW alternatives.
   - Draft potential marketing considerations and pricing strategy.
3. The Hazen Team will prepare Technical Memorandum (TM) to Summarize HSW and Winery Waste Market Assessment Findings.

4.5 Capacity and Market Assessment

The Hazen Team will identify the necessary capital improvements, with cost estimates, to accept and process the additional organic wastes, and identify any operational impacts associated with accepting the organic waste. The Hazen Team will work with the District to develop goals, calculated payback period, to assist in making sound business decisions for the District.

A workshop will be held with District staff to present the trigger-based implementation.

4.6 Review Current Energy Management Program

The Hazen Team will review the District's current energy management programs including usage, energy monitoring, electrical rates. The review will also identify areas to reduce energy inefficiencies with the current systems/practices.

4.7 Evaluate Energy Management Strategies

The Hazen Team will assist with defining goals that meet the District's needs for energy management and conservation. The Hazen Team will conduct a gap
analysis in accordance with ISO 50001 standards. The Hazen Team will develop a high-level energy monitoring and implementation strategies to achieve the energy conservation goals of the District. Some strategies include:

- Renewable natural gas (RNG)
- Additional cogeneration engine or a new larger engine
- Linear generator
- Hydrogen creation (electrolysis)
- Floating solar panels over existing ponds

4.8 Resiliency to Public Power Safety Shutdown (PSPSs)

The Hazen Team will evaluate options to provide the WWP with resiliency against the recent growing PSPS trends in northern California by evaluating the on-site solar system as well as increased digester gas production.

4.9 Renewable Energy and Energy Management TM

The Hazen Team will prepare a draft and final TM summarizing the assumptions, findings and recommendations of the Renewable Energy and Energy Management Analysis. Comments and direction from the review meeting will be incorporated into the final Energy Management TM.

Task 5 Nutrient Management

This following is the scope of services for the Nutrient Management task. The District currently meets the anticipated BAWCA nutrient reduction Level 2 and believes the District is in a strong position as it relates to near term nutrient reduction. Therefore, the emphasis of this effort should be focused on a planning period of about 10-years, while also looking at a long term for compatibility with other District initiatives. Services to be provided by the Hazen Team include the following tasks:

5.1 Review Historical Data

Review five years of historical plant data including influent flows and water quality, effluent water quality, pond effluent water quality and operational data and sludge hauling. Review previous nutrient removal studies for the Napa San WWTP including the 2018 BACWA Nutrient Reduction Study.

5.2 Field Sampling Plan

Based on the review of the historical plant data and performance, detailed site-specific sampling will be conducted to determine Napa San WWTP influent wastewater characteristics and accurately understand current operation of the activated sludge and pond systems.

5.3 Field sampling

The Hazen Team will conduct field sampling to supplement historical plant process data. The sampling will consist of:

- Composite samplingto understand the wastewater fractionation of COD, BOD and nutrients in the influent and effluent streams of the Napa San WWTP
- Diurnal sampling to understand the diurnal loading patters at the WWTP
- Nutrient profile sampling throughout the plant (activated sludge and pond systems) to understand mass and nutrient balances.

The Hazen Team will work collaboratively with the District to complete the sampling.

5.4 Process Model Calibration Check

Data Analysis - The Hazen Team will review and summarize process data from special sampling. Influent wastewater ratios including COD fractions will be determined for use in model calibration

effort.

Calibration check - The Hazen Team will perform a calibration check on the existing plant process model. The process model will also be used in conjunction with Task 6 Biosolids analysis to ensure a holistic approach to master planning.

The calibrated model will be used to analyze nutrient removal scenarios and determine the biological capacity of the secondary system (Task 9).

Nutrient Workshop 1 - A workshop will be held with District staff to present the findings from: (1) Historical plant data analysis (2) special sampling (3) process model calibration (4) initial evaluation of the 2018 BACWA Nutrient Reduction Study. The findings from (1)
– (3) will provide insight into discussion of the 2018 BACWA Nutrient Reduction Study. The goal of the workshop will be come to consensus on model scenarios for near- and long-term Nutrient management scenarios (Task 5.5).

The Hazen Team will prepare an agenda for District review in advance of the workshop.

5.5 Near- and Long-Term Nutrient Management Scenarios

Document Assumptions - The Hazen Team will document process assumptions for sizing of the secondary system consisting of: Influent flows and loads at design horizons, design hydrograph, effluent water quality targets, minimum design temperature, removal rates, redundancy requirements, sludge volume index, solids loading rates, surface overflow rates.

Process Improvements for optimization and BACWA Level 2 standards - The Hazen Team will use the validated process model to evaluate near- and long- term process improvements to enhance nutrient removal at the Napa San WWTP. The improvements may be new, or a combination of new and existing technologies based on the input discussion during Nutrient Workshop 1. Alternatives may include:

- Conventional BNR (MLE, Two Stage, 4 stage) with jockey blower
- Chemically enhanced primary treatment
- One additional option that could be Simultaneous nitrification denitrification, Step feed BNR or another option determined in collaboration with District staff.
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Evaluations will look at synergies with any planned projects as well as establishing trigger points for implementing alternatives or advantages to early adoption.
Additionally, the Hazen team will look at the following alternatives at a high level if it is anticipated that they may be needed beyond BACWA Level 2 requirements to ensure that the District can reserve space for these technologies:

- Intensified BNR (MBR, IFAS, granular sludge, MABR)
- Biological phosphorus removal
- Chemical phosphorus removal

The Hazen Team will also develop process volumes for BACWA Level 3 standards to ensure that there is adequate space for future expansion.

Nutrient Workshop 2 - A workshop will be held with District staff to present the findings from the Task 5.5. and summarize process analysis and sizing near- and long-term nutrient removal.

5.6 Nutrient Alternatives Analysis

The Hazen Team will converge on up to three alternatives to enhance nutrient removal at the Napa San WWTP.

