Wastewater Treatment Facility Upgrades

Bensenville

July, 8 2017

Open House

How this Project was Funded

The approximately $30 million project was financed through the Illinois Environmental Protection Agency (IEPA) Water Quality Revolving Loan Program with a low interest loan and favorable financing terms of 1.93 percent interest over the 20-year life of the loan. The $1.3 million received in grant funding allowed the Village to complete this project without placing any additional financial burden on our residents.

The IEPA extended a grant of nearly $765,000 as principal forgiveness on the loan and in addition to the IEPA grant, the Village was successful in obtaining nearly $500,000 in energy efficiency grants through the Department of Commerce and Economic Opportunity (DCEO) and Illinois Clean Energy (ICE) Program.

Saving Taxpayer Dollars While Improving Environmental Efficiency.

The $30 million Wastewater Treatment Facility Upgrade was the largest utility project ever completed in the Village and will provide our residents with reliable wastewater treatment service for years to come.

Planning for this project began in 2012 with a Facilities Plan that focused on assessing the condition of a plant that had gone through numerous upgrades over its 70-year life. The new state-of-the-art facility has increased wet weather capacity to 12 MGD, reduced operational costs by 20%, provides a more sustainable energy consumption plan, and implemented a biological nutrient removal component to address the inevitable permit limitations on phosphorus. Together these upgrades meet the future development needs of our municipality, which is planning for large commercial and industrial expansion, while improving water quality on the receiving streams and creeks.

The new plant has been streamlined to eight major treatment steps and one digestion process. This “back-to-the-basics” approach yielded a plant with lower capital, operational, and maintenance costs while also providing simplified operations, easier maintenance, and improved flexibility. We are estimating an annual operational cost savings of approximately $400,000.

“As a result of this project, the Village of Bensenville (Wastewater Treatment Facility) expects to see its annual operating expenses to decrease 20%, saving taxpayer dollars while improving environmental efficiency. …The new facility will help promote energy efficiency and sustainability in the Village.”- Lieutenant Governor Evelyn Sanguinetti.

The project included converting tankage previously used for aeration, final clarification, and aerobic digestion into facilities for biological nutrient removal. This project highlights how a relatively complex, aging treatment plant can simplify process steps by 31 percent to reduce maintenance and energy requirements, all while repurposing existing infrastructure to reduce construction costs and environmental impacts.

In addition, the plant is no longer challenged with 25-plus sanitary sewer overflows that occurred annually and is also a model for other communities looking to implement biological nutrient removal (BNR). Bensenville is one of the first full-scale facilities implementing BNR technology in Illinois.

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Forward Flow Process

Start: **Influent flow enters** the plant from three directions and converges into one stream.

1 Screening–Wastewater generated in the Village of Bensenville is conveyed to the plant through three plant influent sewers. The wastewater enters the treatment facility headworks and flows to one of two mechanical fine screens where coarse solids (“rags”) are removed. Each screen discharges the removed screenings into its respective wash press. The wash presses remove the treatable organics before conveying this material to a dumpster where they will await landfill disposal.

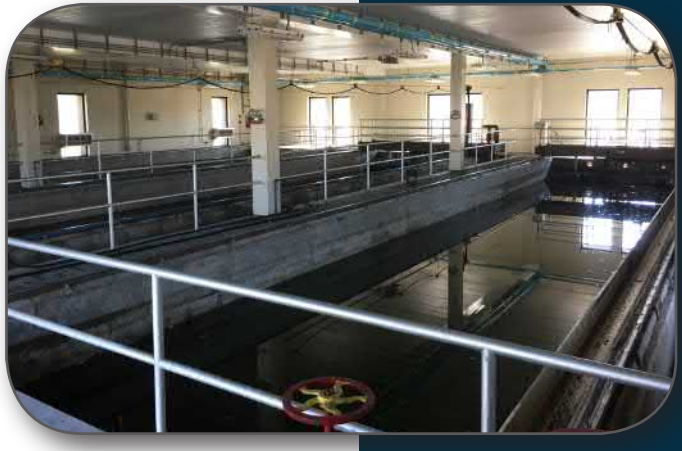
2 Grit Removal–Wastewater flows from the mechanical screens through channels to the vortex style grit tank. Coarse inorganic material is removed in the grit tank. This material is not amenable to further treatment and may cause damage, excessive wear, or otherwise impair the performance of downstream processes. The grit tank has a grit pump that is used to pump the grit from the bottom of the grit tank to the grit washer. The grit washer separates the water and organics that are pumped with the grit and produce a cleaner, dryer grit. An auger on the grit washer conveys the grit to a dumpster where it will await landfill disposal. After grit removal, the raw wastewater is sampled.

3 Influent Pumping Systems–The Bensenville WWTP employs up to four screw pumps to lift the influent wastewater to a higher elevation after preliminary treatment so it flows by gravity through the rest of the treatment plant.

4 Activated Sludge–The activated sludge treatment system consists of two aeration tank trains with anaerobic, anoxic, and aerobic zones. Wastewater is combined with return activated sludge (RAS) to form mixed liquor (ML) before entering the two trains. An anaerobic and an anoxic zone are incorporated into the system design to allow for biological phosphorus removal and nitrogen removal (conversion of nitrate to nitrogen gas) resulting in reduction in the phosphorus and total nitrogen discharged from the facility. Air is provided to the aerated zones with blowers and fine bubble diffusers. The anaerobic and anoxic zones are mixed with floating surface mixers.

