

Bennett Swamp Rehydration Project Quality Assurance Project Plan (QAPP)

Prepared for

City of Daytona Beach

April 17, 2017



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Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with CH2M HILL, Inc., a corporation, authorized to operate as an engineering business, FEID No. 59-0918189, by the State of Florida, Department of Professional Regulation, Board of Professional Engineers, and that I have reviewed and approved this Feasibility Report for the subject project:

Project: Bennett Swamp Aquifer Recharge

Project Location: City of Daytona Beach, FL

Client: City of Daytona Beach Utilities Department

In the preparation of this engineering report, various hydrologic engineering analyses and preliminary designs were prepared. Research, including project specific meetings with the appropriate agencies, of the permitting requirements was performed. I acknowledge that the procedures and references used to develop these documents are standard to the professional practice of civil engineering as applied through professional judgment and experience.

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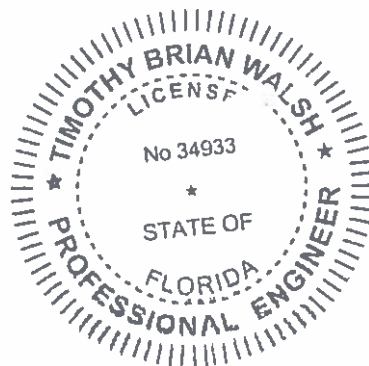
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P.E. Number: 34933 (Florida)

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9/25/2017



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Acronyms and Abbreviations

ARC	Acquisition and Restoration Council
AWT	advanced wastewater treatment
CBOD ₅	Carbonaceous Biochemical Oxygen Demand, 5-
day CTL	Consolidated Tomoka Land
CN	Curve Number
CUP	Consumptive Use Permit
ERP	Environmental Resource Permit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFS	Florida Forest Service
HDD	Horizontal Directional Drilling
MGD	million gallons per day
MOT	maintenance of traffic
NAVD	North American Vertical Datum
NPDES	National Pollutant Discharge Elimination
System NRCS	Natural Resources Conservation Service
POS	Plan of Study
ppm	parts per million
RIB	Rapid Infiltration Basin
SCS	Soil Conservation Service (now NRCS)
SJRWMD	St. Johns River Water Management
District TBSF	Tiger Bay State Forest
TIITF	Trustees of the Internal Improvement Fund
TMDL	Total Maximum Daily Load
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
WWTP	Wastewater Treatment Plant

Quality Assurance Project Plan

1.1 Background

The City of Daytona Beach will have a Quality Assurance Project Plan (QAPP) under its grant obligations for the Bennett Swamp Rehydration Plan. This plan will demonstrate the success of the project with respect to meeting the project goal associated with the FDEP Grant LP64095. The primary goal associated with that grant was to remove as much of the nutrient load from the City's wastewater treatment plants as possible. The basis of the grant was to remove 36,485 LBS of nitrogen and 12,162 LBS of phosphorus annually from the Halifax River. This project has been permitted to remove more than 54,000 LBS of nitrogen and 18,000 LBS of phosphorus. This City Utility Department project does that by dispersing up to 6 MGD of highly treated reclaimed water (AWT standards of 5-5-3-1 with advanced UV disinfection) into 1,100 acres of wetlands known as the Bennett Swamp. The physical components (pipes and dispersal units) have been sized and will be constructed to carry 12 MGD of reclaimed water provided that flow rate becomes available and the system has demonstrated it can accept that flow of water without exceeding its permitted outflow mass of nutrients. The increased size of pipes also allows for a ONE TIME construction and allows the flows to different zones be adjusted to allow for resting periods should that prove beneficial.

1.2 Definition of Success

Success of the project will be defined by the amount of nutrient load to the Halifax River that is reduced. The success will be expressed as a percentage of the nitrogen load reduction goal of 36,485 LBS per year. The success of the project from the grant perspective will be demonstrated by measuring and recording the flows of the water that are dispersed into the Bennett Swamp which would otherwise have been sent to the Halifax River. These flows will be multiplied by the allowable concentration of reclaimed water to Halifax River (i.e. 3 ppm and 1 ppm of nitrogen and phosphorus, respectively). A million gallons of water per day with a 3 ppm nitrogen concentration equates to just over 9,000 lbs of nitrogen per year. There will be an electric valve and meter that is installed just to the west of LPGA Blvd that will be hardwired into the WWTP.