Configurations - The Hazen Team will prepare alternative configurations to implement the required unit processes volumes/areas. The alternatives analysis will consider the following at a high level:

- Repurposing of tankage
- Need for additional clarifiers
- Additional activated sludge basins
- Siting of unit processes
- Major process piping and major flow splitting structures
- MOPO (maintenance of plant operations) –

how the facility operation will be maintained to implement the recommended improvements.
Layouts - The Hazen Team will prepare a plant site layout for the configurations identified.

Estimate of Probable Costs - The Hazen Team will prepare Level 4 capital and life cycle cost estimates for three alternatives. Net present value costs will be developed to understand the impact of the near- and long-term nutrient management solutions.

Nutrient Workshop 3 - workshop will be held with District staff to present the findings from the Alternatives analysis.

5.7 CECs Alternatives Analysis

The Hazen Team will converge on up to three alternatives to address any CECs identified as part of the regulatory review that would require removal at the Napa San WWTP.

Configurations - The Hazen Team will prepare conceptual level alternative configurations to implement the required technologies for removal of CECs and whether existing infrastructure can be used.

Layouts - The Hazen Team will prepare a plant site layout for the configurations identified.

Estimate of Probable Costs -The Hazen Team will prepare Level 4 capital and life cycle cost estimates for three alternatives. Net present value costs will be developed to understand the impact of the near- and long-term nutrient management solutions.

CEC Workshop - The findings of this analysis will be included in the Nutrient Workshop 3.

5.8 Trigger-based implementation

Trigger-Based Logic Sequences - The Hazen Team will develop a logic sequence for each identified flow and load and regulatory triggers. This sequence will identify what elements would require implementation based on activation of the specific trigger.

Implementation Schedule - Implementation Schedule – The Hazen Team will develop an implementation schedule for planning purposes based upon the anticipated timing for the identified triggers for each proposed improvement.

Nutrient Workshop 4 -A workshop will be held with District staff to present the trigger-based implementation.

Technical Memorandum (TM) - The Hazen Team will prepare a TM summarizing the assumptions, findings and recommendations of the Nutrient Removal Management Analysis. Comments and direction from the review meeting will be incorporated into the final Nutrient Removal Management Analysis TM.

Task 6 Biosolids Management

The following is the scope of services for the Biosolids Management task. The Hazen Team will review the existing biosolids management program facilities, solids production data, program performance and objectives.

6.1 Existing Biosolids Program Review

Existing Facilities Review - The Hazen Team will review and summarize existing biosolids management practices, including:

- Treatment
- Onsite Storage/Handling
- Beneficial Use/Disposal

Regulatory Review - The Hazen Team will review the existing regulatory landscape and summarize requirements that govern the current biosolids management and associated treatment processes, as well as anticipated changes in future requirements that could impact the District's ability to maintain compliance and beneficial uses of biosolids. The state of the industry and expected impact of PFAS and other CECs on biosolids management options will be addressed as well.

Operations and Performance Review - The Hazen Team will assess and summarize the existing biosolids management program performance relative to the District's level of service objectives. We will discuss the findings with staff to confirm operations and maintenance performance and document any issues and constraints identified by staff.

6.2 Develop Biosolids Projections

The Hazen Team will estimate the current biosolids production rate and develop projections for the planning horizon of the Master Plan. As part of this task, the inputs for the plant process model will be generated and the results will be reviewed. 6.3 – Develop Biosolids Treatment/Use Alternatives

The Hazen Team will develop biosolids treatment and handling alternatives based on viable uses that take into account anticipated regulatory changes and other internal or other external pressures, for comparison to the existing program (baseline) at buildout.
Alternatives will take into account the following at a minimum:

- Existing program enhancements
- Viable biosolids products (including Class A)
- Options that address CECs

6.3 Screen/Evaluate/Recommend Alternatives The

Hazen Team will screen the biosolids management alternatives developed in the preceding subtask and perform a more detailed evaluation on five of the alternatives to determine and build consensus around a preferred or recommended alternative for the District. Screening and detailed evaluation criteria will include (but not be limited to) regulatory acceptance, life cycle costs, and implementation experience. Alternatives shall include consideration of the following:

- Lystek as a viable option.
- A Regional biosolids facility
- Pond 1 biosolids program considering that algae sludge that is discharged to Pond 1.

6.4 Implementation Plan Development

The Hazen Team will develop an implementation plan for the recommended improvements and alternative(s) to be incorporated into the overall capital improvements program.

6.5 Draft Biosolids Management TM

The Hazen Team will prepare a draft TM summarizing the assumptions and findings of the biosolids management tasks 6.1 through 6.5.

6.6 Biosolids Management Workshop

The Hazen Team will hold a workshop with District operations and maintenance staff, engineering and management to review the findings and implementation plan for the recommended alternative as summarized in the draft Biosolids Management TM.

6.7 Final Biosolids Management TM

The Hazen Team will finalize the Biosolids Management TM incorporating input received from the District's review of the draft TM and discussions during the workshop.

Task 7 Operational Vulnerability Assessment

The following is the scope of services for the Vulnerability Assessment task. Services to be provided by the Hazen Team include the following tasks:

7.1 Review WWTP to Identify Operational Vulnerabilities

Review historical operational data - The Hazen Team will review relevant plant data consisting of historical WWTP operational and process data, unit process SOPs, redundancy of equipment, and applicable regulations.

Identify Process Vulnerabilities - The Hazen Team will identify potential regulatory compliance vulnerabilities as well as susceptibility to climate change factors.

Identify Physical Vulnerabilities - The Hazen Team will identify physical vulnerabilities that can lead to process issues and regulatory issues. This includes analysis of redundancy and maintenance practices that can mask vulnerabilities or create issues. This task can focus more on the critical assets that may not have redundancy such as: IPS, Pond 4 pump station, secondary effluent pump station, primary influent pipeline, river discharge pipeline, pond system.

