

STAFF REPORT

To: Coastside County Water District Board of Directors

From: David Dickson, General Manager

Agenda: March 13, 2018

Report

Date: March 7, 2018

Subject: Agreement with West Yost for a Feasibility Study of Optimizing Local Water Source Treatment

Recommendation:

Authorize the General Manager to execute a Professional Services Agreement with West Yost Associates for an Optimization of Treatment of Local Water Sources Feasibility Analysis at a time-and materials cost not to exceed \$99,700.

Background:

Improvements to the Denniston Water Treatment Plant (DWTP) and the recent completion of the Denniston Booster Station/Bridgestone Transmission Main project have allowed the District to significantly increase production from local, District-owned sources. The DWTP produced 200 million gallons in 2017, saving nearly \$1.4 million in SFPUC water purchase cost. The District's water rights permit for diversions from Denniston and San Vicente Creeks offer the potential for significantly greater yields and savings in favorable years.

In order to take maximum advantage of local source water, we need to ensure that the DWTP can reliably treat the highest flows available from Denniston and San Vicente. We also need to improve the operational flexibility of the Nunes Water Treatment Plant (NWTP) to enhance its ability to treat low flows or shut down entirely when DWTP production can meet most or all of the District's demands.

The attached proposal from West Yost Associates describes limitations on local source production in more detail and outlines a feasibility study to further define modifications needed to increase DWTP yield. Estimated cost of the study is \$76,000. Optional tasks to further evaluate NWTP reliability improvements and to develop information to support an application to the Division of Drinking Water for increased DWTP pathogen removal credits add another \$23,700. Staff recommends proceeding with the study and the optional tasks, for a total of \$99,700.

Fiscal Impact:

Cost of \$99,700. Staff proposes to use the \$100,000 budgeted in the FY17/18 CIP for NWTP Improvements Study (Project 18-10) for this purpose.



January 25, 2018

SENT VIA: EMAIL

Mr. David Dickson
General Manager
Coastside County Water District
766 Main Street
Half Moon Bay, CA 94119

SUBJECT: Optimization of Treatment of Local Water Sources Feasibility Analysis

Dear Mr. Dickson:

West Yost appreciates this opportunity to provide this letter proposal to the Coastside County Water District (CCWD) for a feasibility study to assess the improvements needed at the Nunes Water Treatment Plant (NWTP) and Denniston Creek Water Treatment Plant (DCWTP) to optimize the treatment of the CCWD's local water supplies. This evaluation will include the following specific efforts:

- Identify improvements needed at the DCWTP to increase its reliable water treatment capacity from approximately 700 gallons per minute (gpm) to 1,500 gpm for regulatory-compliant and aesthetically pleasing treated water, and
- Identify improvements needed at the NWTP to:
 - Permit operating at lower water treatment process flow rates to augment CCWD's treated water demand during low-demand periods and when the DCWTP is in service, and
 - Permit stopping and restarting operation of the NWTP when the DCWTP can meet CCWD's total treated water demand.

In addition, during the visit to the NWTP, CCWD staff identified concerns related to absence of pretreatment redundancy and constraints on ability to remove water treatment units from service for scheduled maintenance tasks. West Yost has also identified an optional task in this letter proposal to evaluate alternatives for increasing DCWTP capacity to provide the desired redundancy. Part of this assessment will address whether providing the ability to increase treatment capacity at the DCWTP can achieve CCWD's objectives without having to construct additional treatment units at the NWTP.

Finally, we have identified an optional task that would include working with CCWD staff to prepare an operating permit amendment request that would be submitted to the State Water Resources Control Board's Division of Drinking Water (DDW) requesting that DDW give the same pathogen removal credits (2.5-log *Giardia*, 2-log *Cryptosporidium*, and 2-log virus) to the DCWTP that currently is given to water treatment plants (WTPs) that have the same combination of contact clarification and filtration (CC-F) treatment processes installed in gravity basins.

Additional discussion regarding our understanding of the need for each of these tasks, our proposed scope of services, and proposed fee estimate are included in this letter.

PROJECT UNDERSTANDING

An overview of the primary objectives for the DCWTP and NWTP evaluations is provided below. Also addressed are the two optional tasks.

