ALLIANCE WASTEWATER TREATMENT PLANT HISTORY

The City of Alliance is located in eastern Stark County. The Wastewater Treatment Plant is located at 12251 Rockhill Avenue, NE, and it treats domestic, commercial and industrial wastewater from the City and surrounding areas. The final effluent is discharged into the Mahoning River at the head works of Berlin Reservoir.

The most recent major upgrade was completed in late 1984. The two digesters, one primary tank (now the gravity thickener), the chlorine feed building and contact tank, the old Administration building (now the Maintenance Department) and the old filter building (now the scum concentrator building), were all renovated. All other existing process units were demolished.

Wastewater treatment in Alliance goes back to 1895 with the original plant located on Keystone Street. Due to rapid population growth and the need for additional treatment facilities, a larder plant was built in 1929 on the site of the present treatment plant.

The raw wastewater was screened to remove large solids. Imhoff tanks provided primary settling and anaerobic digestion. The secondary treatment was provided by two trickling filter beds. Final settling followed in two tanks. Digested sludge was dried in nine glass covered drying beds.

Since 1984 several improvements have been made. Influent flow metering was installed in 1995. In 1996, dechlorination equipment was added, a chemical feed building was built and the flow equalization basin was updated by installing a high density polyethylene liner. In 1998, one of the small return activated sludge pumps was replaced with a larger pump.

Over the years, the 1929 plant was modified and improved upon to replace worn or outdated equipment. New facilities were also added as treatment needs changed.

In 2002, the comminutors were replaced with automatically cleaned fine screens. In 2008, the screw lift pumps were replaced with submersible pumps. In 2010, the City began to install a SCADA system.

In 1943, the screening and grit removal facilities were renovated, and the trickling filters modified. In 1953, a fifty foot diameter anaerobic digester was built. In 1958, two fifty foot primary settling tanks, a second anaerobic digester, nine new sludge beds and a vacuum filter were added. In 1970 chlorination facilities were completed.

The City of Alliance will continue to upgrade the wastewater treatment plant to meet the ever changing needs of our community and to comply with current and future environmental regulations.

PRELIMINARY TREATMENT

Preliminary treatment consists of automatically cleaned fine screens followed by aerated grit removal tanks. The materials removed from the screens and grit tanks are hauled away to an approved landfill.

PRIMARY TREATMENT

Raw influent pumps lift the wastewater up to the primary distribution center. The primary clarifiers perform two functions. The heavier sludge settles to the bottom and is pumped to the solids handling facilities for further treatment. The floating material is skimmed off the tank surface, pumped to the scum concentrator and disposed of in a sanitary landfill.

FLOW EQUALIZATION BASIN

Settled wastewater from the primary clarifiers passes through the flow equalization basin. This basin is designed to control the rate of flow to the secondary treatment system and retain storm water until it can be treated.

SECONDARY TREATMENT

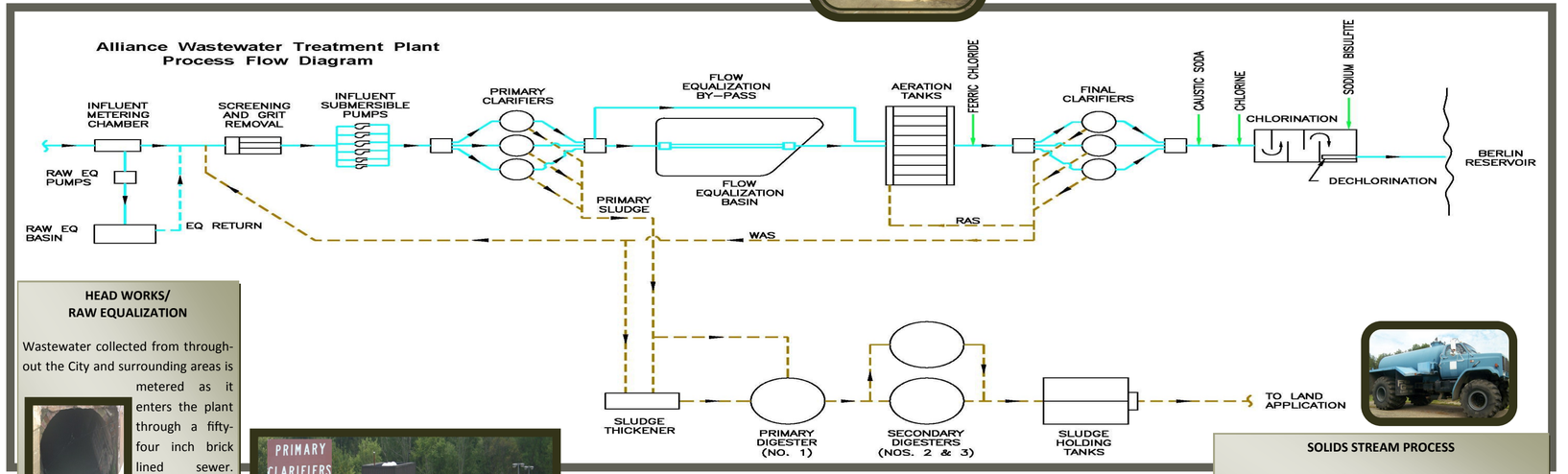
Effluent from the equalization basin is mixed with the return activated sludge (RAS) before it enters the aeration tanks. In the aeration tanks, the activated sludge converts the soluble and non-settleable organic matter into a settleable state. Blowers provide the oxygen necessary for the micro-organisms to survive and to keep the aeration tanks well mixed.