Vulnerability workshop - A workshop will be held with District staff to present the plant process vulnerabilities.

7.2 Sampling and monitoring improvements

Based on the vulnerability analysis the Hazen Team will identify opportunities to improve treatment process control systems including:

- Process sampling (location, analyses or frequency)
- Online monitoring (flow, solids, DO etc.)
- Process data display and key performance indicator monitoring
- Control systems (i.e. SRT control)

7.3 Optimization

The Hazen Team will identify near-term optimization improvements to reduce potential regulatory compliance vulnerabilities. This may include changes to primary operation, aeration basin SRT, aeration basin zones, aeration basin DO, RAS flow, and pond operation.

7.4 Chemical Improvements

The Hazen Team will document type, dosing rate, and intended purpose for the chemicals that the District uses at the WWTP and in the conveyance system. Based on historical process data the Hazen Team will evaluate the effectiveness of the existing chemical dosing strategies. The Hazen Team will determine if the District should consider other chemicals, dosing rates or alternative dosing locations.

7.5 Climate Change Vulnerability

The probability of failure (PoF), Consequences of Failure (CoF), and Mitigation/Redundancy will be expanded to include vulnerability to climate change

impacts during the development of the overall condition and risk assessment. This will include flood risk (using FEMA and Napa County FIRM maps) for both flooding at the plant and ability to access the plant in a flood, wildfire risk and PSPS outages (historical review of recent Northern California past fires), extreme temperature impacts (using CAL Adapt Data). The Hazen Team should attempt to review other nearby wastewater district's climate impact analysis plans.

7.6 Vulnerability Assessment / Process Control Monitoring TM

Under this task the Hazen Team will conduct a workshop and develop a TM as indicated below:

Workshop - A workshop will be held with District staff to present the Process Control Monitoring analysis.

Technical Memorandum - The Hazen Team will prepare a draft and final TM summarizing the assumptions, findings and recommendations of the Vulnerability and Process Control Monitoring Analysis. Comments and direction from the review meeting will be incorporated into the final Vulnerability and Process Control Monitoring Analysis TM.

Task 8 Recycled Water and Potable Reuse

The following is the scope of services for the Recycled Water (RW) and Potable Reuse task. The Hazen Team will review the existing RW program and develop an approach to maintain and expanded the existing program. In addition, an approach for potable reuse will be developed to address potential future water supply / reuse needs.

8.1 Existing Recycled Water System

The Hazen Team will review the existing RW program facilities, program performance and objectives. This will include a summary of the existing system facilities and identification of needs for the current system.
These items will be included in this subtask:

- Water quality and production data review
- Treatment process review including disinfection system which has a hydraulic limitation of 11-12 mgd
- Storage needs analysis
- Pump station needs analysis
- Condition assessment feedback
- Prepare summary current system and needs for use in RW evaluations

8.2 Review 2005 RW Strategic Plan

The Hazen Team will review the District's RW strategic plan, and projected RW demand projections. These projections will be updated for next planning cycle based on staff input and current production information.

8.3 Review Current and Future Regulatory Requirements

The Hazen Team will review the existing regulatory framework and requirements that govern the current RW program as well as anticipated changes in future requirements that could impact the program's ability to comply with future RW regulations.

8.4 Review RW Quality Goals/Objectives

The Hazen Team will review the water quality goals and potential issues identified in previous studies including the recent chemical evaluation. A review of treatment alternatives to address water quality issues will be included, and alternatives to be included for further review will be identified.

- Review 2018 Chemical Evaluation and water quality objectives (chlorides)
- Review and analysis treatment alternative costs to improve water quality (chlorides)
- Determine alternatives to include in expansion evaluation

8.5 Evaluate RW System Expansion

The Hazen Team will review the RW program/system needs identified in previous subtasks. A review and evaluation of alternatives to address the needs will be included. The alternatives will be screened and costs for recommended alternatives will be prepared. The Hazen Team will then prepare a draft TM summarizing the assumptions, evaluations, and findings of the RW task. The following subtasks will be included:

- Filter capacity analysis
- Disinfection upgrades analysis
- Additional treatment needs evaluation
- Storage needs evaluation
- Develop RW system expansion alternatives and costs. Alternatives should consider the use of peak flows versus average flow conditions and the future development of a potable reuse system in

conjunction or in parallel with the Title 22 system.
- Draft future RW system expansion strategy and CIP TM

8.6 Potable Reuse Feasibility Evaluation

The Hazen Team will review potable reuse feasibility, alternatives to achieve that goal will be developed and then evaluated. The alternatives to provide RW meeting direct or indirect potable reuse quality will be screened and costs for recommended alternatives will be prepared. The Hazen Team will then prepare a draft TM summarizing the assumptions, evaluations, and findings of the Potable Reuse Feasibility task. The following subtasks will be included:

- Water quality objectives development
- Treatment technology assessment
- Alternative development and analysis/assessment
- Regional water supply needs
- Regional water partners
- Vulnerability analysis
- Draft Potable Reuse Feasibility Evaluation TM
- Siting Plan

8.7 RW System Review Workshop

The Hazen Team will conduct a workshop with District operation, and maintenance staff, engineering, and management to review the draft RW expansion evaluation and Potable Reuse Feasibility TM.

- Background information summary
- Future RW Expansion evaluation
- Potable Reuse feasibility evaluation
- CIP projection and recommended alternatives

8.8 Final RW CIP and Implementation Plan TM

The Hazen Team will finalize the RW system expansion evaluation and Potable Reuse feasibility TMs incorporating input received during the review workshop and from District review of the draft TMs.

Task 9 Capacity Analysis

The following is the scope of services for the Capacity Analysis task. Services to be provided by the Hazen Team include the following tasks:

9.1 Evaluation of Unit Processes

The following topics will be evaluated based on the future flow projections that are currently being developed by the Collection System Master plan and load projections developed by this Master Plan. These evaluations will be done through the planning horizon and will incorporate climate change effects where appropriate.

