Glenbard Wastewater Authority
WASTEWATER TREATMENT PLANT

GLENBARD WASTEWATER AUTHORITY

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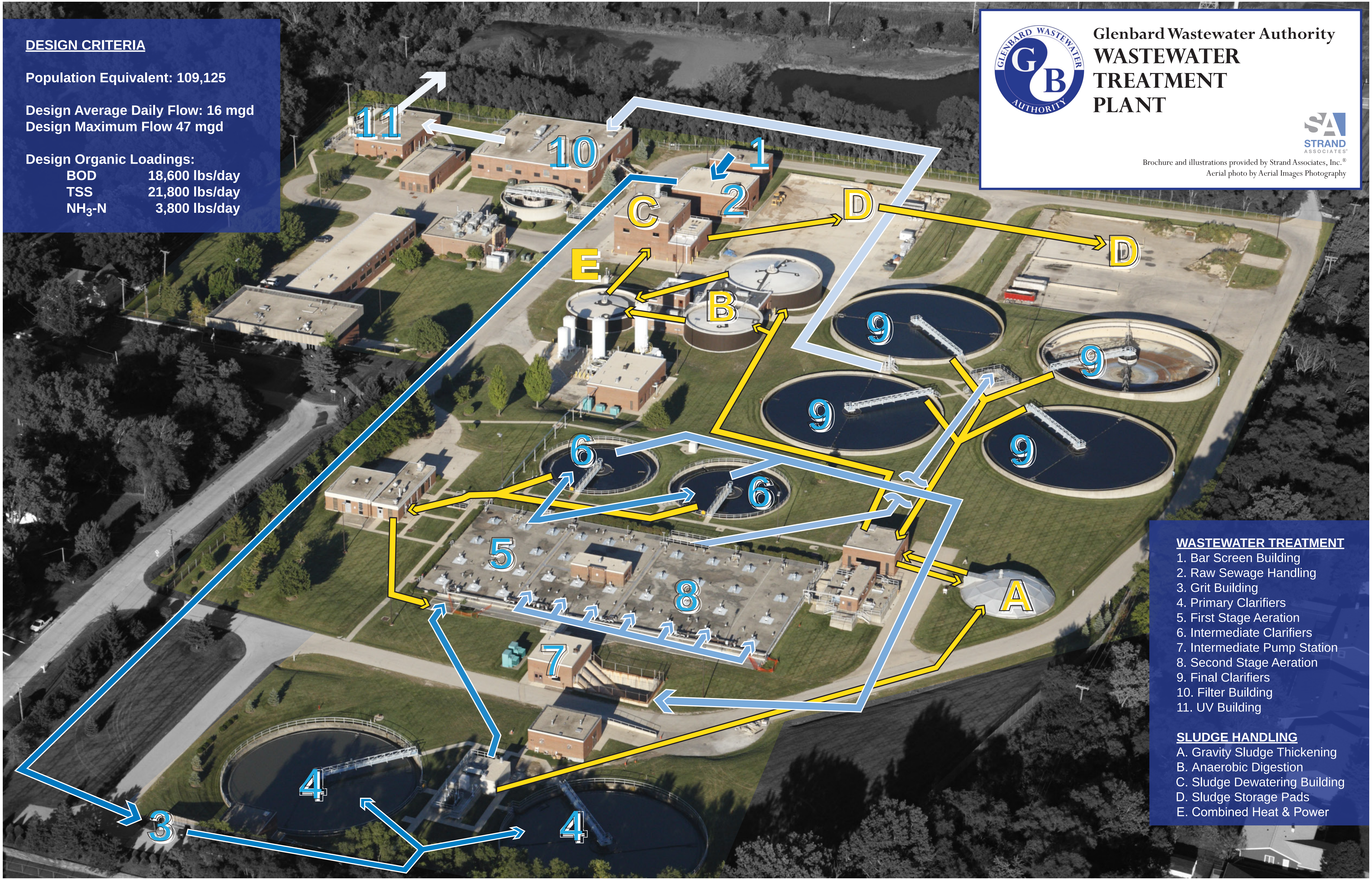
DESIGN CRITERIA

