C-43 West Basin Storage Reservoir Water Quality Feasibility Study
Public Meeting Minutes

January 21, 2020 2:00-4:00 PM
Hendry County Extension Office
1085 Pratt Boulevard, LaBelle, FL 33976

Meeting Welcome

- Kim Fikoski, Project Manager with the South Florida Water Management District (SFWMD), stated that this is the second of four public meetings for the C-43 West Basin Storage Reservoir (WBSR) Water Quality Feasibility Study (Study).
- Mitchell Wills, Chairman of the Hendy County Commission welcomed participants to Hendry County.
- Drew Bartlett, Executive Director of the SFWMD, stated that Governor Desantis' Executive Order asked DEP to work with SFWMD to evaluate water quality treatment options for the C-43 WBSR. SFWMD created a team to evaluate all available options. He encouraged engagement by the local stakeholders in this discussion regarding additional water quality treatment for the C-43 Reservoir. He introduced Chauncey Goss, the Chairman of the SFWMD Governing Board.
- Kim stated that SFWMD and the Florida Department of Environmental Protection (DEP) initially met with the City of Sanibel and Lee County to discuss how to engage local stakeholder's input into the Study. This discussion lead to the formation of the Working Group who are part of the Study team. The Working Group members introduced themselves:
  - Roland Ottolini, Director Lee County Natural Resources
  - Shane Parker, Director Hendry County Public Works
  - Edward Smith, Director of Office of Ecosystem Projects, Florida Department of Environmental Protection
  - James Evans, Director of Natural Resources Department, City of Sanibel
  - Maya Robert, Environmental Resources Division Manager, City of Cape Coral
  - Kim noted Mike Cook, Asst. District Manager, Lehigh Acres MSID was unable to attend today's meeting

- Kim stated that the Working Group helps to provide information to the study consultant team, as well as review and comment on the Study throughout its development. She noted that the water quality treatment technology studies the team is reviewing for the Study are posted to the SFWMD website. If any applicable studies are missing, stakeholders can submit information through the website as a comment or they can follow up with a Working Group member.

- Kim asked the consultant team members of J-Tech - a joint venture of Jacobs Engineering and Tetra Tech, Inc. and Wetlands Solutions, Inc. (WSI) to introduced themselves.
  - Georgia Vince, Project Manager, J-Tech
  - Jim Bays, Technology Lead, J-Tech
  - Chris Keller, Wetland Treatment System Lead, WSI
  - Shawn Waldeck, C-43 WBSR Engineer, J-Tech

- Kim stated that the goals of this meeting are to provide an update on the literature search, identify any studies or information that is missing, ensure everyone understands the Study goals and constraints, and to answer questions. She noted that index cards were provided and will be collected later in the meeting for the Working Group and Study team to respond to.

Study Background

- Ed Smith, DEP, discussed the hydrologic changes that have historically occurred throughout south Florida and the greater Everglades. He discussed the graphic that shows the alteration of flows and the current system and noted that the changes have over drained the Everglades, which lead to the creation of the Comprehensive Everglades Restoration Plan (CERP) to restore historic flows. The C-43 WBSR is part of CERP. The reservoir is designed to store water in the wet season and then meter out the water in the dry season to help meet the minimum flows and levels (MFL). There is concern that storing the water in the reservoir could result in algae blooms within the reservoir.
- Governor Desantis' Executive Order issued in January 2019 directed DEP and SFWMD to improve the quality of water leaving the C-43 reservoir.
- The Governor’s Executive Order identified other initiatives needed to provide better protection of the state's waterbodies. DEP is leading several of those initiatives including the formation of the Blue-Green Algae Task Force and Harmful Algal Bloom (Red Tide) Task Force. The Blue-Green Algae Task Force made its first round of recommendations which included innovative technology grants that DEP is currently issuing, and they are about to begin their second round of recommendations. The Harmful Algal Bloom (Red Tide) Task Force, is meeting for the third time on January 23 to finalize their red tide recommendations.
- Ed also noted DEP, SFWMD, and the Florida Department of Agriculture and Consumer Services (FDACS) are looking for opportunities to improve agricultural best management practices (BMPs). DEP also has a Technology Library with information on technologies that DEP has reviewed and accepted. The Study team will be reviewing these technologies to determine if they will help with water quality treatment for the C-43 WBSR.