- Chemically enhanced primary treatment
- Digester capacity and construction of a second digester
- Cogeneration facility capacity
- Aeration basin capacity
- Chlorine contact basin capacity (for river discharge and Title 22 recycled water)
- Overall WWTP capacity based on projected flows and loads
- Impacts of drought/water conservation on treatment capacity
- Replacement of the flocculating clarifier with a DAF clarifier or conversion of the flocculating clarifier to a third primary clarifier
- Evaluate the odor control systems and analyze alternatives
- Capacity of the overflow pipe from IPS to Pond 1

9.2 Capacity Analysis TM

The Hazen Team will prepare a draft and final TM summarizing the assumptions, findings and recommendations of the Capacity Analysis. Comments and direction from the review meeting will be incorporated into the final Capacity Analysis TM.

Task 10 Business Case Evaluation of Alternatives

The following is the scope of services for the Business Case Evaluation (BCE) of Alternatives task. The Hazen team will conduct up to three BCEs for liquid treatment alternatives and up to three BCEs for solids treatment alternatives. Services to be provided by the Hazen Team include the following tasks:

10.1 Liquids Alternatives

The Hazen team will conduct up to three BCEs on liquid treatment alternatives to meet the proposed nutrient limitations. These evaluations will be based on layouts, capital and operating costs as well as other criteria as outlined below:

- Operability, performance and flexibility to meet future regulatory requirements
- Sustainability - Ability to accept additional waste streams for energy independence
- Increased water recycling benefits

Weighting criteria will be established during workshops with District staff and the evaluation will include a sensitivity analysis.

10.2 Solids Alternatives

The Hazen Team will conduct up to three BCEs on solids treatment alternatives to meet the proposed nutrient limitations. These evaluations will be based on layouts, capital and operating costs as well as other criteria as outlined below:

- Operability, performance and flexibility to meet future regulatory requirements
- Sustainability
- Ability to accept additional waste streams for energy independence

Increased water recycling benefits Weighting criteria will be established during

workshops with District staff and the evaluation will include a sensitivity analysis.

10.3 BCE of Alternatives TM

Under this task the Hazen Team will conduct a workshop and develop a TM as indicated below:

Workshop - A workshop will be held with District staff to present the results of the BCE analysis.

Technical Memorandum - The Hazen Team will prepare a draft and final TM summarizing the assumptions, findings and recommendations of the BCEs. Comments and direction from the review meeting will be incorporated into the final BCE TM.

Task 11 Recommended Capital Improvement Program

The following is the scope of services for the Recommended CIP task. The first step to our approach will be to break through the cloud of overwhelming/ competing factors and organize the master planning components into manageable groups or categories of near- (0-5 years), intermediate- (6 – 10 years) and long-term (11– 20 years) capital projects and associated costs. Services to be provided by the Hazen Team include the following tasks:

11.1Near-term CIP

The Hazen Team will develop a prioritized near-term (0-5 years) list of CIPs based on the asset management of the facilities and piping and includes the following:

Final Asset Register - The Hazen Team will finalize the risk results register and use the register to identify priority projects for inclusion in the CIP.

Develop Near-term CIP Sheets - The Hazen Team will also develop a project sheet for use with the CIP. The project sheet will contain a summary of critical project information including descriptions, costs, and implementation. Hazen will also use the District's existing budget to prioritize the repair and rehabilitation CIP projects over the near-term.

Near-term CIP Workshop - The project sheet template and preliminary project descriptions and costs will be reviewed at a workshop with the District. Once finalized, the project descriptions and construction costs will be entered into the project sheet format, encapsulating the near-term CIP.

Develop Near-Term CIP Story Map - To enhance the adaptability of the Master Plan, Hazen will work with the District to develop an GIS graphical interface to allow District staff to easily navigate through and update, when needed, the CIP projects. This Story Map will provide access to the CIP project sheets and CIP packages if multiple projects are bundled into one CIP project. The projects can be viewed by location or year in the CIP program.

Review Meeting Finalize Near-term CIP Projects - The Hazen Team will conduct a workshop to review the finalized prioritized near-term CIP projects along with descriptions, costs and year of implementation to ensure that the District is in agreement before the list is finalized.

11.2 Intermediate and Long-term CIP

The Hazen Team will develop a prioritized intermediate (6 to 10 years) and long-term (11 to 20 years) list of CIPs. This task will include the following:

Identify Intermediate and Long-term CIP Projects - Based on recommendations from other studies conducted in this Master Plan, the Hazen Team will identify long-term CIP projects that will need to be included in the future District CIP years.

Draft Intermediate and Long-term CIP Project Packages - Hazen Team will develop a preliminary list of project packages for the long-term CIP Projects where it makes sense to bundle projects into larger packages for efficiency of implementation.

Intermediate and Long-term CIP Project Packages workshop - Hazen Team will facilitate a workshop with District staff to discuss bundling the long-term CIP projects.

Final Intermediate and Long-term CIP Project Packages - After completion of the workshop, the Hazen Team will develop a finalized list of CIP project bundles for District review. Hazen Team will update the Story Maps to include the long-term CIPs.

Draft / Final CIP - The Hazen Team will combine the near-term and long-term CIP projects into a draft overall CIP program for the District. The District will review the draft Final CIP and provide comments.

Final CIP - Based on feedback from the District, the Hazen Team will finalize the overall CIP program for the District.

11.3 Trigger Based Road Map Development

The Master Plan must also be adaptable to change. Our process will provide the District with the Roadmap needed to navigate near-term challenges while maximizing flexibility for the future. The Roadmap will be a dynamic plan including trigger points and off- ramps that will provide the District with the flexibility to adapt to change. Potential trigger points include more stringent nutrient requirements, rising energy costs that enhances the need for beneficial use of digester gas and other renewable energy sources or current biosolids management strategies are no long viable, Based on what happens in the future, the District may need to take an alternative approach (i.e. off-ramp), such as severe drought impacting flows and loads. The Hazen Team will develop a Trigger-Based Roadmap to guide District on timing and phasing of the major near term and long-term CIP projects. This Trigger Based Roadmaps will provide the District with a graphical means for conveying how triggers impact the path toward achieving goals.