Population Equivalent: 109,125

Design Average Daily Flow: 16 mgd
Design Maximum Flow 47 mgd

Design Organic Loadings:

BOD	**18,600 lbs/day**
TSS	**21,800 lbs/day**
NH_3-N	**3,800 lbs/day**



WASTEWATER TREATMENT
1. Bar Screen Building
2. Raw Sewage Handling
3. Grit Building
4. Primary Clarifiers
5. First Stage Aeration
6. Intermediate Clarifiers
7. Intermediate Pump Station
8. Second Stage Aeration
9. Final Clarifiers
10. Filter Building
11. UV Building

SLUDGE HANDLING

A. Gravity Sludge Thickening
B. Anaerobic Digestion
C. Sludge Dewatering Building
D. Sludge Storage Pads
E. Combined Heat & Power

CONVEYANCE AND PRELIMINARY TREATMENT

Collection System

Glenbard Wastewater Authority (GWA) owns and maintains several major interceptors, which include the North Regional Interceptor (NRI) and the South Regional Interceptor (SRI). These interceptors are large-diameter underground pipes that convey wastewater by gravity from the Villages of Glen Ellyn and Lombard and adjacent unincorporated areas to GWA's main treatment facility. GWA owns and maintains five collection system pumping stations: St. Charles Road (pictured), Hill Avenue, Sunny Side, Valley View, and SRI Pump Stations. GWA also operates and maintains a Combined Sewage Treatment Facility, located on Hill Avenue, just west of Interstate-355, which receives peak wet-weather flows from a portion of the Village of Lombard.

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Bar Screening and Raw Sewage Handling

Wastewater first flows through two automatic bar screens (large metal racks with parallel vertical bars) to remove debris such as trash, plastic materials, and rags. The debris is removed from the screens, compacted, and disposed in a landfill. Removing these materials upfront improves plant performance and reduces maintenance.

Three large pumps lift screened wastewater so that it can flow by gravity through the rest of the plant. Pumps are operated with variable frequency drives that allow the pumps to run at different speeds depending on the flow of wastewater entering the plant. Typically, the lowest flows occur at night and during the very early morning hours with higher flows observed in midmorning and late afternoon. Very high flows typically occur during and after rain events. The pumps are capable of pumping up to 50 million gallons per day of wastewater through the treatment facility.

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Grit Building

The grit system contains circular vortex tanks where heavier particles settle out and lighter organic material is kept in suspension. Grit is normally comprised of sand, silt, coffee grounds, egg shells, and similar heavy materials. Grit is removed to avoid accumulation in downstream tanks and clarifiers, prevent wear on pumps, and keep pipes from clogging. The grit is compacted and landfilled along with the screenings.

PRIMARY AND INTERMEDIATE TREATMENT

4

Primary Clarifiers

Two circular primary clarifiers are used to remove heavier organic solids from the wastewater through a simple sedimentation process. In addition, oil, grease, and lighter solids float to the surface of the clarifiers and are skimmed off. The skimmed material (primary scum) and settled solids (primary sludge) are pumped to sludge treatment processes, and the remaining water, referred to as primary effluent, flows by gravity to the first-stage aeration tanks.

5

First-Stage Carbonaceous Aeration Tank (Carbo)

The two Carbo tanks remove dissolved organic material from the wastewater. Bacteria and other microbes are grown in these tanks and convert the organic matter in the wastewater into energy and more microbes. Similar to humans, the microbes need oxygen to live. High purity oxygen is generated on-site with a Cryogenic Oxygen Plant that removes nitrogen out of the air and distributes 96 percent pure oxygen into the covered Carbo Tanks.

