

**Documentation in Support of Category 4e**  
**WBID 722: Rocky Bayou**  
**February 09, 2017**

**Waterbody/Watershed Identification**

<i>Organization</i>	Niceville-Valparaiso Regional (NVR) Sewer Board
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<i>Waterbody(s)</i>	WBID 722 – Rocky Bayou
<i>No. Waterbody / Pollutant Combinations</i>	WBID 722; OGC Case No. 16-0501; during Cycle 3 listed for Nutrients (Total Nitrogen)

**Description of Baseline Conditions**

<i>Watershed(s)</i>	Choctawhatchee Bay
<i>Baseline Data</i>	Parameter assessed under the IWR was Total Nitrogen; Stations used for the assessment varied from year to year but included 21FLPNS32010GB2, 21FLPNS320100G2, 21FLNWFDDS197, 21FLNNWFD303002086254901, 21FLKWATOKA-CEVILLE-2-1, 21FLKWATOKA-CB-BEACH-9, 21FLCMP32010GR3, 21FLCMP32010GR2, 21FLCBASWC4, 21FLCBANVL02, 21FLCBANVL01 and 21FLCBABTC1; AGM exceeded 0.33 mg/l more than once in a consecutive three-year period during the period 2008 through 2015
<i>Map</i>	See Figure 1 which delineates the drainage basin for WBID 722 and Figure 2 which shows the sampling station locations in Rocky Bayou

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## Evidence of Watershed Approach

### *Area of Effort*

Rocky Bayou lies within the Choctawhatchee Bay Planning Unit., a TMDL Group Group 3 Unit. Rocky Bayou (WBID 722) is a sub-unit of the Choctawhatchee Bay Planning Unit. Our effort is confined to Rocky Bayou.

### *Key Stakeholders Involved and Their Roles*

The Cities of Niceville and Valparaiso are the owners and stakeholders. The Niceville-Valparaiso Regional Sewer Board is a corporation set up by these two cities to operate and maintain the WWTF and land application site (sprayfield). The City of Niceville owns the reclaimed water system and operates the holding basins, pumping facilities and distribution system. The City of Niceville owns the reclaimed water production facility located on the WWTF site, but the NVR Sewer Board operates this portion of the system.

### *Watershed Plan & Other Supporting Documentation*

The area includes the watershed drainage area for Rocky Bayou shown in Figure 1. Rocky Bayou is WBID 722. This WBID was listed as impaired for nutrients (Total Nitrogen) based on exceedances of the annual geometric mean of all samples more than once in a consecutive three-year period during the years 2008-2015. The NVR Sewer Board has requested and has been granted an extension for the filing of a petition to challenge that listing through June 30, 2017, such that the listing of WBID 722 as impaired for nutrients based on TN is not final. It is anticipated that the Department's review of the materials provided herein will ultimately resolve the NVR Sewer Board's concerns as to the listing of WBID 722 and the request for extension will ultimately be withdrawn.

The objective of the stakeholders is three-fold: First to assess the appropriateness of the sampling during the assessment period (2008-2015); second to determine if higher limits would still protect the waterbody based upon the parameters established by the EPA; and third to reduce the nitrogen concentration in the groundwater exiting the zone of discharge from the land application site (sprayfield) in order to reduce the nitrogen reaching Rocky Bayou as a result of the application of the WWTF effluent to the land application site.

The process used in the WWTF has recently been upgraded in order to reduce the Total Nitrogen and Total Phosphorus in the facility effluent, which is applied to the land application site. This is discussed in detail later in the section titled "Restoration Work."

### *Point Sources and Indirect Source Monitoring (Sites)*

Point sources of wastewater known to us which contribute to the Rocky Bayou watershed are the land application site (sprayfield) used by the Niceville-Valparaiso Regional WWTF for effluent disposal, the Rocky Bayou Country Club golf course, numerous septic tanks in the eastern end of the City of Niceville sewer service area and camp sites with septic tanks in the Fred Gannon Rocky Bayou State Park. These sites are shown in Figure 4. As can be seen, the creeks surrounding the sprayfield, which receive the water from under the sprayfield, all ultimately drain into Rocky Bayou, as do all septic tanks mentioned. All runoff from the Rocky Bayou Country Club golf course drains into Henderson Lake, which discharges through an overflow pipe into Sanders Branch, which flows into Swift Creek and into Rocky Bayou. Figure 2 shows the location of the groundwater monitoring wells at the sprayfield zone of discharge.

