C-43 West Basin Storage Reservoir Water Quality Feasibility Study

Deliverable 3.1.5: Summary of Public Meetings

Prepared for

South Florida Water Management District

Date

December 8, 2020

Prepared by

J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.

1.0 Introduction

On January 10, 2019, Governor Ron DeSantis signed Executive Order 19-12, calling for greater protection of Florida's environment and water quality. The Executive Order directed the state's agencies to take an aggressive approach to address some of the environmental issues plaguing the state, with a significant emphasis on south Florida and recent harmful algal blooms associated with blue-green algae. Specifically, the Executive Order directed the Florida Department of Environmental Protection (DEP) to "work with the South Florida Water Management District [SFWMD] to add stormwater treatment to the C-43 Reservoir to provide additional treatment and improve the quality of water leaving this important storage component" of the Comprehensive Everglades Restoration Plan (CERP).

To examine conventional and innovative biological, physical, and chemical technologies available and applicable to treating water entering and discharging from the C-43 West Basin Storage Reservoir (WBSR) or reducing potential algal biomass within the C-43 WBSR, SFWMD, DEP, and local governments have partnered to develop the C-43 WBSR Water Quality Feasibility Study (Study). Collectively, representatives of SFWMD, DEP, Hendry County, Lee County, City of Cape Coral, City of Sanibel, and Lehigh Acres Municipal Services Improvement District make up the C-43 Study Working Group (Working Group). The Working Group provides guidance to the SFWMD Project Manager, who is responsible for administering the contract and acting as the liaison between the Working Group and Study consultant, J-Tech (Jacobs Engineering and Tetra Tech, Inc.), who was selected to complete the Study.

The objectives of the Study are to obtain a cost-benefit, alternatives, and trade-off analysis from which cost-effective, available, technically feasible, conventional and innovative biological, chemical and physical treatment technologies for water quality improvement for eventual pre-treatment, in-reservoir treatment, and/or post-treatment application to the C-43 WBSR will be selected, while maintaining the current CERP construction schedule and congressionally approved project purposes for the C-43 WBSR; to conduct a literature review of existing pertinent studies/literature; to review and evaluate applicable water quality treatment technologies suitable for use; to conduct public meetings; and to identify cost-effective options that reduce discharge of nutrients which may contribute to blue-green algal blooms from the C-43 WBSR to the downstream Caloosahatchee Estuary. It is imperative the current C-43 WBSR construction schedule and all project purposes are not impacted by the recommendations ultimately provided in the Study.

2.0 Public Meeting Overview and Feedback

As part of J-Tech's contract with SFWMD, the consultant was required to coordinate, organize, and facilitate five public meetings and to provide a summary of all public meetings. The first public meeting was held on September 27, 2019. In 2020, public meetings were held on January 21, March 25, July 16, and December 2. Below is a summary of the main categories of comments and questions received at these public meetings as well as how they were addressed in the Study, where applicable.

Technologies

Immediately following the first public meeting, J-Tech and Working Group members held discussions with the public about the Study. During these discussions, several technologies were brought to the attention of J-Tech and the Working Group, which were not included in the DEP Accepted Technologies Library. J-Tech followed up with vendors and searched literature to gather more information about these technologies so that they could be included in the Information Collection Summary. A few of these

technologies were brought forward for further evaluation as part of the Study and in the formulation of the water quality treatment alternatives including:

- MPC-Buoy
- ADS
- Phosphorus Free Water Solutions
- Hybrid Wetland Treatment Technologies (HWTT).

Other Treatment Options

Throughout the meetings, there were questions about other potential treatment options, which were not part of the Study.

One method raised through public input was aquifer storage and recovery (ASR). SFWMD investigated the potential use of ASR wells in conjunction with the C-43 WBSR in 2005. It was ultimately decided that the soils near the C-43 WBSR are not suitable for ASR. As a result of these findings, ASR was not further evaluated as part of the Study as a water quality treatment option for the C-43 WBSR. Information on the 2005 investigation was included in the Study to explain why ASR was not included.