Integrated Monitoring Program Components

Simply recording the flow at the meter may be all that is necessary from this FDEP grant QAPP perspective to demonstrate success. However, this project has additional monitoring and reporting requirements to comply with its various permit monitoring requirements. There are several components of these various monitoring program that overlap. Therefore, it is in the public interest to combine all of these into one integrated monitoring plan. As part of its scope of work for this Bennett Swamp Rehydration Project, CH2M is responsible for preparing that overall plan. This QAPP is a part of that overall plan. The following sections provide a description of the various permit/grant monitoring and reporting requirements.

Finally, as these flows begin to rehydrate the swamp, there will be changes to its hydrologic and water quality conditions. Some of these changes may be realized immediately, but others may take months, if not years, to be fully developed. With an integrated monitoring program, the City will be able to adjust flows as necessary to meet changing conditions from an operational standpoint. With the monitoring program, the City also meets its various permit application requirements and possibly increase the flows to the Bennett Swamp.

2.1 FDEP Grant Performance Demonstration—QAPP

As a condition of its grant, the FDEP will require a monitoring plan (i.e. this QAPP) to demonstrate the success of the project. One of the main justifications for the FDEP providing this grant was this project's ability to reduce nutrient loads from the City's WWTPs to the Halifax River. The following parameters will be monitored as part of this grant requirements

- Daily Precipitation—from NOAA gage at Daytona Beach International Airport
- Flows and Concentrations to the Halifax River—Continuous for Flows—Averages for Concentration
- Flows and Concentrations to this Bennett Swamp—Continuous for Flows—Averages for Concentrations
- Flows and Concentrations to the other Reuse Customers in the City's System—Continuous for Flows—Averages for Concentrations

The duration of this monitoring plan is generally one year, but since there are no additional monitoring costs associated with this plan, it may be continued for a longer period. Reporting requirements are once a quarter.

2.2 FDEP NPDES Permit for Westside Regional WWTP Outfall/Discharge

The discharge from the Westside Regional WWTP currently goes either to Reuse customers or is pumped to the Bethune Point WWTP where it is mixed with the Bethune Point and discharged to the Halifax River. With this Bennett Swamp Rehydration Project, there will be a discharge out of the swamp. That water will travel to the Tomoka River which has its own TMDL. The City's NPDES permit for the Westside Regional WWTP will be conditioned so as to not allow more than 15,652 LBS

of nitrogen or more than 809 LBS of phosphorus to leave the Bennett Swamp under an average water year.

As with any NPDES permit for a WWTP plant, its discharge needs to be monitored and reported. With this Bennett Swamp project, the water quantity and quality of the water leaving the swamp will also need to be monitored as required by FAC 62-611. Additionally, there are specific monitoring requirements for evaluating the conditions WITHIN the swamp. For this NPDES permit, the monitoring parameters are:

- Groundwater and Surface Water Stages at four points—#1 one discharge to the swamp, #2 one discharge from the swamp at Thayer Canal, #3 one discharge at US 92, #4 one midpoint location—see Green Triangles on Figure 3—note the Thayer Canal and US 92 stage data will be converted into flows-- continuously
- Precipitation data—daily
- Nutrient, Biological Oxygen Demand and Suspended Solids Concentrations at the monitoring locations of #1, #2, and #3—quarterly. As part of the startup and operational monitoring program, nutrients will be sampled at the Thayer Canal Outfall and the US 92 Outfall on a monthly basis.
- Biota data, including fish, invertebrates and vegetation at 3 quadrat plots at all four locations-- annually

The duration of this monitoring program will be indefinitely and required for as long as the City is utilizing the Bennett Swamp Rehydration Project. A Baseline Monitoring Program has been approved and completed in October, 2016. That Baseline Monitoring Plan and the results of the Existing Conditions are included as Appendices A through D of the Environmental and Engineering Report. The wetland monitoring reporting under 62-611 FAC is annual.

