

APPENDIX F

WASTEWATER TREATMENT PLANT SITE ANALYSIS

Wastewater Treatment Plant
Site Analysis

For

The Reserve at Sweetwater Estuary



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November, 2008

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I. Introduction

Secret Promise, Ltd. is proposing development of its property located in a largely undeveloped area of Florida's west coast, north of Keaton Beach, in Taylor County, Florida. This area is part of the limited area available for private development along the coastline in Taylor County. The proposed development will contain 624 residential units, 400-room conference hotel and 150,000 square feet of commercial space and other uses. The development will require wastewater service once it is constructed. See Appendix F.1 for a location map of the development.

The development is located within the service area of a Taylor County utility, the Taylor Coastal Water and Sewer District (TCW&SD). TCW&SD is a special water and sewer district, created under Taylor County Ordinance Chapter 66, Article IV, which serves the communities of Dekle Beach, Boggy Bay, Ezell Beach, Keaton Beach, Cedar Island, Lindsey Island, Dark Island and Fish Creek.

II. Objective

The objective of this site study is to determine if an existing TCW&SD wastewater treatment plant (WWTP) has capacity to serve the development. If the existing WWTP does not have capacity, the site for a new WWTP, which could be funded by the developer of The Reserve at Sweetwater Estuary, will be studied and recommended.

There are concerns that nutrients from effluent spray irrigated from a new WWTP may affect the water quality in the Big Bend Seagrass Aquatic Preserve (Aquatic Preserve), specifically regarding nitrogen levels in the Aquatic Preserve. This study will discuss the affects that the effluent discharged from a new WWTP may have on the water quality of the Aquatic Preserve.

III. Existing WWTP

The construction permit for the existing Taylor Coastal Water and Sewer District (TCW&SD) WWTP and the current permit renewal application materials were obtained from the Florida Department of Environmental Protection (FDEP) and reviewed. Mr. John Gentry, former TCW&SD General Manager, was contacted and he provided information on the utility and the existing WWTP. The design engineer of the existing WWTP, Mr. John Horvath of Jones Edmunds and Associates, Inc., was also contacted and he provided information on the existing WWTP.

The existing WWTP is located approximately 2 miles east of the community of Keaton Beach in the southwest quadrant of the intersection of Sand Hill Road and Blue Creek Road. The existing WWTP lies in Section 31, Township 7 South, Range 8 East and Section 6, Township 8 South, Range 8 East. See Appendix F.1 for the location of the existing WWTP in relation to the proposed development.

According to FDEP State of Florida Domestic Wastewater Facility Permit number FLA325864 the existing WWTP has a design capacity of 0.08 millions gallons per day (MGD) or 80,000 gallons per day (gpd) to serve the communities of Keaton Beach, Ezell Beach, and Cedar Island.

The existing WWTP is a Type III, Category III-Class C, Reliability Class III treatment unit using the Modified Ludzack-Ettinger activated sludge process. The permit requires the effluent from the existing WWTP contain no more than 20 mg/L CBOD₅ and 20 mg/L TSS. According to Mr. Horvath, the treatment plant was designed to produce effluent with total nitrogen (TN) of less than 10 mg/L. It should be noted the TN in the effluent is a design parameter and is not required by permit, nor is the effluent monitored for TN before applied to the spray irrigation field.

The existing WWTP effluent disposal system is slow rate application to a restricted public access 10.3 acre spray field that is planted with Bermuda grass. Numerous piezometers were installed to determine the groundwater gradient at the existing WWTP site. The depth to the water table ranges between 11 and 13 feet below grade. There is one existing monitor well located adjacent to and hydraulically downgradient of the spray field. See Appendix F.2 for a plan of the existing WWTP that shows groundwater contours at the site.

The groundwater is monitored at the well on a semi-annual frequency for TN and the existing permit requires less than 10 mg/L TN in the monitor well. Monitoring results from the past two years show TN levels range from 0.89 to 1.5 mg/L at the monitor well.

The permitted design for the existing WWTP requires that total nitrogen (TN) only be monitored in a well located adjacent to and hydraulically down gradient from the spray field. The TCW&SD and their design engineer have indicated that no studies were required to perform groundwater analyses or evaluate nutrient impacts on the Aquatic Preserve. This was confirmed after reviewing the FDEP construction permit for the existing WWTP and the current permit renewal application materials.

Mr. Gentry mentioned the construction of the existing WWTP is the first phase to provide wastewater service to Keaton Beach. Mr. Gentry also stated the following:

- The existing WWTP has capacity for 500 service connections.
- Phase II is planned to connect the community of Dekle Beach to the existing WWTP and will increase the total number of connections to the existing WWTP to approximately 440 services.
- Phase III is projected to expand the existing WWTP facility to provide service to the community of Fish Creek and may provide higher treatment capability for reclaimed water use.
- TCW&SD has a good relationship with Foley Timber and Land, the owners of property adjacent to the existing WWTP parcel.

- The existing WWTP was grant funded with conditions that expansion of the existing WWTP will be for existing development only.

Based upon the gathered information it is not feasible to expand the existing WWTP for the proposed development.

IV. Wastewater Flows

The proposed development will produce a wastewater flow of approximately 0.31 MGD. See Appendix F.3 for the estimated wastewater flows that will be generated from the proposed development. The total estimated wastewater flows for the proposed development will far exceed the approximate 60 connections that will remain at the existing WWTP after the Phase II connections come on-line.

Therefore, there will not be sufficient capacity at the existing WWTP to connect the subject development, after Phase II is completed.

V. New WWTP

Since it is not feasible to expand the existing WWTP for the proposed development, a new WWTP may be constructed adjacent to the existing WWTP. It is proposed that irrigation of the effluent onto a spray field, similar to the existing WWTP, will be utilized for discharging the effluent.