Another option was planting of submerged aquatic vegetation (SAV) within and/or downstream of the reservoir. While SAV were considered as part of several treatment options, SAV cannot be planted within the reservoir due to operational constraints. Planting within the river was not considered since the Study purpose is identify options to treat water specifically routed to or from the reservoir and not on restoration in-river. Information about why SAV planting was not further evaluated as part of the Study is further explained in the Study.

In addition, questions were raised about the use of dispersed water management (DWM) for treatment. DWM projects are typically designed for water storage and not water quality treatment; therefore, this option was not considered in the Study.

C-43 Reservoir

Various questions were received regarding the C-43 WBSR during the public meetings. J-Tech identified the constraints associated with operations of the reservoir in the Study, as the water quality treatment component cannot affect the congressionally approved C-43 Reservoir project purposes, infrastructure, construction schedule, or operation. These constraints were considered during the evaluations of the treatment technologies.

There were several questions received about water quality standards for the reservoir releases. The reservoir is pulling water in from the C-43, holding it in the reservoir, and transferring it back to the Caloosahatchee River and Estuary. The waters are not separate from Waters of the United States, so the Water Transfers Rule applies. Therefore, water quality-based effluent limits (WQBELs) are not applicable for this reservoir. There were also questions about when DEP would certify and permit reservoir operation. While operational plans are under development, permitting of the operation of the reservoir will occur after the operational testing monitoring phase, once construction is complete. DEP will work with SFWMD to permit those operations through the CERP process.

Ecosystem Benefits

During the second public meeting, there were several comments received regarding ancillary benefits, such as ecosystem benefits to wildlife, and how they will be evaluated as part of the Study. Based on the feedback, J-Tech included ecosystem benefits, such as creation of habitat for fish and wildlife, as one of the attribute ranking criteria used to evaluate each of the technologies. In addition, a criterion was developed to evaluate the human benefits of each technology, such as providing aesthetic and recreational opportunities.

Residuals

Residuals are the waste product, typically in a solid form, that remain after a treatment process has occurred. For chemical treatment, this is typically a precipitate, while for biological treatment, residuals are typically an organic solid produced by plant or microbial growth. Interest was expressed in whether or not residuals would be created by any of the evaluated technologies and how the residuals would be disposed or reused. There were several questions about whether the residuals could be sold to help recover the costs of treatment. Residuals production was included as an attribute ranking criterion for each technology, and J-Tech evaluated whether a technology produces residuals and how they would be handled. Preference was given to technologies that produce less residuals or require minimal management/handling. The costs associated with residuals handling was included in the annual operations and maintenance (O&M) cost for each technology, if applicable. If a technology vendor indicated that the residuals could be sold as fertilizer instead of disposed in a landfill, that benefit was used to offset the O&M costs for the technology.

Chemical Treatment

Significant interest was expressed about the safety and potential toxicity of the chemical treatment technologies evaluated in the Study. Several questions and some concerns were received about the use of aluminum (alum) as a treatment option, both on its own and as part of the hybrid wetland treatment technology (HWTT). There were concerns about toxicity and impacts on the physical, chemical, and biological conditions downstream of the treatment component. J-Tech conducted extensive research and found numerous papers and Florida-specific examples of successful application of alum. The literature was posted to the Study's website and cited in the Study report. Alum has been proven to work as a coagulant for water quality treatment at scales similar to what is expected at the C-43 WBSR. Alum treatment in Florida specifically has been studied for more than 30 years and toxicity impacts have not been observed. The alum systems can be managed to limit pH changes and floc getting into the natural system. To assess the feasibility of using alum to treat Caloosahatchee River water, SFWMD is currently conducting a pilot study using water collected at several locations with the basin. The preliminary results from this pilot study have been included in the Final Feasibility Study document as Appendix G and will be considered in the technology evaluations in the next phase of the Study.