Task 12 Report Preparation

This following is the scope of services for the Report Preparation task. Services to be provided by the Hazen Team include the following tasks:

12.1 Draft Report

The Hazen Team will incorporate District staff comments on the individual technical memorandum developed in Tasks 2 through 11 into one unified document. The final WWTP MP report shall be a complete document with a table of contents, frequently asked questions, executive summary, chapters, graphics, tables, and any other supporting information in appendices. The draft report will include:

- Site plans developed for alternatives as part of different analyses showing where future facilities are planned to be located.
- A trigger-based maps to visualize the options for the District.
- A Capital Timing Tool to visualize the impact of the trigger-based solutions on funding.
- A CIP Master Plan Tool to summarize the Task 2 Condition Assessment and other strategic projects identified in Task 3 through Task 11 as well as incorporate any existing District CIP projects already planned for the CIP planning horizon .
- Update of the CIP Story Map produced with other strategic projects identified in Task 3 through Task 12.

12.2 Draft Report Meeting

The Hazen Team will facilitate a meeting to:

- Review trigger-maps identifying key “if” and “when” decision points
- Review and demonstrate the Capital Timing Tool
- Review and demonstrate the CIP Master Plan tool
- Review District Comments on Draft Final report
- Review and Demonstrate the online Story Map

12.3 Final Project Report

The Hazen Team will incorporate District staff comments into the final report.

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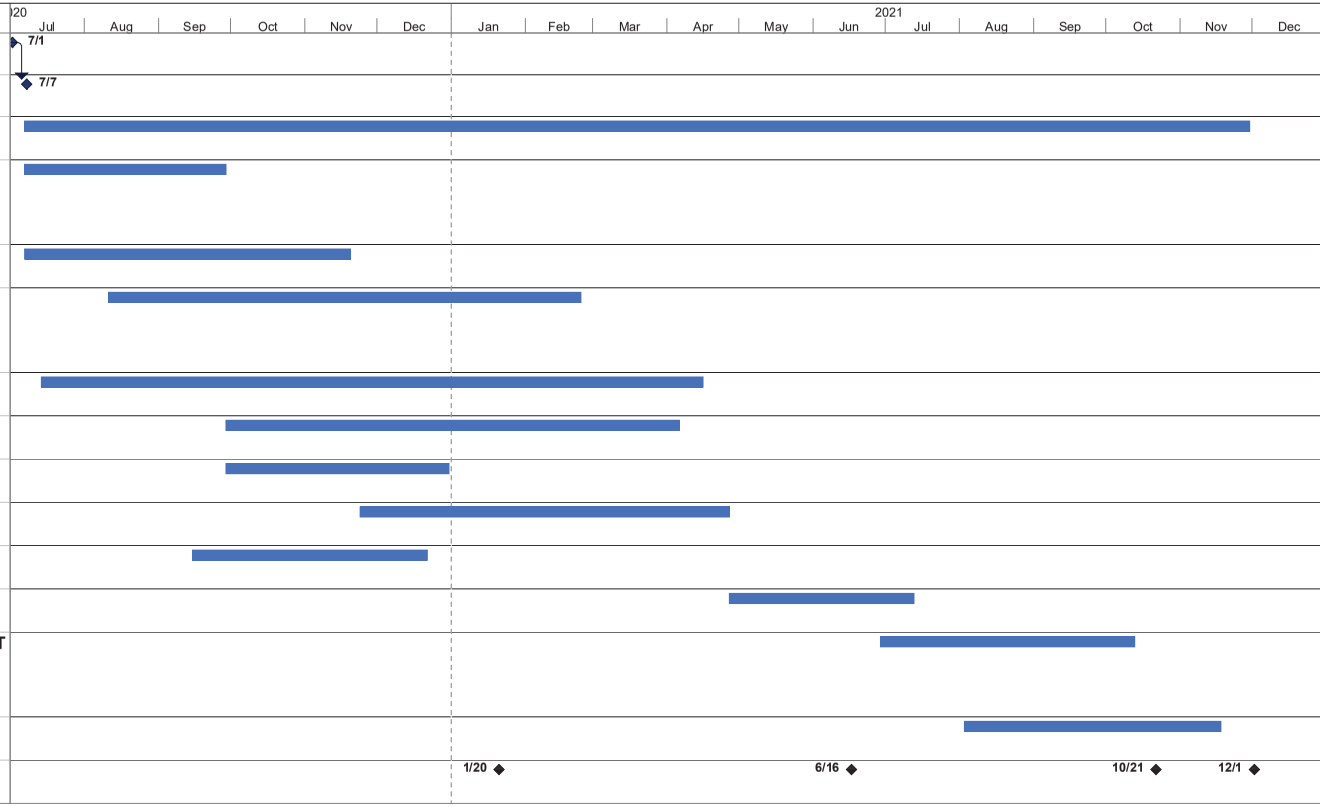
Napa Sanitation District
Wastewater Treatment Plant Master Plan

ID	Task Name
1	NTP
2	Kick-Off Meeting
3	**TASK 1 - PROJECT MANAGEMENT**
7	**TASK 2 - INTRODUCTION, BASIS OF PLANNING, AND OVERVIEW OF EXISTING FACILITIES**
16	**TASK 3 - FACILITY CONDITION ASSESSMENT**
35	**TASK 4 - RENEWABLE ENERGY PRODUCTION AND MANAGEMENT**
51	**TASK 5 - NUTRIENT MANAGEMENT**
69	**TASK 6 - BIOSOLIDS MANAGEMENT**
82	**TASK 7 - OPERATIONAL VULNERABILITY ASSESSMENT**
93	**TASK 8 - RECYCLED WATER AND POTABLE REUSE**
103	**TASK 9 - CAPACITY ANALYSIS**
108	**TASK 10 - BUSINESS CASE EVALUATION OF ALTERNATIVES**
114	**TASK 11 - RECOMMENDED 10-YEAR CAPITAL IMPROVEMENT PROGRAM**
129	**TASK 12 - REPORT PREPARATION**
134	**Board Presentations**