SECONDARY CLARIFICATION

Ferric Chloride is added to enhance phosphorus removal. Mixed liquor flows to three Secondary (Final) Clarifiers for settling. The activated sludge is returned back to the head of the aeration tanks or wasted to the solids handling facility. Caustic soda is added to the effluent of the clarifiers to raise the pH.

CHLORINATION/ DECHLORINATION

Chlorine is used for disinfection. Sodium bisulfite is used to reduce the chlorine residual before discharging to the receiving stream.

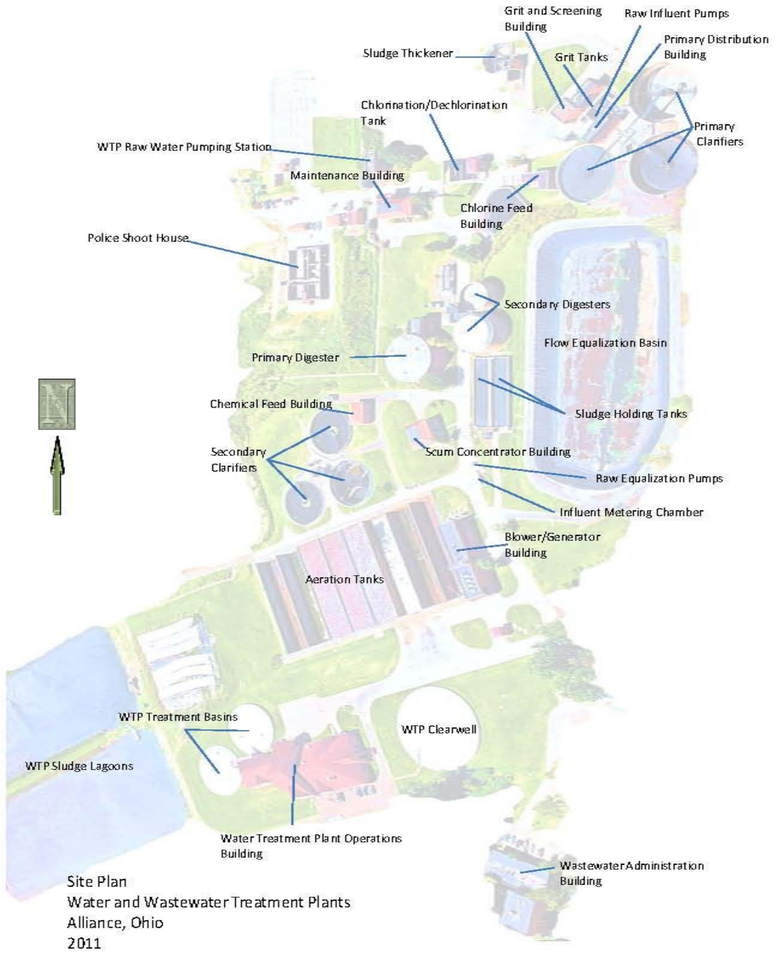


HEAD WORKS/ RAW EQUALIZATION

Wastewater collected from throughout the City and surrounding areas is metered as it enters the plant through a fifty-four inch brick lined sewer. Influent flows greater than 32 MGD are diverted to the Raw Equalization pump station where it is pumped to the Raw Equalization basins for treatment later.