DCWTP Evaluation

The DCWTP is permitted to treat surface and ground water supplies from the following three sources:

- **Denniston Creek:** CCWD's current water right permit allows CCWD to withdraw up to 2 cfs from Denniston Creek. However, the CCWD's water rights to Denniston Creek is subordinate to an adjacent landowner's agricultural water rights. In addition, the flow in Denniston Creek available to CCWD is constrained by the need to ensure a minimum flow rate of 2 cfs that is required by State of California Department of Fish and Wildlife.
- **San Vicente Creek:** CCWD's existing water right for San Vicente Creek also permits sending up to 2 cfs to the DCWTP. CCWD has not exercised its water right on San Vicente Creek for an estimated 15 to 20 years.
- **Two operational groundwater wells located south of Half Moon Bay Airport:** CCWD owns and currently uses two of its seven groundwater wells located south of the Airport as a supplemental water source, especially when its Denniston Creek water supply is limited. The wells produce groundwater that includes iron and manganese that must be removed in the DCWTP's contact clarifiers and/or filters. The wells are more than 40 years old, and have less capacity than when they were new.

The CCWD does not have to pay for its water used from the sources listed above. Consequently, maximizing treatment at the DCWTP provides for significant operational savings. Therefore, in the last four years, CCWD has worked to increase the water supply production from the DCWTP, and in 2017 the DCWTP's total production was approximately 200 million gallons (MG).

Based on discussions with CCWD staff, current limitations on treated water production at the DCWTP may include:

1. When source water turbidity in Denniston Creek is greater than 50 NTU,
2. DCWTP reliable treatment capacity,
3. Hydraulic capacity of screened inlet in Denniston Creek Reservoir,
4. The raw water pipeline's hydraulic capacity between Denniston Creek Reservoir Pump Station and the DCWTP,
5. The San Vicente Creek surface water diversion and conveyance pipeline to the Denniston Creek Reservoir pump station are not operational and require replacement, and
6. The age and condition of the groundwater wells near the Half Moon Bay Airport limit their capacity.

With respect to the first item, the current Operating Permit allows for treatment of Denniston Creek water up to a turbidity of 50 NTU (recently increased from 15 NTU). However, discussions with CCWD staff indicate that if source water supply is much higher than 35 NTU, the supply into the DCWTP could exceed 50 NTU. Therefore, the effective turbidity limit on Denniston Creek is currently approximately 35 NTU. As a result, there are periods during the year when water is available but the raw water turbidity does not permit treating raw water supplied from Denniston Creek Reservoir. CCWD recently submitted a request to amend its Operating Permit to allow treatment of Denniston Creek water up to a turbidity of 100 NTU. This would permit treating the Denniston Creek source water when turbidity is as high as approximately 75 to 80 NTU. If DDW approves CCWD's requested Operating Permit amendment, it is anticipated that additional source water can be treated during periods when the turbidity is between 35 and 75 NTU. This would permit increasing use of the District's Denniston Creek and possibly its San Vicente water supply.

With respect to the second item, CCWD recently completed an Environmental Impact Report that included provisions for increasing the DCWTP treatment capacity WTP to 1,500 gpm. The DCWTP's current treatment capacity is approximately 785 gpm. However, due to age of the existing facilities, the ability to reliably provide regulatory-compliant and aesthetically pleasing treated water at this flow rate is uncertain. Therefore, one of the primary objectives of this feasibility study will be to evaluate the facility improvements needed to increase the reliable treatment capacity up to 1,500 gpm.

The DCWTP CC-F system consists of contact clarification pretreatment process that is installed in two pressure vessels followed by "rapid sand" filtration in three pressure filter vessels. Disinfection occurs in the 1.5- MG Denniston Tank located on the hillside above the DCWTP. The DCWTP also includes a spent filter backwash water and sludge handling system. Based on West Yost's understanding of the DCWTP facilities, the CC-F systems would need to be expanded to meet the desired 1,500 gpm capacity. However, the remaining facilities should be adequately sized for the higher treatment flows.

We also understand that the DCWTP needs to be able to treat 2 cfs (approximately 900 gpm) of Denniston Creek source water supply for at least a one-month period prior to when CCWD's will need to submit its request to renew its Denniston Creek water supply permit, and CCWD's current Denniston Creek water supply permit is scheduled to be renewed in 2026. In addition, the San Vicente Creek water supply permit will also need to be renewed, and the ability to divert 2 cfs from this source must be demonstrated. This project must consider the ability to treat water from both source waters.

Finally, based on direction from CCWD staff, the capacity limitations associated with the last three items listed above will not be considered as part of this feasibility study. Moreover, for purposes of this evaluation, it should be assumed that the water supply to the DCWTP could be from any combination of the available water supplies. Since the groundwater supply requires treatment to remove both iron and manganese. Therefore, the well groundwater treatment needs will be considered in the treatment facilities feasibility study.