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ATTACHMENT B

Hazen

Napa Sanitation District		HAZEN																															
WASTEWATER TREATMENT PLANT MASTER PLAN		Project Manager	Technical Advisor	QA	Condition Assessment	Condition Assessment	Climate Change Resiliency	Process Optimization	Energy Management	Biogas Production, Food and	Structural	Mechanical	Electrical	I&C	Odor Control	Capacity Analysis	Clarifiers	Nutrient Management	Nutrient Management	Vulnerability	EBAT Model	Cost	Principal Engineer	Assistant Engineer	Assistant Engineer	CAD	Admin	H&S Labor Cost	CAROLLO ENGINEERS	SCADA	Condition Assessment	Subcontractor Fee (5%)	Other Direct Costs (ODCs)	Total Fee
		Marc Solomon	Paul Pitt	Janice Caroll	Allan Briggs	Sean Pour	Ryan Nagel	Irene Chu	Bryan Lisk	Derya Dursun	Wyatt Dressler	Swaid Alhajri	Shishir Doctor	Justin Irving	Kristen Smeby	Michael Wang	Alonso Giboro	Ron Latimer	Joe Rohrbacher	Sandeep Mehrotra	Jay Dvilbiss	Chris Portner	Victoria Boschmans	Kambiz Rasoulkhani	Grant Groshans	Regina Shnayderman	Vanessa Avila							
Billing Rate		$300	$300	$300	$255	$205	$290	$205	$255	$205	$185	$240	$250	$200	$240	$290	$260	$280	$255	$290	$140	$200	$150	$135	$135	$135	$130							
1	PROJECT MANAGEMENT	123	0	0	212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$ 90,960	$ 49,200	$ -	$ -	$ 2,460	$ 2,500	$ 145,120
1.1	Overall Project Management	51			136																							$ 49,980	$ 19,868				$ 500	
1.2	Project Meetings	68			68																							$ 37,740	$ 27,616				$ 2,000	
1.3	Quality Management Plan	4			8																							$ 3,240	$ 1,716					
2	INTRODUCTION, BASIS OF PLANNING, AND OVERVIEW OF EXISTING FACILITIES	14	14	6	6	0	0	48	0	0	0	0	0	0	0	0	0	28	0	0	0	0	78	0	100	0	6	$ 55,390	$ 12,424	$ -	$ -	$ 621	$ 1,000	$ 69,435
2.1	Historical Data Review		2		2			8										4					8		16			$ 7,230	$ 2,242					
2.2	Review of Existing Record Drawings		2					4										4					8		8			$ 4,820	$ 572					
2.3	Flow and Load Projections		4					8										4					8		16			$ 7,320	$ 4,422					
2.4	Review WWTP Best Practices	4			2			8															8		16			$ 6,710	$ -					
2.5	Regulatory Review	4			2			8										8					24					$ 9,190	$ 2,900					
2.6	Draft Introduction, Basis of Planning, and Overview of Existing Facilities TM	4	4	4				8										4					16		32		4	$ 13,600	$ 1,144				$ 500	
2.6A	Final Introduction, Basis of Planning, and Overview of Existing Facilities TM	2	2	2				4										4					6		12		2	$ 6,520	$ 1,144				$ 500	
3	FACILITY CONDITION ASSESSMENT	0	0	17	82	182	24	0	0	0	27	23	19	29	16	0	0	0	0	8	0	0	24	270	326	0	4	$ 182,085	$ -	$ -	$ -	$ -	$ 12,250	$ 194,335
3.1	**Asset Inventory**																											$ -						
3.1A	Data Review				2	4																		8	8			$ 3,490						
3.1B	Preliminary Asset Register				8	10																		40	80			$ 20,290						
3.1C	Data Review Meeting and Gap Closure Workshop			2	4	8																		8	8			$ 5,420					$ 2,000	
3.2	**Focused Condition Assessment**																											$ -						
3.2A	Asset Register Updated with Desktop Condition Assessment Results				4	8																		24	24			$ 9,140						
3.2B	Risk Assessment Workshop			1	4	8																		16	16			$ 7,280					$ 2,000	
3.2C	Asset Register Updated with Risk Results				1	2																		8	8			$ 2,825						
3.2D	Condition Assessment Strategy Meeting			1	2	4																		6	6			$ 3,250					$ 1,000	
3.2E	Electronic Condition Assessment Forms			2	1	2																		16	12			$ 5,045						
3.2F	Focused Level 1 Visual Condition Assessment			1	20	40					24	20	16	26	16								24	24	32		4	$ 47,560					$ 7,250	
3.2G	Assessment of Flood, Sea Level Rise, Wildfire, Extreme Temperature and High Wind Risks			4	8	16	24													8				40	40			$ 26,600						
3.2H	Asset Register Updated with Condition Scores, RUL and Risk Results				2	8					1	1	1	1										36	48			$ 14,365						
3.3	**Remaining Useful Life (RUL)**																											$ -						
3.3A	Asset Register Updated with Remaining Useful Life				2	4																		16	16			$ 5,650						
3.3B	Draft Prioritized Renewal and Rehabilitation Needs TM			4	20	60					2	2	2	2										24	24			$ 26,830						
3.3C	Final Prioritized Renewal and Rehabilitation Needs TM			2	4	8																		4	4			$ 4,340						