Study Objective

- Georgia Vince, J-Tech Project Manager, stated that the primary objective of the study is to identify opportunities to provide additional treatment and improve water quality leaving the C-43 Reservoir. To do this, the Study will evaluate pre-storage, in-reservoir, and/or post-storage treatment options to identify at a minimum three conceptual options to improve water quality. The Study team will evaluate options to ensure they are cost-effective and technically feasible. They will consider biological, chemical, and physical treatment options that are scalable and available for long-term use. In addition, any treatment technologies that are chosen must be compatible with the reservoir operations.
- Georgia reviewed the Study schedule. The Study is under development and the team is currently collecting information on treatment technologies. The Information Collection Summary Report is being drafted and will be finalized in March. The next step will be to evaluate the technologies. The Study will wrap up in October and a final meeting will be held in November.

C-43 Reservoir Operations

- Shawn Waldeck, J-Tech, stated the purpose of the C-43 WSBR is to capture excess Caloosahatchee basin runoff and Lake Okeechobee releases; improve quantity, timing and distribution of freshwater flows to the Caloosahatchee Estuary to help maintain proper salinity levels; and maintain water supply for existing legal users .
- The reservoir is a component of CERP and the Project Implementation Report was approved in 2010 and the project was authorized by Congress in 2014. A Project Partnership Agreement with the U.S. Army Corps of Engineers (USACE) was executed in June 2016 since this project is a 50/50 cost-share with USACE.
- Shawn provided an overview of the location of the C-43 WBSR, including its location related to the C-43 Canal, Lake Okeechobee, Ortona and Franklin Locks, and Townsend Canal.
- Flows from the river are directed down the Townsend Canal and into the reservoir. Water will go through the S470 pump station that is currently being constructed. The reservoir has two cells and a pump to transfer water from one cell to another. The two discharge structures are located on the north end of the reservoir. Water flows out of the reservoir into Townsend Canal and back into the Caloosahatchee River.
- The major constraints to the reservoir operations are the Lake Okeechobee operation schedule and the Caloosahatchee MFL. The reservoir will be filled during the wet season and discharge during the dry season to help modulate the salinity barrier in the river.
- Shawn reviewed the general operational plan which includes filling during the wet season, discharging during the dry season at a target rate of 450 cubic feet per second (cfs), which was identified as the MFL for the Caloosahatchee estuary, and an emergency discharge rate of 2,500 cfs.

Study Constraints

- Georgia reviewed several of the Study constraints including that the Study cannot affect the congressionally approved C-43 Reservoir project purposes, infrastructure, construction schedule, or operation. Project lands have not been specifically identified for the Study. The Study will focus on reviewed and accepted technologies included in the DEP Library for Water Issues, but will not be limited to those technologies, if other information is provided.
- The C-43 Reservoir and the selected treatment component(s) alone are not intended to achieve compliance with the Caloosahatchee River and Estuary Total Maximum Daily Loads (TMDLs). There are other projects identified throughout the watershed related to that effort.

Conventional and Innovative Treatment Technologies

- Jim Bays, J-Tech, stated that while the treatment focus is on nitrogen, they are also evaluating phosphorus and suspended solids (algae or suspended particles) removal. The technologies reviewed included natural and conventional engineered technologies that each have costs, benefits, and tradeoffs that should be considered.
- There are opportunities to treat the water flowing into the reservoir, water within the reservoir, and water leaving the reservoir. The goal is to have cleaner water leaving the reservoir than what came into it.
- Jim reviewed physical treatment technologies including filtration, sorption, dissolved air flotation (DAF), oxidation, and sonication. He presented an example of a physical/chemical project from AquaFiber from the DEP database. They had a pilot project on Lake Jesup that uses DAF with a chemical additional to remove algal solids and associated phosphorus and nitrogen. The pilot study ran for five years and there is a detailed report of the results. Jim noted that they are finding a wide range in the level of detail for each technology.
- Jim stated that chemical treatment options include coagulation and flocculation. He provide an example of electro-coagulation where an electric current is used to increase the settling of nutrients.
- Biological treatment options include bioremediation (use of microbes) or floating wetland islands and treatment wetlands. Jim provided an example of BioCleaner, which is a floating device on a waterbody that draws water into a media tube that has microbes that remove nutrients. The units are about 10 feet long so scaling up to the size of the reservoir may be an issue which is a factor that is being evaluated.
- The team is reviewing the 30 applicable technologies in the DEP database. There were also 8 unsolicited technologies that are being reviewed. Jim summarized the technologies based on the treatment type. Some of the technologies in the DEP database have Florida case study data.
- Jim noted that in-reservoir treatment typically includes aeration or adding chemicals to reduce algae growth and flocculate nutrients. The reservoir ecosystem

itself can also be used to retain nutrients and to use differences in oxygenation to remove nutrients. Jim provided examples including ultrasonication, algicide application, and biological treatment through artificial circulation in the reservoir.