NWTP Evaluation

The NWTP treats surface water and groundwater under the influence of surface water from the following sources:

1. Six operational groundwater wells (of seven total) located along Pilarcitos Creek: This source is generally very high quality, but is typically limited to approximately 700 gallons per minute (gpm). Availability of water from these wells depends on flow in Pilarcitos Creek. Some of the wells are not able to produce water throughout the entire year.
2. Pilarcitos Creek surface water stored behind Stone Dam: This water is purchased from San Francisco Public Utilities Commission (SFPUC) at a cost of approximately \$5,000 per MG.
3. Surface Water stored in Crystal Springs Reservoir: This water is also purchased from SFPUC at a cost of approximately \$5,000 per MG, and is pumped over the coast range to the CCWD's Pilarcitos (raw water) pipeline at a cost of \$800 per MG.

The NWTP was expanded between 1990 and 1992, and currently has a nominal treatment capacity of 4.5 million gallon per day (mgd). Historically, NWTP has been CCWD's primary water treatment facility for meeting its treated water demands. However, with the DCWTP's 2013 improvements, it is anticipated that the NWTP will continue to be used in the future during most of the year, except at a reduced capacity during periods when the DCWTP is operating. During these periods, NWTP will be used to supplement DCWTP production to satisfy CCWD's treated water demands. With this change in operating strategy, the NWTP operation could be shut down several times a year for several weeks or even several months. In addition, when DCWTP is used to satisfy some of CCWD's peak day demands, the NTWP flow rate could be lower than its treatment capacity.

Improvements at the NWTP are needed to address these two operational needs. Therefore, the second primary objective of this feasibility study will be to evaluate the treatment process improvements needed to permit both more frequent shut downs of the NWTP and for satisfactory operation at reduced flow rate. Both objectives must be met without compromising treated water quality.

NWTP Reliability Assessment

As noted previously, CCWD staff have identified concerns related to NWTP treatment redundancy and the ability to take major units out of service for long-term maintenance activities. The NWTP has a conventional filtration treatment process that includes coagulation, one pretreatment train that includes three flocculation stages followed by sedimentation-clarification, four “rapid sand” filters, and disinfection in the three treated water tanks. CCWD staff have specifically identified the following redundancy issues:

- Staff report that all four “rapid sand” filter units are currently needed to provide reliable water treatment during the summer months. The four filters are at least 25 years old and cannot be removed from service during this period for major maintenance activities. Rehabilitation of the four existing filters will likely be needed during the next five to ten-year period. CCWD staff is concerned that the cost of rehabilitation will be greater if it must occur during the winter months because vendors are at their highest demand during this time.
- Staff report that it is difficult to take down the pretreatment train for regular cleaning, because the plant must operate without a pretreatment system during this time. In addition, because the NWTP can only be operated for a short period of time without pretreatment, major maintenance on the pretreatment facilities is not feasible. If a second pretreatment train were provided, staff could readily conduct both routine and major maintenance.

To address these two issues, West Yost has identified an optional task in this letter proposal to evaluate alternatives for providing an additional pretreatment train and one or two new filters. If approved by the CCWD, this assessment will also evaluate whether increasing the DCWTP treatment capacity can be achieved and provide the desired redundancy without having to construct additional treatment units (filters) at the NWTP.

DCWTP Pathogen Removal Credit Increase

The DCWTP is currently classified as having a direct filtration treatment process, and thus receives 2-log *Giardia* removal credit, 1-log virus removal credit, and 2-log *Cryptosporidium* removal credit¹. However, water treatment plants that have a CC-F process can receive 2.5-log *Giardia* removal credit, 2-log virus removal credit, and 2-log *Cryptosporidium* removal credit². These pathogen removal credits are the same pathogen removal credits given to water treatment plants

¹ As long as the filtered water turbidity is less than 0.3 NTU in at least 95% of the filtered water samples collected at 15 minute intervals during each month and does not exceed 1.0 NTU during the month

² As long as the filtered water turbidity is less than 0.2 NTU in at least 95% of the filtered water samples collected at 15 minute intervals during each month and does not exceed 1.0 NTU during the month.

that have a conventional filtration treatment process that includes coagulation, flocculation, sedimentation (or some other gravity clarification processes), and granular media filtration. Based on discussions with CCWD staff about the DCWTP's filtered water turbidity data, it appears that the DCWTP should be reclassified from being identified as having a direct filtration treatment process to being classified as having a CC-F treatment process, and should thus receive the higher pathogen removal credit.

