

Wastewater Treatment Plant ENR Upgrade

The existing Denton Wastewater Treatment Plant is currently undergoing the Enhanced Nutrient Removal upgrade to meet additional reductions of nutrient pollutants under the 2000 Chesapeake Bay Agreement. Upgrading sewage treatment plants for nutrient removal is one of the top environmental priorities of the federal government and the states comprising the Chesapeake Bay watershed.

The Chesapeake Bay, vital to the economy and quality of life in Maryland, has experienced a decline in water quality due mainly to excess nutrients flowing into the Bay and its tributaries. The bay suffers from algae growth that blocks sunlight, kills seabed grasses, and creates oxygen-depleted zones. The U.S. EPA and the state governments are working on plans to establish pollution caps for nitrogen, phosphorus, and sediment flow into the bay. Funds are being allocated to upgrade treatment plants to meet the criteria.

Sewage treatment systems first appeared in the United States in the mid-1800s. Initially, wastewater treatment plants collecting wastewater from homes, industries, and businesses simply had to achieve primary/physical treatment by providing screens, grit removal units, and settling tanks. This primary treatment succeeded in a 45 to 50% reduction of pollutants by eliminating easily removable materials. The Clean Water Act of 1972 established the National Pollutant Discharge Elimination System (NPDES), which permits and regulates all discharges to U.S. waterways. NPDES permits regulate discharges into navigable waters from all point sources of pollution, including industries, municipal wastewater treatment plants, sanitary landfills, large agricultural feedlots, and return irrigation flows.

Secondary treatment introduced the biological process in which microorganisms are used to metabolize and remove the organic material from the wastewater. Under carefully controlled conditions, the wastewater, microorganisms, and air are mixed. The microorganisms consume and break down the organic material, achieving 85-90% reduction in pollutants. As early as 1957, communities in Maryland received federal and State grants to upgrade their facilities with secondary treatment systems. However, secondary treatment was not required for most plants until the inception of the NPDES permit in 1972.

The Chesapeake Bay Agreement of 1983, signed by Maryland, Virginia, Pennsylvania, and the District of Columbia, specified a nutrient reduction goal of 40% by the year 2000. The Maryland Department of the Environment developed a strategy for achieving the desired reduction by the upgrade of the major 66 wastewater treatment plants, including Denton Wastewater Treatment Plant, to remove nitrogen through a process known as biological nutrient removal (BNR). Using the BNR process, more than 90% of pollutants are removed, while achieving nitrogen concentration below 8 milligrams per liter (mg/l) total nitrogen.

Recognizing that more needs to be done, the Chesapeake Bay 2000 Agreement requires additional reductions of nutrient pollutants entering the Bay from all sources including sewage treatment plants. The Maryland Department of the Environment is using the Bay Restoration Fund to upgrade with enhanced nutrient removal (ENR) technologies the 66 major wastewater treatment plants which discharge to the Chesapeake Bay. Once upgraded, these plants are expected to reduce nitrogen and phosphorus in the wastewater down to 3 mg/l total nitrogen and 0.3 mg/l total phosphorus, achieving approximately one-third of the needed reduction under the Chesapeake Bay 2000 Agreement. The ENR strategy builds on the success of the BNR removal program already in place.

The upgrade project at the Denton Wastewater Treatment Plant should be completed by July 2011.