

### HAVRE DE GRACE WASTEWATER TREATMENT PLANT HISTORY

- 1910** - The City's first collection system. A combined sanitary and storm water gravity-flow system discharging directly to the Susquehanna River with no treatment.
- 1967** - The first wastewater treatment plant using only primary treatment discharging into the Chesapeake Bay.
- 1986** - Secondary treatment is added to the existing plant along with storm flow control, sludge dewatering facilities, a lab and a composting facility for recycling sludge.
- 1997** - BNR added to the existing facility for nitrogen and phosphorous removal.
- 2010** - Completion of the ENR upgrade for the further reduction of ammonia, nitrogen, and phosphorous discharging into the Chesapeake Bay.



### **WASTEWATER TREATMENT PLANT OVERVIEW**

The Plant is located off of Jerry Foster Way in the South- western section of the City. The plant receives up to 1.7 million gallons per day, with a maximum design capacity of 3.3 million gallons, of wastewater generated from residential and commercial facilities.

#### **Head works**

The City's 16 pumping stations send the raw wastewater to the head works where non organic materials are removed from the waste stream. Removal is accomplished by the fine screens and the vortex grit removal system.

#### **Reactor**

The biological process begins with the reactor where the raw wastewater is introduced to the bio mass. The bio mass uses the raw waste as a food source and begins the removal of unwanted elements, such as nitrogen and ammonia. This process is continued in the post anoxic /reaeration basin.

#### **Clarifiers & Solids Handling**

Clarifiers allow solids to be settled out from the liquid. This allows sludge to be pumped from the bottom of the clarifiers back to the reactor to reseed the biological process, or excess can be removed to the digester system where more water is separated from the sludge by the centrifuges. The dried sludge is then mixed with wood chips to produce compost that can be land applied or distributed to the public.

#### **Filters**

The clear water leaves the clarifiers and goes to the continuous backwash filters where any remaining solids are captured and removed before disinfection.

#### **UV Disinfection**

From the filtration system the flow now goes to the UV disinfection system where UV light is used to break down any remaining pathogens before final discharge 1 mile offshore into the receiving waters of the Chesapeake Bay.

#### **Administration Building**

The administration building houses the SCADA (*supervisory control and data acquisition*) system, lab, and offices. The SCADA system allows the operations staff to monitor, control, and gather data to assist in the operation of the plant. The lab conducts testing for use in quality control and reporting to government agencies.

### **MISSION**

To protect public health and promote stewardship of the Chesapeake Bay, by collecting and delivering high-quality wastewater-treatment services in the most effective and efficient manner, meeting or exceeding all local, state and federal requirements.

### **VISION**

To be recognized, responsive, creative and flexible in managing and achieving operational excellence as the stewards of the Chesapeake Bay

### **SCOPE OF WORK**

The Clean Water Act of 1972 sets guidelines for the United States to help control and ultimately remove pollutants from our receiving, agricultural, industrial, and drinking water supplies. The Havre de Grace Waste Water Treatment Plant was upgraded in 2004 to meet the newly mandated BNR (Biological Nutrient Removal) requirements, as part of the Chesapeake Bay Agreement of 1983 which specified a goal of 40% nutrient reduction. This improvement was followed by a major facility expansion and process upgrade to include ENR (Enhanced Nutrient Removal), further reducing nitrogen and phosphorus from the effluent, or discharge water, leaving the treatment plant. These process improvements ensure the quality of the effluent will protect the drinking, recreational, and commercial water users of the Susquehanna River and Chesapeake Bay.

### **OPERATIONS**

The Havre de Grace Waste Water Treatment Plant (HDG WWTP) operates 24 hours a day, 7 days a week, and has operators on call after 5:00 p.m. and on weekends. Operators have control of the plant utilizing remote SCADA system capabilities. All operators are certified by the State of Maryland Department of the Environment with a Class 5A Wastewater Treatment License.

#### **Operator Responsibilities**

- Operations and preventive maintenance of the facility and pump stations
- Daily laboratory testing of plant process efficiency
- Continual bacteriological and chemical sampling of the distribution system
- Meeting Local, State & Federal regulations on effluent discharge

### **WASTEWATER TREATMENT PROCESS**

The City of Havre de Grace's National Pollutant Discharge Elimination System (NPDES) Permit contains effluent limits as well as reporting, record keeping, monitoring, testing, and post-treatment requirements.