- Jim presented a draft matrix of factors that will be used to evaluate each of the technologies. The factors include the process, Florida information, nutrient concentration, removal efficiency, area, flow, scale factor, power, residuals, and cost.
- The next step will be to summarize the performance of each of the technologies with a focus on technologies with Florida-specific information. They will estimate costs, estimate the physical requirements (land, power, day to day requirements), and the administrative requirements (permitting needs, regulations).

Wetland Treatment Technologies

- Chris Keller, WSI, stated that a lot of the treatment types that Jim described also occur naturally. Sedimentation occurs as water moves slowly through a natural system. Vegetation is covered with biofilm, which is a collection of microorganisms that can trap particles and provide biological processes that transforming nitrogen and phosphorus into other forms.
- Chris described the wetland nitrogen and phosphorus cycles. The nitrogen cycle coverts nitrogen to gas that goes into the atmosphere. The phosphorus cycle is different in that the phosphorus is taken up by vegetation that then dies and decomposes and turns into sediments.
- Chris described the various types of wetland plant communities that have been used in wetland treatment systems including floating aquatic vegetation (FAV), emergent aquatic vegetation (EAV), submerged aquatic vegetation (SAV), and periphyton. Treatment wetlands are engineered systems, although they may require a larger area and look different from conventional treatment options.
- Chris presented data from the 2007 C-43 WBSR Test Cell Water Quality Study. Water quality was measured in five-acre test cells. He presented data showing the nitrogen and phosphorus fractions. There was a net reduction of the total nitrogen (TN) concentration by 14% and total phosphorus (TP) concentration by 74%, which indicates that the reservoir itself provides some treatment.
- Chris summarized the results from the C-43 Water Quality Treatment and Testing Project Phase 1 Mesocosm Study, which was completed in July 2019. The objectives were to evaluate if the plant community type makes a difference in nutrient removal, if the soil type makes a difference, and how much water can flow through and still have nitrogen reductions. The focus of the study was on nitrogen, especially dissolved organic nitrogen (DON), which is the most abundant form in the C-43 watershed and the most difficult to remove. The final results showed that the mesocosms reduced TN by 23% on a concentration basis and 33% on a mass basis. DON was most (68%) of source water. More DON was removed in the wet season (14%) than in the dry season (4%). Dissolved inorganic nitrogen was

effectively removed at 90%. The nitrogen removal was not different based on plant community type, but more phosphorus was removed by SAV than EAV.

- Chris presented on results from the SFWMD Everglades Agricultural Area (EAA) stormwater treatment areas (STAs). The STAs were not designed or operated to remove nitrogen, but SFWMD had some monitoring data. He presented the differences in the EAA and C-43 basin water, in which the inflow TN concentrations are higher in the EAA. This is attributed to the soil type because the organic peat soils in the EAA store more organic nitrogen than the sandy soils in the C-43. There were some TN reductions with much higher TP reductions. SAV was used to help remove TP.
- Chris also presented regional filter marsh results from projects completed by the Working Group members within the Caloosahatchee watershed, which provide good examples for comparison to treatment of the reservoir. The TN inflow concentration were lower than in the EAA so a larger area for treatment or a different treatment process may be needed. The projects have a range of TN reductions from 6%-40% and TP reductions of 21%-84%.
- There was also a study by Lee County of three wet detention ponds that had TN removals in the range of 26%-50%.
- Chris presented examples of floating treatment wetlands from Lee County and Naples. There is a lot of literature about this treatment, but not many Florida-specific studies. These systems are typically small in footprint compared to the size of the waterbody, which makes it difficult to determine nutrient reductions. There is a possible interaction between the plant roots and algae in which there is something from the plant roots that controls algae, which is not well understood. The floating wetlands also shade the water column, which reduces light for algae.

Next Steps

- Kim noted that future public meetings will be held on March 25 and July 16. She reviewed the upcoming deliverables and provided a link to the Working Group website which was created to keep the public up to date on the study and to allow the public to submit via an email address on the webpage any pertinent studies missing from the studies collected to date. The webpage contains the C-43 reservoir fact Sheet and map, a copy of Governor Ron DeSantis' Executive Order 19-12, the Study Work Plan, and a link to all the studies that J-Tech will be evaluating including the DEP Technology Library. The webpage also contains the public meetings date/time/locations, PowerPoint presentations, meeting minutes, videos, and press releases. Upon their completion, the Information Collection Summary Report and the Study will also be available on the webpage.
- The Working Group webpage link is: https://www.sfwmd.gov/content/c43waterqualitystudy

Questions and Answers

- Following the presentations, the Working Group and J-Tech responded to questions and comments that were provided by the public on comment cards.