Based on West Yost's experience, the DCWTP should be eligible to receive these higher pathogen removal credits since the DCWTP's has the same combination of CC-F treatment processes in pressure vessels that are installed in gravity basins at other WTPs in California, and since the DCWTP produces filtered water that meets the criteria identified in the State's Alternative Filtration Technologies Demonstration Report (AFTDR), as follows:

- a combination of CC-F units manufactured by either Roberts Filter Group (RFG) or Microfloc,
- 0.2 NTU turbidity or lower in at least 95 percent of the individual filter's filtered effluent (IFE), and
- combined filtered effluent (CFE) turbidity data collected during each month, and no IFE or CFE turbidity exceeding 1.0 NTU during each month.

If authorized by CCWD, West Yost will assist with development and submission to DDW a request to amend the current DCWTP Operating Permit to reclassify the water treatment process from a direct filtration treatment process to being the same CC-F treatment process in pressure vessels that is described in the AFTDR and to increase the pathogen removal credits. This justification would be based on using the DCWTP's IFE and its CFE turbidity data to demonstrate that the DCWTP's CC-F in pressure filter vessels meets the same performance criteria required for WTPs that have a CC-F treatment process in gravity basins.

A lower pathogen inactivation (disinfection) requirement may be important when the DCWTP is operating at CCWD's maximum desired capacity of 1,500 gpm, since the available disinfection contact time through the filtered water pipeline between the DCWTP and Denniston Tank, through the Denniston Tank, and between the Denniston Tank and the Denniston Treated Water pump station may not be adequate to provide the required pathogen inactivation credit if the Giardia and virus inactivation requirements remain at 1-log and 3-log, respectively.

SCOPE OF WORK

Task 1. Project Management, Quality Control, and Workshops

West Yost's Project Manager will monitor progress of the work and will coordinate quality control review procedures. These efforts will include maintaining regular contact with the CCWD's project manager to ensure that the CCWD is apprised of the progress of the work and is aware of any issues that may impact project completion.

In accordance with the West Yost Quality Assurance/Quality Control (QA/QC) policy, a West Yost staff member at the Principal Engineer level or higher will provide a review of key scope items and significant work products. The review will include timely suggestions for corrective actions, as needed.

This task also includes three workshops, as follows:

- A brief kickoff workshop will be held to confirm project goals and objectives, discuss the project schedule, and identify timing for receipt of data and site visit discussed under Task 2
- Following the completion of Tasks 3 through 4, a progress workshop will be held to review the results of the analysis with CCWD staff.
- A second progress workshop will be held after the Draft Local Water Treatment Optimization Evaluation Technical Memorandum.

Task 1 Deliverables: Monthly invoices detailing tasks completed for the billing period and remaining available budget.

Task 2. Review Background Information

West Yost will review water quality data for the CCWD's water sources and treated water from the five-year period between January 2013 and December 2017, plus source water quality data from prior periods identified by CCWD when unusual source water quality events made it more challenging/difficult to treat the source water.

The source water quality data is expected to include:

- Turbidity
- Hardness
- Alkalinity
- pH
- Total *Coliforms* and/or *E. coli*
- First and second round of source waters' *Cryptosporidium* monitoring data from April 2008 - March 2010 and also from October 2016 – September 2018 (include currently available data)
- Total organic carbon (TOC)
- Ultraviolet light absorbance at 254 nanometer (UV254), if available

The settled/clarified, filtered and treated water quality data is expected to include:

- Turbidity (settled or contact clarifiers', filters' (both IFE & CFE)
- Chlorine concentration in treated water leaving NWTP and DCWTP
- CT compliance data for NWTP and DCWTP
- Hardness, Alkalinity, pH
- Total Coliform data from monthly reports submitted to DDW
- Trihalomethane and Haloacetic Acid monitoring data (Stage 2 Disinfectants and Disinfection Byproducts Rule)
- TOC and UV254 data (if available)

Following our review of the above data, West Yost will participate in a site visit at the two WTPs to gain a better understanding of the current operations and any issues identified through the data evaluation efforts.

Task 3. DCWTP Capacity Expansion Evaluation

West Yost will evaluate the facilities needed to increase the DCWTP capacity to provide reliable treatment at flow rates as high as both 900 gpm and 1,500 gpm. Feasibility level cost estimates, and preliminary layouts of the recommended facilities will be developed. This assessment is expected to be limited to expansion of the CC-F systems, as well as associated support systems. This analysis will also consider whether specific treatment needs of the groundwater source need to be considered in the treatment facilities design.

The information developed under this task will be presented to CCWD in the progress workshop discussed under Task 1, and summarized in the Technical Memorandum discussed under Task 5.

Task 3 Deliverables: Tables and figures showing the results of the analysis. Workshop agenda and notes with identified decisions and action items.

