

**Wandendale Regional Wastewater Treatment and Disposal Facility
Coastal Zone Application
Part 6C: Environmental Offset Proposal**

The site consists of three previously identified parcels located within Delaware's Coastal Zone. The site currently consists of farmland and forested areas. Information on fertilizer application rates from 2003 to 2008 has been provided in the Deerfield Farm, Inc./Crop & Nutrient Report for Wandendale Farm. This information was used to determine that the average annual nitrogen and phosphorus loading of 11,610 and 6,690 pounds per year respectively is applied to these parcels through farming operations. Tidewater Environmental Services proposes to lease portions of the site for the treatment and disposal of wastewater.

The 3 million gallons per day (MGD) treatment facility will be designed with a pre and post anoxic biological nutrient removal (BNR) process, which will be designed to remove the total nitrogen (TN) and total phosphorus (TP) in the wastewater to less than 5 and 0.5 mg/l respectively. Chemical precipitation will be included to meet the TP target. The BNR process is followed by a membrane technology for biosolids separation. Rapid infiltration basins and spray irrigation will be used to recharge the underlying aquifer.

The PCS creates a built-in nutrient reduction mechanism for the Wandendale project. The nutrients in the wastewater associated with each new service connection are treated and removed by 90% (TN) and 96.8% (TP) before that wastewater is land applied. According to the PCS, the effluent from an existing, well-functioning small onsite wastewater treatment and disposal system (OWTDS) will be 50 and 15.7 mg/l TN and TP, respectively.

- Any large OWTDS (flow > 20,000 gpd) replacement systems must meet PSN2 (10 mg/l) and PSP1 (3.9 mg/l) if in an area with high phosphorous mobility potential, and
- Any large OWTDS (flow between 2,500 and 20,000 gpd) new systems must meet PSN2 (10 mg/l) and replacement systems PSN3 (20 mg/l), and
- Any new or replacement small OWTDS (flow less than or equal to 2,500 gpd) must meet PSN3 (20 mg/l), and
- Any innovative or alternative OWTDS with a flow less than or equal to 2,500 gpd, must meet PSN3 (20 mg/l.)

The following nutrient removal rates will be accomplished for each connection to Facility:

- For any new subdivision service connection, the Facility's effective removal rates will be 90% for TN and 96.8% for TP, and
- For any existing, small OWTDS, the Facility's effective removal rates will be 90% for TN and 96.8% for TP, and
- For any large OWTDS (flow > 20,000 gpd), the Facility's effective removal rates will be 80% for TN and 75 % for TP, and

- For any large replacement OWTDS (flow between 2,500 and 20,000 gpd), the Facility's effective removal rate will be 60% for TN, and
- For any replacement, innovative or alternative small OWTDS, the Facility's effective removal rate will be 60 % for TN.

The offsets are not necessary until there is a discharge to the Facility through a service connection. The offset occurs coincident with treatment and prior to discharge onto the land.

The resulting reduction in nutrient loading to the Inland Bays will mark a significant step toward water quality improvement. The offset amounts will be complimented by a combination of the following:

- Reduction of commercial fertilizer application by current operations
- Use of buffers around project site

Current nutrient loadings to the site have been compared with proposed conditions in Exhibit M.1, Nitrogen Offset Determination and Exhibit M.2, Phosphorus Offset Determination. The reduction in the amount of commercial fertilizer will be realized by not only the 15.42, 5.08 and 4.80 acres of farm field taken out of service for the construction of RIB A, Lagoon A and Lagoon B respectively (see Attachment H), but also in reduced application rates on remaining fields due to the 3-5 mg/l TN and the 0.5 mg/l TP in the wastewater disposal. The reduced commercial fertilizer application rates are difficult to quantify. The TN and TP reduction by taking 25.30 acres of farm field out of service based on historical commercial fertilizer application rates has been estimated to be approximately 1,916 and 981 pounds per year respectively.

All spray irrigation areas are surrounded by buffer zones ranging in width from 50 to 200 feet as can be seen on the Site Plan provided in Attachment H. The Inland Bays Pollution Control Strategy (April 2007) recommends the planting of additional buffers for nutrient reduction and protection of the bays. The Delaware Department of Natural Resources and Environmental Control (DNREC) developed a series of equations for the determination of nutrient reduction by the incorporation of buffers into a project. The DNREC Nutrient Loading Assessment Protocol Worksheet (Version July 15, 2007) was used to determine nitrogen and phosphorus offset of 843 and 37 pounds per year respectively by proposed buffers.