SOLIDS STREAM PROCESS

Raw sludge removed from the primary clarifiers is either pumped directly to the primary anaerobic digester or to the sludge thickener tank first. In the digester the sludge is mixed and heated to ninety-five degrees Fahrenheit to reduce the volatile solids. The sludge is transferred to one of the two secondary digesters for further stabilization and for separation of the water and sludge. The concentrated sludge is withdrawn to one of the sludge holding tanks for further separation of the water and the sludge and for storage until it is land applied.



Site Plan
Water and Wastewater Treatment Plants
Alliance, Ohio
2011

DESIGN DATA

Plant Capacities
- Design Capacity ..... 7.5 MGD
- Maximum hydraulic capacity
  - prior to flow equalization ..... 32 MGD
  - after flow equalization ..... 19 MGD

Raw Influent Flow Equalization
- EQ Pumps (3) ..... 2.8 MGD each
- Storage ..... 2.0 MG

Influent Screens (2)
- Width ..... 48 inches
- Hydraulic Capacity ..... 16 MGD each

Grit Tanks (3)
- Dimensions ..... 18' W X 21' L X 10' SWD
- Volume ..... 28,000 gallons each
- Detention Time @ 16 MGD each ..... 2.5 minutes

Raw Influent Pumps (6)
- Lift ..... 25 feet
- 45 hp pumps (2) ..... 2.5 – 5.0 MGD
- 70 hp pumps (4) ..... 5.0 – 8.0 MGD

Primary Clarifiers (3)
- Dimensions ..... 100' diameter X 15' SWD
- Volume ..... 842,000 gallons each
- Surface Overflow Rate
  - average ..... 477 gpd/square foot
  - maximum ..... 1360 gpd/square foot
- Detention time @ 3.75 MGD each ..... 5.33 hours
- Detention time @ 10.67 MGD each ..... 1.9 hours

Flow Equalization Basin
- Dimensions ..... 223' X 448' X 9' SWD
- Volume ..... 4.67 MG

Aeration Tanks (8); 3 tanks in use
- Dimensions ..... 50' X 200' X 13' SWD
- Volume ..... 972,000 gallons each
- Detention time @ 2.5 MGD each ..... 9.33 hours
- Detention time @ 6.33 MGD each ..... 3.68 hours

Centrifugal Blowers (4)
- Capacity ..... 4200 cfm each @ 7 psig
- Motor horsepower ..... 200 hp

Secondary Clarifiers (3)
- Dimensions ..... 90' diameter X 12' SWD
- Volume ..... 571,000 gallons each
- Surface Overflow Rate
  - average ..... 393 gpd/square foot
  - maximum ..... 995 gpd/square foot
- Detention Time @ 2.5 MGD each ..... 5.5 hours
- Detention Time @ 6.33 MGD each ..... 2.2 hours

Chemical Feed
- Ferric Chloride Storage ..... 6500 gallons
  - Feed Pumps (2) ..... 0-317 gallons per day each
- Caustic Soda Storage ..... 6500 gallons
  - Feed Pumps (2) ..... 0-317 gallons per day each

Chlorination Tank
- Dimensions ..... 40' X 65' X 12' SWD
- Volume ..... 233,000 gallons
- Detention Time @ 7.5 MGD ..... 45 minutes
- Detention Time @ 19 MGD ..... 18 minutes

Dechlorination Tank
- Sodium Bisulfite Storage Tanks (2) ..... 260 gallons each
- Feed pumps (2) ..... 0-18 gallons/day each

Sludge Thickener
- Dimensions ..... 50' diameter X 10' SWD
- Volume ..... 147,000 gallons

Primary Digester Number 1
- Dimensions ..... 85' diameter X 27' SWD
- Volume ..... 1,146,000 gallons

Secondary Digester Number 2
- Dimensions ..... 65' diameter X 24' SWD
- Volume ..... 596,000 gallons

Secondary Digester Number 3
- Dimensions ..... 50' diameter X 25' SWD
- Volume ..... 367,000 gallons

Sludge Holding Tanks (2)
- Dimensions ..... 30' W X 125.5' L X 14' SWD
- Volume ..... 433,000 gallons each

City of Alliance Wastewater Treatment Plant

The City of Alliance, Ohio
"The Carnation City"