Questions and comments were also received on the composition of Bold & Gold®. This mixture includes clay, tire crumbs (with no metals), and fine sand. This mixture has sorption attributes that are good for nutrient removal. There was also a question about only using sand and clay for treatment instead of the Bold & Gold® mixture. The Study does evaluated the use of sand filters as a technology. In addition, SFWMD is currently conducting a pilot study using Caloosahatchee River water to evaluate nutrient removal from Bold & Gold® as well as sand only. The results from the first month of the pilot study have been included in the Final Feasibility Study document as Appendix G and will be considered in the technology evaluations in the next phase of the Study.

Stormwater Treatment Area (STA)

Throughout the meetings, questions were asked about why an STA was not included with the original design of the C-43 WBSR, similar to other CERP reservoirs. An STA for the C-43 Reservoir was not included in the final project components of CERP; therefore, as part of Executive Order 19-12, SFWMD initiated the Study to evaluate potential options for water quality treatment, including an STA. As the Study process moved forward, comments were received from the public that they would prefer a natural treatment solution, such as an STA. To treat the flows from the C-43 WBSR would require an STA of approximately 5,000 acres. An STA alternative was evaluated in the Study and was determined to be one of the more costly treatment options. Two of the other highest ranking alternatives include wetland treatment systems as part of the technology. However, based on public input, the full-scale STA is being brought forward into the next phase of the Study .

Sensitivity Analysis

During the public process, questions were asked about whether the ranking criteria were sensitive enough to determine differences between the technologies. To address the concern, J-Tech conducted a sensitivity analysis on the weights used in the attribute ranking to evaluate the impacts of modifying the weights on the technology ranking results. The attribute ranking was assessed against the total nitrogen (TN) cost-effectiveness in a series of plots for the sensitivity analysis. The TN cost-effectiveness value remained the same since it was based on the information provided by the vendors for each technology. The highest ranked, most cost-effective technologies fall in the lower left portion of the plots. The goal of the sensitivity analysis was to determine if changing the attribute scores or weights affected which technologies were the highest ranked (in other words, falling within the lower left portion of the plot). The information from this analysis was included in Appendix F of the Study and indicated that the attribute ranking was adequate to differentiate between the technologies and validated the methodology.

Cost Estimates

At two of the public meetings, questions were received about whether O&M costs were included in the cost estimates in addition to the capital costs. O&M requirements were included as a ranking criterion, and preference was given to technologies with less complex operations or less operator involvement. As part of the cost-effectiveness ranking, the O&M costs and the capital costs were combined to determine the net present value (NPV) for each technology. The NPV was divided by the nutrient removal to determine the cost per pound of TN, total phosphorus (TP), and total suspended solids (TSS) removed. Details of these estimates were included in the Study.

Scalability

Questions were asked about whether scalability was considered when evaluating treatment and treatment train options. In response to these questions, a ranking criterion for scalability was included in the attribute ranking for each technology. J-Tech reviewed relevant literature gathered in the Information Collection Summary Report to determine if a given technology had been implemented at a similar scale, and this information was included in the Study. J-Tech also evaluated whether or not the technologies would be able to sustain zero flows for several weeks. Any technologies that could not be used at the scale needed for the expected flows and nutrient concentrations were not carried forward in the Study evaluation.

Nutrient Removal Evaluation

Clarification was requested on what nutrient reduction goals the technologies would be evaluated against. Per Executive Order 19-12, the goal is to add water quality treatment to the C-43 WBSR to ensure that water leaving the reservoir is at least as good as the quality of water in the river. A more specific nutrient reduction goal will be developed as part of the next phase of the Study. There were also questions about whether the treatment technology should mainly reduce TN since that is the focus for the estuary. This Study evaluated both TN and TP removal since those are the nutrients that drive algal growth, as well as removing TSS that includes algae and organic matter.