- Wastewater enters the treatment plant through the City's force main, which is designed and built to collect and convey wastewater from homes, businesses and industries.
- In order to properly convey wastewater, the collection system is designed for a gravity flow of two to eight feet per second to keep solids suspended in the wastewater. This speed is dependent on many variables but the flow is designed to keep the wastewater from sitting still and becoming a health hazard to citizens. Sixteen Lift stations are used where gravity flow is not possible due to the topography of the land. Here in Havre de Grace there are three pumping stations, Main Pumping Station, Northwest Regional Pumping Station, Erie Street Pumping Station and thirteen lift stations.

#### **Components of a Wastewater Collection System**

- Pumping Stations - The city has pump stations located at specific areas that gravity sewers collect and feed. Each station uses either pneumatic or centrifugal pressure to move the wastewater to different gravity sewers that feed the Main Pumping Station or the Northwest Regional Pumping Station which force main directly to the HDG WWTP.
- Main Sewers - Are collectors for numerous lateral and branch sewers from a specific neighborhood and convey the wastewater to larger trunk sewer lines or lift stations.
- Lift Stations or Pump Stations - Are used in gravity sewer systems to lift (pump) wastewater to a higher elevation when the route followed by a gravity sewer would require the sewer to be laid at an insufficient slope or at an impractical depth.

## City of Havre de Grace – Waste Water Treatment Plant – Operating Procedures

Lift stations vary in size and type depending on the quantity of wastewater to be handled and the height it must be lifted.

### **Components of the Waste Water Treatment Plant**

- Upon entering the treatment plant, wastewater then goes through the Headworks treatment which removes grit, rags, plastics and large objects that could block pipes or damage equipment. The system is cleaned periodically with automated mechanical Step-Screens and by hand. The material removed is drawn through a conveyer and compressed then taken to the landfill.
- Secondary Treatment - The wastewater is treated through an activated sludge process in which biological organisms are used to clean the wastewater to a quality that meets state permit regulations.
- The process principle is to biologically convert pollutants that will not settle into substances that will settle. The wastewater is mixed with activated sludge in a large aeration basin called an Orbal. Mechanical rotors with large plastic aerators are used to provide the bacteria and other micro-organisms with enough oxygen to support the designated biological process in the wastewater. In fact, the bacteria "eat" organic matter in the wastewater. The process is controlled to minimize biological exhaustion but significantly reduce organic material.
- Dissolved and suspended impurities in the wastewater are incorporated into the activated sludge floc through adsorption (when solids stick to the surface of the bacteria) and absorption (when dissolved gases and solids are taken into the bacteria where they can be assimilated) by the micro-organisms.
- The mixture of activated sludge from the aeration basin is transferred to Final Clarifiers, where gravity separates the bio-mass from the wastewater.
- The settled activated sludge is returned to the aeration basin to continue the treatment process. Scum floating on the surface of the final clarifier is recycled back to the plant for treatment and removal.
- Passing from the Weirs the clarified wastewater goes into Tertiary treatment where the water is "scrubbed" with continuous backwash sand filters to remove fine particulates. The cleanest water is carried to Ultra Violet Disinfection and discharged to the Chesapeake Bay. The backwash or dirty water heads back to the head of the plant to be recycled for treatment. A relatively small amount of the effluent is charged in the Plant's water system. The Plant reuses this water for cleaning and other non-potable water needs.
- Odor Control - Most of the odors detected at a HDG WWTP have a rotten egg smell that indicates the presence of sulfur and may include hydrogen sulfide and mercaptans. Some of the City's pumping stations have biological and mechanical odor control systems to help prevent nuisance odors to the public. Other odors are characterized as fishy or pungent and may include materials containing ammonia. All of these compounds are naturally occurring and are detectable by the human nose at extremely

low

concentrations.

### **WASTEWATER TREATMENT PLANT OPERATIONS TEAM**

Each member of the Operations Team is required to hold a License for their specific assignment. Continuing education is a regular part of their responsibilities. License renewals are required every 3 years. The HDG WWTP staff has considerable experience as outlined below.

Superintendent - Superintendent's Class 5A Wastewater Treatment License  
13 years Water and Wastewater Experience

Maintenance Foreman – Class 5A Wastewater Class 5A Wastewater Treatment License  
23 years Wastewater Experience – Limited License Electrician

Lab Manager – Chemist  
28 years Controlled Lab testing and Equipment Experience

Pre-Treatment Coordinator – Class 5A Wastewater Treatment License  
16 years Wastewater and Composting Experience

Operations – All operators Class 5A Wastewater Treatment License  
10-20+ years Wastewater Experience Individually