4	RENEWABLE ENERGY PRODUCTION AND MANAGEMENT	36	0	16	0	0	0	0	124	140	0	0	32	0	0	0	0	0	0	0	276	16	0	0	248	0	6	$ 160,020	$ 8,064	$ -	$ -	$ 403	$ 7,000	$ 175,487
4.1	Digester and Gas Production Capacity	4							4	24											16				40			$ 14,780	$ 1,058				$ 500	
4.2	EBAT Model Development								16												60							$ 12,480	$ -				$ 1,000	
4.3	Organic Waste Market Assessment																								48			$ 6,480					$ 1,000	
4.3A	Gather Background Information	4							4	24																		$ 7,140	$ -					
4.3B	Conduct HSW Market Survey	4							8	24											16	8			48			$ 18,480	$ -				$ 1,000	
4.3C	HSW Technical Memorandum	4		4					8	16											8				24			$ 12,080	$ 1,630				$ 500	
4.4	Capacity Assessment & Evaluation	4							16	24											40	8			48			$ 23,880	$ 2,116					
4.4A	Capacity Assessment & Evaluation Workshop	4							8	8											8				8			$ 7,080					$ 2,500	
4.5	Review Current Energy Management Program								12												40							$ 8,660						
4.6	Evaluate ISO 50001 and Other Energy Management Strategies								12												40							$ 8,660						
4.7	Resiliency to Public Power Safety Shutdown (PSPSs)	4		4					16				32								16							$ 16,720	$ -					
4.8	Draft Renewable Energy and Energy Management TM	4		4					16	16											24				24		4	$ 16,880	$ 1,630					
4.7A	Final Renewable Energy and Energy Management TM	4		4					4	4											8				8		2	$ 6,700	$ 1,630				$ 500	
5	NUTRIENT MANAGEMENT	0	80	8	0	0	0	208	0	0	0	0	0	0	0	0	40	76	16	0	0	48	344	0	64	28	12	$ 179,980	$ -	$ -	$ -	$ -	$ 6,000	$ 185,980
5.1	Review Historical Data		4					8										4					16					$ 6,360						
5.2	Field Sampling Plan		4					8										4					16					$ 6,360						
5.3	Field Sampling							40															40		40			$ 19,600					$ 1,000	
5.4	Process Model Calibration Check		4					8									16	4					40					$ 14,120						
5.4A	Calibration Workshop		8					8															16					$ 6,440					$ 500	
5.5	Near- and Long-Term Nutrient Management Scenarios		8					40										16	16				48					$ 26,360						
5.5A	Nutrient Management Workshop		8					8										16					16			4		$ 11,440					$ 2,000	
5.6	Alternatives Analysis		8					16									24	8				24	24		24	16		$ 27,960						
5.6A	Alternatives Analysis Workshop		8					8															16			4		$ 6,960					$ 2,000	
5.7	CEQA Alternatives Analysis		6					16										8				24	32					$ 16,920						
5.8	Trigger Based Implementation		8					16										8					16					$ 10,320						
5.8A	Implementation Workshop		8					8															16			4		$ 6,960					$ 500	
5.8B	Draft Implementation TM		4	4				16										4					36		8			$ 13,280						
5.8C	Final Implementation TM		2	4				8										4					12		4			$ 6,900						
6	BIOSOLIDS MANAGEMENT	12	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$ 6,000	$ 130,620	$ -	$ -	$ 6,531	$ -	$ 143,151
6.1	Existing Biosolids Program Review																											$ -	$ 12,390					
6.2	Develop Biosolids Projections																											$ -	$ 14,572					
6.3	Develop Biosolids Treatment/ Use Alternatives																											$ -	$ 19,592					
6.4	Screen Alternatives / Recommended Alt Development																											$ -	$ 15,804					
6.5	Implementation Plan Development																											$ -	$ 7,448					
6.6	Draft Biosolids Management Program TM	4		4																								$ 2,400	$ 29,416					
6.7	Biosolids Management Workshop	4																										$ 1,200	$ 16,732					
6.8	Final Biosolids Management Program TM	4		4																								$ 2,400	$ 14,660					
7	OPERATIONAL VULNERABILITY ASSESSMENT	28	0	6	0	0	0	0	0	0	0	0	0	84	0	0	0	0	0	38	0	0	0	0	96	12	6	$ 53,380	$ 25,016	$ -	$ -	$ 1,251	$ 2,000	$ 81,647
7.1	Review WWTP to Identify Operational Vulnerabilities	2												8						8					20			$ 7,220	$ 6,904					
7.1A	Vulnerabilities Workshop	4												8						8					8			$ 3,880	$ 4,460				$ 1,000	
7.2	Sampling and Monitoring Improvements	4												16														$ 4,400	$ 1,944					
7.3	Optimization	4												16											16			$ 6,560	$ 2,516					
7.4	Chemical Improvements	4												16														$ 4,400	$ 1,544					
7.5	Climate Change Vulnerability Assessment	2																		16					8			$ 6,320						

