



## DEPARTMENT OF PUBLIC WORKS

**Project:** Wastewater Treatment Facility Tertiary Upgrades

**Contact Person:** Lorraine Sander, Wastewater Superintendent

In June of 2006 the Town of Billerica retained Woodard & Curran to design upgrades to the 5.4 MGD municipal Wastewater Treatment Facility required to meet a 0.2 mg/L effluent phosphorus limit imposed jointly by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) through the Town's NPDES permit. The project was consistent with the Town's Comprehensive Plant Evaluation (CPE) in parallel with the conceptual design which provided the Town with their first long-term capital improvement plan for the facility.

### Phosphorus Removal Planning

When the Town received their new NPDES permit containing the 0.2 mg/L effluent phosphorus limit, it was determined that we should be planning for even lower limits in the future. The Town designed an upgrade that would allow us to meet the current permit but be flexible enough to treat to even lower limits in the future. This sets the Town up for success now and for the future.

Woodard & Curran worked closely with Town, State, and Federal Regulators to craft a project that met the needs of all parties and complied as closely as possible with the regulatory compliance schedule set forth in the NPDES permit. Working together with the Town's financial team, MassDEP, and state Clean Water Revolving Fund officials, the Town was able to secure a 2% loan for the full value of the construction (\$10.8 million) and has been awarded loan forgiveness for a portion of the construction value through the American Recovery and Reinvestment Act.



*Diversion and Flow Control Structure*

### Technology Selection

Many cutting-edge phosphorus removal strategies were evaluated and it was determined that the CoMag process by Cambridge Water Technology was the best choice for Billerica. The technology is a ballasted flocculation process consisting of chemical conditioning of the wastewater in reaction tanks followed by magnetite enhanced settling in traditional clarifiers. The process allows for treatment of a large flow of wastewater in a small volume of tanks, thereby reducing the process footprint and saving cost. The small footprint was critical in Billerica since there is very limited available space. An electromagnetic filter can be added in

the future to reach lower effluent phosphorus values to the current limit of technology for removal of phosphorus.



***Reaction Tank Piping***

Pilot testing of the CoMag process coupled with operating data from another nearby full-scale installation confirmed that the process would meet Billerica's needs and fulfill their obligations under the NPDES program.

### **Tertiary Upgrade**

The project is now under construction and expected to be up and running in the summer 2010.

Upgrades to the WWTF include new concrete reaction tanks, conversion of sludge holding tanks into settling tanks, 16.5 MGD peak flow pump station, chemical storage and feed systems, magnetite separation system, two 30-foot diameter gravity thickeners, vector truck unloading area, and a new SCADA system which will provide a level of process control currently unavailable at the plant. The SCADA system will allow the Town to upgrade the pump station monitoring system to alleviate long time alarming problems as well as remotely monitor key processes at the plant.

The project is one of the first of its kind and when complete, will provide highly treated wastewater to assure that the Town is doing their part to keep the Concord River clean. This is one of the key priorities of the Town's Comprehensive Wastewater Management Plan (CWMP) currently being completed by the Town.

### **Construction**

The Construction Contract was awarded to Waterline Industries in December 2008 for \$8,932,777 and is now underway. At this point the project is approximately 53% complete. The demolition in the sludge buildings has been completed. The gravity thickener diversion structure and the tertiary reaction tanks are complete. The installation of the yard piping is almost complete.



*Waste Activated Sludge Pumps*



*Tertiary Reaction Tanks*

Gravity thickeners have been installed and should be up and running by the end of November. The SCADA system is currently being installed. The projected completion date is August 2010.



*Gravity Thickener and Piping Installation*