### *Nonpoint Sources*

Omitted.

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*Water Quality  
Criteria*

After the effects of the nitrogen reduction from the WWTF following the process upgrade, it is anticipated that the nitrogen concentration in the groundwater leaving the zone of discharge at the land application site (sprayfield) will be reduced sufficiently that the Total Nitrogen in Rocky Bayou will be reduced to a concentration that does not exceed the limits set by the FDEP.

*Restoration Work*

The NVR WWTF was placed on line in January of 1982. It had a treatment capacity of 2.0 MGD and the effluent was applied to a restricted public access land application site (sprayfield) which had 267 acres of wetted area and is leased from Eglin AFB. The process used was the contact-stabilization mode of the activated sludge process. This process was not designed to remove any nitrogen or phosphorus. Coastal bermuda grass was planted on the sprayfield to remove nitrogen and phosphorus from the wastewater applied. During the winter months when the Coastal bermuda grass is dormant, the sprayfield is overseeded with winter ryegrass. The WWTF has been expanded twice and its permitted capacity was increased to 3.35 MGD but the sprayfield was not expanded. The annual average total nitrogen concentration in the facility effluent exceeded 20 mg/l and the annual average phosphorus concentration exceeded 6 mg/l. This led to increased nitrogen and phosphorus concentrations in the wastewater effluent applied to the sprayfield which percolated to the groundwater and thus increased concentrations in the groundwater leaving the zone of discharge.

On April 4, 2012, the Cities of Niceville and Valparaiso and the NVR Sewer Board executed a contract to construct major improvements to the NVR WWTF. These improvements changed the process used for wastewater treatment from the contact-stabilization mode of the activated sludge process to an integrated fixed-film/activated sludge (IFAS) process. The improvements were designed to reduce the total nitrogen in the facility effluent from the annual average of greater than 20 mg/l to an annual average not to exceed 6.0 mg/l and the total phosphorus in the facility effluent from the annual average of greater than 6 mg/l to an annual average not to exceed 4.0 mg/l. The design anticipated that after process optimization the facility would produce an effluent in which the total nitrogen would not exceed 3.0 mg/l and the total phosphorus would not exceed 2.0 mg/l on an annual average basis.

Construction began on June 26, 2012 and after several delays, was completed and all components were started up on January 5, 2015. Construction was completed in three phases. Each phase was completion of one of the three trains which make up the treatment facility. Each train treats one-third of the flow to the facility. Train #3 was completed and placed into service on October 21, 2013. Train #2 was completed and placed into service on March 13, 2014. Train 1 was completed and placed into service on January 5, 2015.

The total cost of the upgrade was more than \$6 million.

## Critical Milestones/Monitoring

### *Anticipated Critical Milestone(s) and Completion Dates:*

As stated above, the completion dates for the three phases of the WWTF upgrade were October 21, 2013, March 13, 2014 and January 5, 2015. Table 1 shows the nitrogen and phosphorus concentrations in the facility effluent beginning January 1, 2015 after the full facility upgrade was completed. Comprehensive TN and TP data does not exist prior to this date. As can be seen, the total nitrogen concentrations have been variable, but all are much lower than the 20+ mg/l present before the upgrade. The reason for variable results of the treatment process is due to clogging problems with the submerged screens which are located in the aerated zones of the treatment plant. The clogging problems were caused by using plant effluent as the source for water to the spray bars which clean the headworks screens. The solids in the plant effluent were clogging the spray system which cleans the influent screens resulting in solids being bypass around the influent screens and into the treatment tanks. These solids built up in the treatment tanks and eventually reached a concentration which clogged the submerged screens. Each time the submerged screens in a train clogged, the tanks had to be drained so the submerged screens installed as part of the process upgrade could be cleaned. Each time a tank had to be drained, the bacteria responsible for nitrification were lost and the bacterial population had to regrow so the nitrification process had to start over. It is hoped that this problem has been resolved by converting the washwater source for the influent screens from plant effluent to potable water.