- Q: Is there any preference for natural system solutions such as natural wetlands?
- A: There is not, we are technology neutral at this point and all options are on the table. However, there will be constraints to implementing different technologies. It may be that too much land is needed for a natural system or a conventional technology produces too many residuals. The team is gathering information on technologies and will then evaluate them using a matrix. Some technology options are a combination of natural and conventional treatment.

- Q: Is there any consideration to prioritize or limit options that can alter the aquatic environment?
- A: Some technologies do include adding microbes or a chemical to the system. Right now there is no bias against those options but there will be a question moving forward about whether these are appropriate for the reservoir.

- Q: Will operations and maintenance (O&M) costs be considered?
- A: The next step will include a cost-benefit analysis of both the construction and O&M costs. O&M requirements are critical to understand because the reservoir will operation for years into the future so the treatment will also need to be long-term.

- Q: What role might aquifer storage and recovery (ASR) wells play in water quality treatment?
- A: ASR wells take surplus surface water, treat it as required for permit compliance, and then store it underground for subsequent recovery during dry periods. This technology has the potential to store and supply large volumes of water beneath a small surface footprint. This technology is on the list of options to be evaluated in the Study.

- Q: Without considering the current hydrologic limitations, what would be needed to help the nearby Orange River?
- A: There is no practicable way to move water from the reservoir to the Orange River. The Lehigh Acres Municipal Services Improvement District (LAMSID) is working on projects to treat water prior to entering tributaries that flow into the Caloosahatchee River. A pipe cannot be added to the C-43 reservoir to connect with LAMSID projects because, as noted in the discussion of Study constraints, the conceptual projects proposed by the Study cannot affect the Congressionally approved and authorized C-43 Reservoir project purpose, infrastructure, construction schedule, or operation.

- Q: Will the water quality monitoring include microcystin in the reservoir and discharge point?
- A: This will be determined as part of the reservoir operation plan that is currently being developed.

- Q: What nutrient reduction goals will the technologies be evaluated against?
- A: Per the Executive Order, the goal is to add stormwater treatment to the C-43 Reservoir to provide additional treatment and improve the quality of water leaving the reservoir. During the next phase of the Study, estimated concentrations will be determined to evaluate the treatment efficiencies of the different options. These results will be presented at a future meeting.

- Q: Is there any consideration for sediment and legacy nutrients in the nutrient budget?
- A: There will be work done to bracket the range of water quality concentrations and to what degree the sediment load may contribute and affect the system. This has not been considered in detail yet but will be as part of the next step.

- Q: The Coastal and Heartland National Estuary Partnership held a C-43 Water Quality Summit where several projects and concepts were discussed. The presentations and information are on the website. Has this information been reviewed?
- A: The information on completed projects with data on nutrient removal have been reviewed. There are more example projects that have been reviewed than what were presented today. All the evaluations will be summarized in the Information Collection Summary Report to be completed and available in mid-March. The website contains a link to all the studies currently under review. An email address on the website allows the public to submit any pertinent information not already under review.

- Q: Has the team reviewed all the statewide stormwater rule technologies?
- A: The team has reviewed the technologies in the DEP database and available reports. These likely overlap with the stormwater rule technologies.

- Q: Has the project received a DEP water quality certification and National Pollutant Discharge Elimination System (NPDES) permit?
- A: The reservoir has received a construction permit and an NPDES construction permit so erosion control BMPs are being implemented. The operation permit will be issued separately and will include the water quality certification.

- Q: Will offsite treatment projects be considered for the reservoir to meet water quality based effluent limits (WQBELs)?

- A: WQBELs are not applicable to the reservoir. These are for the EAA STAs. The water quality treatment will help to meet BMAP water quality treatment requirements.

- Q: Are there any plans for a reservoir north of Lake Okeechobee to slow and clean water before it reaches the lake?
- A: There is a plan underway for treatment north of the Lake, but this is not part of the C-43 WBSR project. Additional information is on the SFWMD website.

- Q: Would it be more cost effective to store and clean water closer to the source of major water inlets in Kissimmee than at the Caloosahatchee River?
- A: It is always better to treat at the source. There needs to be storage and treatment on all sides of the lake, which is currently being implemented by numerous CERP projects.
  It is important to note the C-43 WBSR is not just for storing water from Lake Okeechobee, but also for storing Caloosahatchee watershed runoff.

- Following the question and answer session, there was a time for open discussion between the public and the Working Group and Study consultant team members.