6

Intermediate Clarifiers

Two intermediate circular clarifiers separate the microorganisms and other solids leaving the Carbo tanks from the cleaner wastewater. The solids settle to the bottom of the clarifier. A portion of these settled microorganisms are returned to the Carbo tanks to continue treating the wastewater. A portion of the settled solids from these tanks is pumped to sludge treatment processes. The wastewater continues through to a second aeration stage for further processing and ammonia removal.

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Intermediate Pump Station and Second-Stage Nitrification Aeration Tanks (Nitro)

At the intermediate pump station, the clarified wastewater from the intermediate clarifiers and Nitro return activated sludge (RAS) are blended and pumped to the eight Nitro tanks. This intermediate station has three large screw pumps to lift the wastewater.

Within the second-stage aeration tanks, more bacteria and other microbes are grown to remove ammonia, which can be toxic to fish and other organisms in the receiving stream. By the time the wastewater flows out of the Nitro tanks, nearly all the dissolved organic compounds and ammonia have been converted to solids in the form of bacteria and other microbes. Pure oxygen is also distributed into these covered tanks to promote the biological treatment process.

FINAL TREATMENT

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Final Clarifiers

Microorganisms that grow in the Nitro tanks settle to the bottom of the four final clarifiers and are either returned to the Nitro tanks or pumped to the sludge treatment processes. At this point in the process, nearly all the organic material, ammonia, and solids have been removed from the wastewater.

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Filter Building and UV Light Treatment Building

The wastewater flows through filters to remove any remaining solids that pass through the final clarifiers.

The final stage of treatment uses ultraviolet light (UV) to disinfect the wastewater before it is discharged into the East Branch of the DuPage River. The UV system inactivates bacteria, viruses, and other disease-causing pathogens, making them unable to grow and reproduce in the receiving water.

SLUDGE HANDLING

A

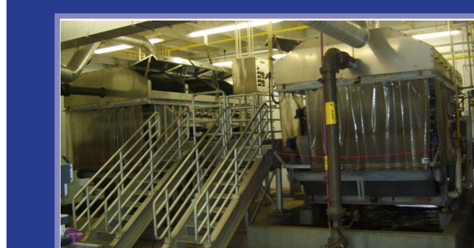
Sludge Thickener

Heavy sludge removed from the clarifier tanks (sludge) is combined in the gravity thickener. A gravity thickener is similar to the clarifiers and provides a quiescent zone to concentrate the sludge (remove excess water). Generally, the sludge volume is decreased to about half the original volume through this process.

B

Anaerobic Digesters

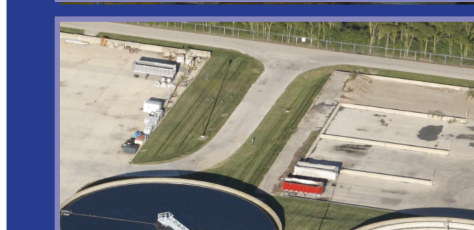
Anaerobic digestion is used to stabilize the concentrated sludge. Stabilization refers to the destruction of disease-causing microbes. The digesters mix and heat the solids in the absence of oxygen. The microorganisms break down the solid material and produce stable biosolids and methane gas. The methane gas is captured and used as fuel in the boilers to heat the digesters, and as fuel to run the Combined Heat & Power engines, which decreases the plant's energy footprint. Any excess methane gas is burned in a flare.



C

Biosolids Dewatering Building

The biosolids still contain a significant amount of water that needs to be removed to reduce the total volume of biosolids to be disposed. The biosolids are first treated with a small amount of polymer to bridge sludge particles together and separate them from the water. The solids are then mechanically pressed between two belts to squeeze out excess water.



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Biosolids Storage Pads

Digested and dewatered biosolids are a great fertilizer, which is rich in nitrogen, phosphorus, and organic matter. It is stored on concrete pads before application on nearby agricultural land.

E

Combined Heat & Power

Two internal combustion engines use methane gas generated by the Anaerobic Digesters to generate up to 375kW each. The excess heat off the engines then is used to heat the Anaerobic Digesters in lieu of boilers. This is an efficient method of using renewable energy, and excellent example of resource recovery.

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