5 Final Clarification and RAS Pumping–Following the activated sludge process, the ML flows to the Mixed Liquor Division Box, which controls flow to each of the two final clarifiers. The clarifiers use quiescent conditions to allow the biological solids to settle from the water. Solids separated in this process are pumped from the bottom of these tanks and returned to the activated sludge process or wasted as biosolids.

6 Tertiary Filtration–The treated secondary effluent flows by gravity from the clarifiers to the tertiary sand filters. This process further removes suspended solids from the clarified effluent. Effluent from the tertiary filters then flows through the effluent flow metering Parshall flume.



7 Disinfection–From the Parshall flume the flow continues into the chlorine contact tank. This process kills any bacteria that remains in the effluent stream. The effluent is then dechlorinated before flowing by gravity into Addison Creek.

8 Excess Flow and Flow Equalization Tank–Excess flow is diverted to an excess flow and flow equalization tank. This tanks allows temporary storage and partial treatment during wet weather events.

Plant Overview

Screening

Grit Removal

Influent Pumping

Activated Sludge

Biological Nutrient Removal Zones

Tertiary Filtration

Excess Flow and Flow Equalization Tank

Biosolids Storage

Biosolids Thickening and Dewatering

Aerobic Digester

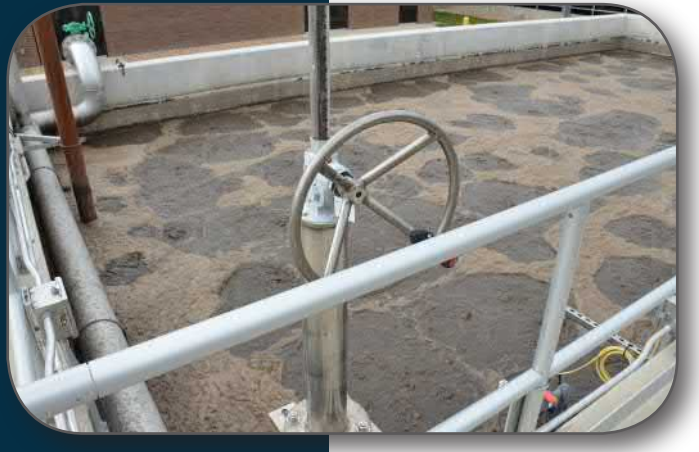
Final Clarification

Disinfection (Chlorine Contact Tank)

Excess Flow Chlorine Contact Tank

Biosolids Process

1 Sludge Thickening–Biosolids removed from the activated sludge system may be thickened using a gravity belt thickener. Thickened sludge is then pumped to the aerobic digesters. This reduction in excess water allows for more efficient digestion process sizing and a more cost effective process.



2 Biosolids Stabilization–Biosolids removed from the activated sludge system are stabilized through an aerobic digestion process to achieve volatile solids and pathogen reduction. This stabilization creates a by-product valuable as a fertilizer rich in nutrients and organic matter.

3 Biosolids Dewatering and Storage–Stabilized biosolids are dewatered by the belt filter press. Also used as a thickener as shown in the first biosolids step (above), the "combination" unit can dewater the biosolids. Dewatering solids removes water to improve fertilizer value and reduce hauling costs. These biosolids can then be stacked, resembling potting soil.

A Multiple Award Winning Project Brings Pride to the Community

2017 APWA IL Chicago Metro
Project of the Year Award

2017 APWA IL Suburban Branch
Project of the Year Award

2017 ACEC Illinois Excellence
Special Achievement Award

Fun Facts about the Plant

- New high speed turbo blowers and automatic controls have reduced electrical use by nearly 150,000 kWh per month!

- Modifications to the treatment system enhance phosphorus removal, resulting in reduced energy use, while removing approximately 500 lbs of phosphorus in the plant effluent weekly. Being proactive, by having these processes in place, positions the Village to address impending future phosphorus removal requirements. Why is this important?– Phosphorus removal is a growing environmental concern as it causes excess algae growth in bodies of water when levels are too high. For the Village, reduced phosphorus discharge benefits Addison Creek and downstream water.

Acknowledgments

Village Officials at Project Approval

- Frank Soto, Village President
- Ilsa Rivera-Trujillo, Village Clerk
- Morris Bartlett, Trustee
- Susan Janowiak,Trustee
- Robert Jarecki, Trustee
- Martin O'Connell, Trustee
- JoEllen Ridder, Trustee
- Henry Wesseller, Trustee
- Michael Cassady, Village Manager
- Joseph Caracci, Director of Public Works
- Mark Swayne, Wastewater Supervisor

Ground Breaking Ceremony
June 19, 2014

Ribbon Cutting Ceremony
October 27, 2016

Village Officials at Project Completion

- Frank DeSimone, Village President
- Nancy Quinn, Village Clerk
- Rosa Carmona, Trustee
- Ann Franz, Trustee
- Annie Jaworska, Trustee
- McLane Lomax, Trustee
- Nicholas Panicola, Jr., Trustee
- Armando Perez, Trustee
- Evan Summers, Village Manager
- Joseph Caracci, Director of Public Works
- Mark Swayne, Wastewater Supervisor

2017 Village Officials

Bensenville's Public Works Department

The Bensenville Public Works Department provides essential services to plan, design, construct, maintain, repair, manage and operate Bensenville's buildings, facilities, public infrastructure, natural resources, and park and highway systems in a manner that provides the best value and highest quality service available to satisfy the needs of our residents.

The department works to provide efficient, effective, high quality, constantly improving services to our residents through the coordinated resources and expertise of the Public Works staff.

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