23 Consumptive Use Permit Monitoring Plan

As a requirement of the City's Consumptive Use Permit, the City is required to monitor and report to the SJRWMD the following parameters:

- Production well discharges--continuously
- Groundwater/surface water stages at 13 locations-once a day—see RED circles on Figure 3
- Precipitation-daily

The duration of this monitoring plan will continue indefinitely unless modified by the CUP. Reporting requirements are twice a year.

24 Field Walks for FFS

Initially, during the first year startup period, a field walk through along the pipeline alignments will be performed by engineers and ecological scientists to review the situation first hand. FFS personnel will be invited to participate. A key concern of the FFS is the potential for invasive species to migrate into the cleared areas and Videos and/or photographs will be taken and a field report prepared. For the first year in its startup period, these field walks will be performed on a monthly basis.

Field Measurements

3.1 Precipitation

The NOAA rain gage at the Daytona Beach International Airport (2 miles away) will be used to record the daily precipitation. Daily summaries will be downloaded each month from the National Climatic Data Center.

3.2 Stages, Water Levels and Flows from Bennett Swamp

Ground water table levels will be measured with the piezometers. Piezometers are little pressure transducers that are placed into pvc tubes that are drilled into the ground. On top of the tube is a box. Inside the box is the data recording and transmitting devices. These piezometers also measure surface water stages when the water is above the ground surface. The City's current 13 site system sends the data via cell phones. There is some spotty/intermittent coverage out in the woods. Therefore, the City will be switching to a satellite system for these 13 existing systems and for the 4 new sites associated with this project.

In order to measure water flows from the Thayer Canal and at US 92, the stage data will be used. Rating curves will be created for the weir at Thayer Canal and the natural ditch at US 92 to convert the stage data into flow data.

3.3 Water Flows to Bennett Swamp

Just west of LPGA Blvd., a large flow meter will be hardwired into the City's Westside Regional WWTP SCADA system. An electronic modulating valve will also be installed at this point and hardwired into the SCADA system. Another modulating valve and flow meter will be installed on the pipeline branch that runs to the north. However, this will be a manually operated modulating valve and a satellite system for transmission of the data. The total flow of water to the swamp and to the northern branch will be directly measured. The flow to the southern branch is indirectly measured by subtracting the northern branch flow from the total flow.

3.4 Water Quality and Biota Sampling

Detailed descriptions of the various field instrumentation and sampling techniques for the water quality and biota sampling are described in detail in the Baseline Monitoring Report. All water quality laboratory testing will be performed by certified laboratories.

Data Analyses

The data will be analyzed to determine compliance with permit requirements and project success. In addition, the data will be analyzed to allow for operational improvements to the project. Tables and graphical plots of the data will be presented. That data will include:

- Daily Precipitation
- Daily Flows of WWTP water to Halifax River
- Daily Flows of WWTP water to Reuse
- Daily Flows of WWTP water to Bennett Swamp
- Daily Flows of water from Bennett Swamp
- Water Quality Data collected
- Stages of water levels in piezometers
- Mass of Nutrients generated at WWTPs
- Mass of Nutrients sent to Halifax River
- Mass of Nutrients sent to Reuse
- Mass of Nutrients sent to Bennett Swamp
- Mass of Nutrients sent to Tomoka River

Trend analyses will be performed in the interest of adjusting the flow rates to the four different zones to optimize the success. However, it is important to understand that natural systems responses almost always lag stimuli. Therefore, it may be months or even years before enough data is collected to make legitimate sense of any trend analyses.

Results and Recommendations

Results of the monitoring data will be reported on a monthly basis with the report prepared quarterly. There are two critical results:

- Mass of Nutrients that have not been sent to the Halifax River
- Mass of Nutrients that have been sent to the Tomoka River

Based upon these two results, recommendations can be made to either increase or decrease the total and/or specific zone flows.