Table 2 shows the nitrate concentrations in the compliance groundwater monitoring wells located on the boundary of the zone of discharge of the sprayfield. Figure 5 is a plot of the nitrate concentration in each compliance groundwater monitoring well. Figure 6 is a plot of the nitrate concentration in each compliance well beginning the first quarter of 2013 after the process conversion in the first train was completed. The TN reduction in the groundwater in several of the wells was striking, with steep downward slopes and coefficients of determination exceeding 0.5. This suggests that there will be significantly lower nitrate concentrations in Sanders Branch, Shaw Still Brank and Deer Moss Creek over time, which translates into significant TN loading reductions to Rocky Bayou. It is anticipated that it will take several years for the full effect of the lower concentrations of nitrogen in the facility effluent to reach a steady-state condition in the nitrate concentrations in the groundwater exiting the zone of discharge under the sprayfield, thus it is anticipated that it will take several years before the reduced nitrogen in the facility effluent will have its full effect on the nitrogen concentrations in Rocky Bayou.

### *Monitoring Component*

The total nitrogen and total phosphorus in the WWTF effluent beginning January 1, 2015 is shown in Table 1. The nitrate concentration in each compliance groundwater monitoring well is shown in Table 2. Samples will continue to be collected and analyzed for total nitrogen and total phosphorus in the WWTF effluent and in the groundwater monitoring wells at the sprayfield for at least five more years.

The NVR Sewer Board has also approved an agreement with Sweetgum Environmental to monitor the water quality in Rocky Bayou at four sites representative of those used in the development of the criteria for protection of the water quality in Rocky Bayou. These sites will be monitored quarterly during 2017. Monitoring will include physical/chemical measurements of DO, pH, salinity, temperature, Secchi depth, Total Nitrogen, Total Phosphorus, and chlorophyll-a in accordance with DEP SOPs. This work will actually be performed by Frydenborg Ecologic. It is anticipated that this will be continued for years 2018, 2019, 2020 and 2021. Hopefully in five years the reduced TN concentration in the facility effluent will have produced its steady-state effect on the TN concentration in Rocky Bayou.

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**Other Key Dates**

*Estimated Date to Determine Whether or not to Include Rocky Bayou on the federal 303(d) list*

WBID #722 is in the state’s Group #3 Basin in the <u>Northwest</u> District. As stated above, hopefully in five years sufficient data will be acquired to fully assess the WBID and determine if it is impaired and DEP can make a logical determination as to whether or not Rocky Bayou needs to be included in the federal 303(d) list.
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**Financial Commitments**

Estimated Implementation Cost

As stated above, the total construction cost of the improvements to the NVR WWTF was in excess of \$6 million. This was funded through a bond issue.  It is estimated that the operation and maintenance cost of the WWTF has increased by about \$400,000 per year as a result of the improvements made. This is mainly due to increased power cost for additional aeration and increased chemical cost for MicroC (needed to enhance the denitrification process) and alum (needed to chemically bind the phosphorus so that it will settle out). The annual lease payment to Eglin AFB for the property used as the sprayfield is \$8,500.
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Land Acquisition (if applicable)

<b>Funding Source:</b>
Total.....\$8,500/year

Design and Construction (if applicable)

<b>Funding Source:</b>
Total.....\$See “Restoration Work” above

**Attachments:**

- Figure 1-Rocky Bayou Drainage Basin Map
- Figure 2-Sampling Locations in Rocky Bayou Included in the FDEP Database
- Figure 3-Location of Groundwater Monitoring Wells at the Sprayfield
- Figure 4-Land Use Map for Rocky Bayou Drainage Basin
- Figure 5-Plot of Nitrate Concentrations in Compliance Groundwater Monitoring Wells at Sprayfield
- Figure 6-Plot of Nitrate Concentrations in Compliance GWM Wells Since January 2014
- Table 1-Total Nitrogen and Total Phosphorus Concentrations in WWTF Effluent
- Table 2-Nitrate Concentrations in the Compliance Groundwater Monitoring Wells at Sprayfield