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Napa Sanitation District		Project Manager	Technical Advisor	QA	Condition Assessment	Condition Assessment	Climate Change Resiliency	Process Optimization	Energy Management	Biogas Production, Food and	Structural	Mechanical	Electrical	I&C	Odor Control	Capacity Analysis	Clarifiers	Nutrient Management	Nutrient Management	Vulnerability	EBAT Model	Cost	Principal Engineer	Assistant Engineer	Assistant Engineer	CAD	Admin	H&S Labor Cost	CAROLLO ENGINEERS	SCADA	Condition Assessment			Total Fee
WASTEWATER TREATMENT PLANT MASTER PLAN		Marc Solomon	Paul Pitt	Janice Caroll	Allan Briggs	Sean Pour	Ryan Nagel	Irene Chu	Bryan Lisk	Derya Dursun	Wyatt Dressler	Swaid Alhajri	Shishir Doctor	Justin Irving	Kristen Smeby	Michael Wang	Alonso Giboro	Ron Latimer	Joe Rohrbacher	Sandeep Mehrotra	Jay Dvilbiss	Chris Portner	Victoria Boschmans	Kambiz Rasoulkhani	Grant Groshans	Regina Shnayderman	Vanessa Avila					Subcontractor Fee (5%)	Other Direct Costs (ODCs)	
Billing Rate		$300	$300	$300	$255	$205	$290	$205	$255	$205	$185	$240	$250	$200	$240	$290	$260	$280	$255	$290	$140	$200	$150	$135	$135	$135	$130							
7.6	Vulnerability Assessment / Process Control Monitoring TM																											$ -	$ 972					
7.6A	Assessment Workshop	4												8						8					8			$ 6,200	$ 3,588				$ 1,000	
7.6B	Draft Vulnerability Assessment/Process Control Monitoring TM	2		4										8						4					24	8	4	$ 9,400	$ 1,544					
7.6C	Final Vulnerability Assessment/Process Control Monitoring TM	2		2										4						2					12	4	2	$ 5,000	$ 1,544					
8	RECYCLED WATER AND POTABLE REUSE	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$ 4,800	$ 139,788	$ -	$ -	$ 6,989	$ -	$ 151,577
8.1	Existing Recycled Water System Review																											$ -	$ 16,008					
8.2	Review Plan and Permits																											$ -	$ 10,240					
8.3	Review Regulatory Requirements																											$ -	$ 12,188					
8.4	Review RW Quality Goals / Objectives																											$ -	$ 11,044					
8.5	Evaluate RW System Expansion/Draft TM																											$ -	$ 22,488					
8.6	Potable Reuse Feasibility Evaluation/Draft TM	4		4																								$ 2,400	$ 32,786					
8.7	RW System Review Workshop																											$ -	$ 15,640					
8.8	Final RW CIP and Implementation Plan TM	4		4																								$ 2,400	$ 19,392					
9	CAPACITY ANALYSIS	8	10	6	0	0	0	28	0	0	0	0	0	0	20	56	16	14	0	0	0	0	48	0	124	0	0	$ 66,000	$ 10,132	$ -	$ -	$ 507	$ 500	$ 77,139
9.1	Evaluation of Unit Processes	4	4					16							20	32	16	8					36		80			$ 42,360	$ 3,320					
9.2	Draft Capacity Analysis TM	2	4	4				8								16		4					8		32			$ 15,920	$ 3,892					
9.2A	Final Capacity Analysis TM	2	2	2				4								8		2					4		12			$ 7,720	$ 2,920				$ 500	
																												$ -						
10	BUSINESS CASE EVALUATION OF ALTERNATIVES	12	8	6	0	0	0	38	14	14	0	0	0	0	0	0	0	12	4	0	14	34	24	0	80	28	0	$ 53,350	$ 13,240	$ -	$ -	$ 662	$ 1,000	$ 68,252
10.1	Liquids Alternatives	4	4					16										8	4			20	8		24	16		$ 19,540	$ -					
10.2	Solids Alternatives	2							8	8											8	8	4		24			$ 10,840	$ 5,840					
10.3	Draft BCE of Alternatives TM	4	2	4				16	4	4								2			4	4	8		24	8		$ 15,560	$ 3,700				$ 500	
10.3A	Final BCE of Alternatives TM	2	2	2				6	2	2								2			2	2	4		8	4		$ 7,410	$ 3,700				$ 500	
11	RECOMMENDED 10-YEAR CAPITAL IMPROVEMENT PROGRAM	14	0	16	50	72	0	8	8	8	0	0	0	0	0	0	0	0	0	0	0	44	108	140	224	0	0	$ 115,970	$ 9,586	$ -	$ -	$ 479	$ 6,500	$ 132,535
11.1	Near-Term CIP																											$ -						
11.1A	Final Asset Register	2		2	2	4																		20				$ 5,230						
11.1B	Develop Near-Term CIP Sheets				8	8																	24	40	40			$ 18,080						
11.1C	Near-Term CIP Workshop				4	8																		8				$ 3,740					$ 2,000	
11.1D	Develop Near-Term CIP Story Map				8	4																	24	16	60			$ 16,720						
11.1E	Finalize Near-Term CIP Projects Workshop	4			4	8																	16					$ 6,260					$ 2,000	
11.2	Intermediate and Long-Term CIP																											$ -						
11.2A	Draft Intermediate- and Long-Term CIP Project Packages			2	8	8																16	12	40	20			$ 17,380						
11.2B	Intermediate- and Long-Term CIP Project Packages Workshop	4			4	8																			8			$ 4,940					$ 2,000	
11.2C	Final Intermediate- and Long-Term CIP Project Packages			2	4	8																16	8	16	24			$ 13,060						
11.2D	Draft CIP			4	4	8																8	4		12			$ 7,680						
11.2E	Final CIP			4	2	8																4	8					$ 5,350	$ 5,628					
11.3	Trigger Based Roadmap Development	4		2	2			8	8	8													12		60			$ 17,530	$ 3,958				$ 500	
12	REPORT PREPARATION	12	8	12	32	14	0	14	6	6	0	0	0	0	0	6	0	6	6	2	20	0	40	48	132	0	8	$ 65,930	$ 21,444	$ -	$ -	$ 1,072	$ 500	$ 88,946
12.1	Draft Report	4	4	8	24	12		8	4	4						4		4	4		16		32	40	96		4	$ 46,080	$ 9,012					
12.2	Draft Report Meeting	4			4			4																	16			$ 5,200	$ 6,000				$ 500	
12.3	Final Report	4	4	4	4	2		2	2	2						2		2	2	2	4		8	8	20		4	$ 14,650	$ 6,432					
	TOTAL	267	120	109	382	268	24	344	152	168	27	23	51	113	36	62	56	136	26	48	310	142	666	458	1,394	68	42	$1,033,865	$419,514	$0	$0	$20,976	$39,250	1,513,605
TOTAL COST																																	$ 1,513,605	