Task 4. NWTP Turn Down/Shut Down Evaluation

West Yost will work with CCWD staff to evaluate the NWTP facilities to identify a reasonably achievable minimum treatment flow rate given the existing water treatment units' and ancillary systems, including chemical metering pumps' capacities. This analysis will consider improvements that can be made to existing treatment units and ancillary systems' components to improve operating turndown capacity. Of particular interest will be the chemical metering pumps. For any facility improvements identified, feasibility level cost estimates, and preliminary layouts of the recommended facilities will be developed.

West Yost will also work with CCWD staff to develop a conceptual shut-down/restart strategy for the NWTP. This effort is anticipated to include a focused workshop that includes West Yost and CCWD staff. The shut-down/restart evaluation will identify potential control system improvements, as well as modification and/or replacing equipment needed to accommodate frequent shut down/restart operations.

We will prepare a conceptual (feasibility) level opinion of probable project cost for improvements identified, and preliminary layouts of the recommended improvements.

The information developed under this task will be presented to CCWD in the progress workshop discussed under Task 1, and summarized in the Technical Memorandum discussed under Task 5.

Task 4 Deliverables: Bullet-list summary of recommended shut-down/restart operations protocol. Tables and figures showing the results of the analysis. Workshop agenda and notes with identified decisions and action items.

Task 5. Technical Memorandum

The information developed under the tasks described above will be summarized in a Draft Water Treatment Plants Optimization Evaluation Technical Memorandum (TM). The TM will also include recommendations for appropriate next steps to move forward with development of design for potential improvements. Feedback from CCWD, which is assumed will be provided as written comments, will be incorporated into a Final TM.

Task 5 Deliverables: One (1) electronic copy (in PDF format) of the Draft TM. One (1) electronic copy (in PDF format) of the Final TM.

Task 6. *Optional* NWTP Reliably Improvements Evaluation

If directed by CCWD, West Yost will evaluate the facilities needed to provide additional treatment redundancy at the NWTP. This assessment is expected to be limited to expansion of the pretreatment and filtration systems. The analysis will also consider whether increased operations of the DCWTP can achieve the desired reliably objectives. Feasibility level cost estimates, and preliminary layouts of the recommended facilities will be developed.

If this task is authorized, the information developed under this task will be presented to CCWD in a progress workshop (which is assumed to be in addition to the workshops discussed under Task 1). The information developed will also be summarized in the TM discussed under Task 5.

Task 6 Deliverables: Tables and figures showing the results of the analysis. Workshop agenda and notes with identified decisions and action items.

Task 7. *Optional* Assistance to Increase DCWTP Pathogen Removal Credit

If directed by CCWD, West Yost will provide engineering assistance to prepare a draft amendment for the DCWTP operating permit that CCWD can send to DDW requesting an increase in the DCWTP's pathogen removal credits. This effort will include a presentation of available IFE and CFE turbidity data to demonstrate that the DCWTP meets the same performance criteria required for treatment facilities that have a conventional filtration treatment process.

The request will be prepared on the operating permit amendment form, will be submitted to CCWD for review. A final letter will be developed based on CCWD input. It is assumed that the final letter will be printed by CCWD on CCWD letterhead, and submitted directly to DDW.

One conference call with DDW staff is also assumed to be included in this task.

Task 7 Deliverables: Draft and Final electronic copy (MS Word) of the request letter.

ESTIMATED FEE

The estimated fee for this project is \$76,000, and a breakdown of the fee is shown in Table 1. With the optional tasks included, the total estimated fee is \$99,700. All services will be performed on a time and materials basis in accordance with the terms defined in West Yost's current on call contract with CCWD. West Yost will not exceed the total fee listed in Table 1 without prior authorization from CCWD. We will notify CCWD's project manager when we have expended 80 percent of our budget. The distribution of budget between the project tasks may be adjusted, as needed, to meet the project needs.

Task No.	Task	Estimated Fee, dollars
1	Project Management, QC and Workshops	16,700
2	Review Background Materials	11,000
3	DCWTP Capacity Expansion Evaluation	13,900
4	NWTP Turn Down/Shut Down Evaluation	14,100
5	Technical Memorandum	20,300
6	<i>Optional</i> NWTP Reliability Improvements Evaluation	18,600
8	Optional DCWTP Pathogen Removal Credit Increase Assistance	5,100
Total		76,000
Total with Optional Tasks		99,700

Sincerely,

WEST YOST ASSOCIATES



Craig Thompson, PE, BCEE
Principal Engineer

CT:ap