According to the Taylor County Property Appraiser office the existing WWTP is located on a 95.36 acre parcel. See Appendix F.4 for documentation showing the existing WWTP parcel, parcel number 08951200. The area of the existing WWTP site, including the treatment facility and the spray field is approximately 14.3 acres. Therefore, approximately 81.1 acres remains for a new WWTP site.

According to data from the National Resource and Conservation Service (NRCS) the soils adjacent to the existing WWTP spray field appear to be conducive to slow rate application of effluent onto a new spray irrigation field. See Appendix F.5 for soils information at the new WWTP site.

According to information from the Florida Land Use, Cover and Forms Classification (FLUCCS – FDOT 1999), the parcel owned by TCW&SD and the site of the existing WWTP appears to have no wetlands. See Appendix F.6 for wetland information at the new WWTP site. Wetland encroachment should not be an issue with constructing a new WWTP and spray field adjacent to the existing WWTP. The permitted plans for the construction of the existing WWTP show that gopher tortoises reside on the existing WWTP site. As part of the permitting process for a new WWTP an environmental assessment of the site will be performed.

According to the latest Federal Emergency Management Agency (FEMA) Floodplain Insurance Rate Map, there are no base floodplains at the new WWTP site. See Appendix F.7 for floodplain information at the new WWTP site.

A stormwater management system will be necessary for a new WWTP site design to obtain an Environmental Resource Permit (ERP) from FDEP.

Coordination with TCW&SD will be required to determine if a new WWTP will mesh with their planned phases. If the new WWTP is owned by TCW&SD, then the new and existing spray fields could be considered one system and may simplify groundwater monitoring requirements.

A hydrogeologic study should be performed during the permitting phase for the new WWTP to develop a groundwater model of mounding affects once the effluent is applied to refine the spray field sizing, and to verify if the selected treatment process will minimize water quality impacts to the Aquatic Preserve. The new WWTP should use the Advanced Wastewater Treatment (AWT) process which produces an effluent of higher quality than achieved by traditional secondary treatment processes. However, if a hydrogeologic study performed during the permitting phase for a new WWTP, determines that a secondary treatment level similar to the existing WWTP will not impact water quality in the Aquatic Preserve, then it may be constructed in lieu of an AWT plant.

According to FDEP regulations, Chapter 62-610.423, F.A.C., the recommended initial maximum annual average spray field application rate is two inches per week; the same application rate utilized for the design of the existing WWTP spray field. Higher rates can be provided if justified in the final engineering report on the basis hydraulic capacity of the soil-plant system, the existing quality and use of surface or ground water in the area, and other hydrogeologic conditions. Using the recommended two inches per week and the 0.3 MGD flows from the proposed development, a spray field for a new WWTP would require a 40 acre spray field, approximately.

Land applications systems (spray fields) are to maintain a distance of 100 feet from the edge of the wetted area to buildings that are not part of the treatment facility, utilities systems, or municipal operation; or to the site property line according to FDEP regulations, Chapter 62-610.421, F.A.C. According to the same regulation, the setback distance can also be reduced as follows.

- The setback distances can be reduced to 50 feet if the setback is vegetated with trees shrubs (landscaping) for a continuous visual barrier.
- The setback distances can be reduced to 50 feet if low trajectory, low pressure nozzles or surface application techniques are used within the outermost 50 feet of the application area.
- This distance can be further reduced to 25 feet if high-level disinfection is also provided.

For this planning exercise the 100 foot setback will be utilized to conceptually size a new spray field from the existing road right-of-way and property lines. It conceptually appears there is sufficient area within the remaining parcel where the existing WWTP is located, for a new WWTP. A graphic of a new WWTP site and spray field located adjacent to the existing WWTP site is provided in Appendix F.8.

VI. Water Quality Affects

Nitrogen removal in a WWTP spray field application generally follows three pathways: crop uptake, direct volatilization of nitrogen or ammonia gas, and denitrification. In addition, adsorption of nitrogen to soil particles takes place throughout the aquifer. Crop uptake is the primary source of nitrogen removal in wastewater effluent spray fields.

Using an effluent spray field application rate of 2 inches per acre per week and an effluent concentration of 3 mg/L of nitrogen, a total of 70 pounds of nitrogen will be applied to each acre of spray field annually. The U.S. Environmental Protection Agency (EPA) Process Design Manual titled "Land Application of Municipal Wastewater Effluents" (September 2006) indicates that properly maintained Bermudagrass, which is the crop proposed for the new WWTP spray field, typically takes up 300 pounds of nitrogen per acre per year. Due to crop uptake, volatilization from spray field application and denitrification within the shallow soils, it is expected that nitrogen concentrations should not increase in the aquifer as a result of the spray field application. Therefore, it is anticipated that the concentration of nitrogen in the groundwater from the new WWTP will not have an adverse impact on the Aquatic Preserve.

VII. WWTP Site and Recommendations

1. There will not be sufficient capacity at the existing WWTP to connect the subject development.
2. A hydrogeologic study should be performed during the permitting phase for the new WWTP to develop a groundwater model of mounding affects once the effluent is applied to refine the spray field sizing, and to verify if the selected treatment process will minimize water quality impacts to the Aquatic Preserve.
3. The new WWTP will use the Advanced Wastewater Treatment (AWT) process which produces an effluent of higher quality than achieved by traditional secondary treatment processes. However, if a hydrogeologic study performed during the permitting phase for a new WWTP, determines that a secondary treatment level similar to the existing WWTP will not impact water quality in the Aquatic Preserve, then it may be constructed in lieu of an AWT plant.
4. Conceptually, there is sufficient land area for a new WWTP and spray field on the existing parcel where the existing WWTP is located and owned by TCW&SD.