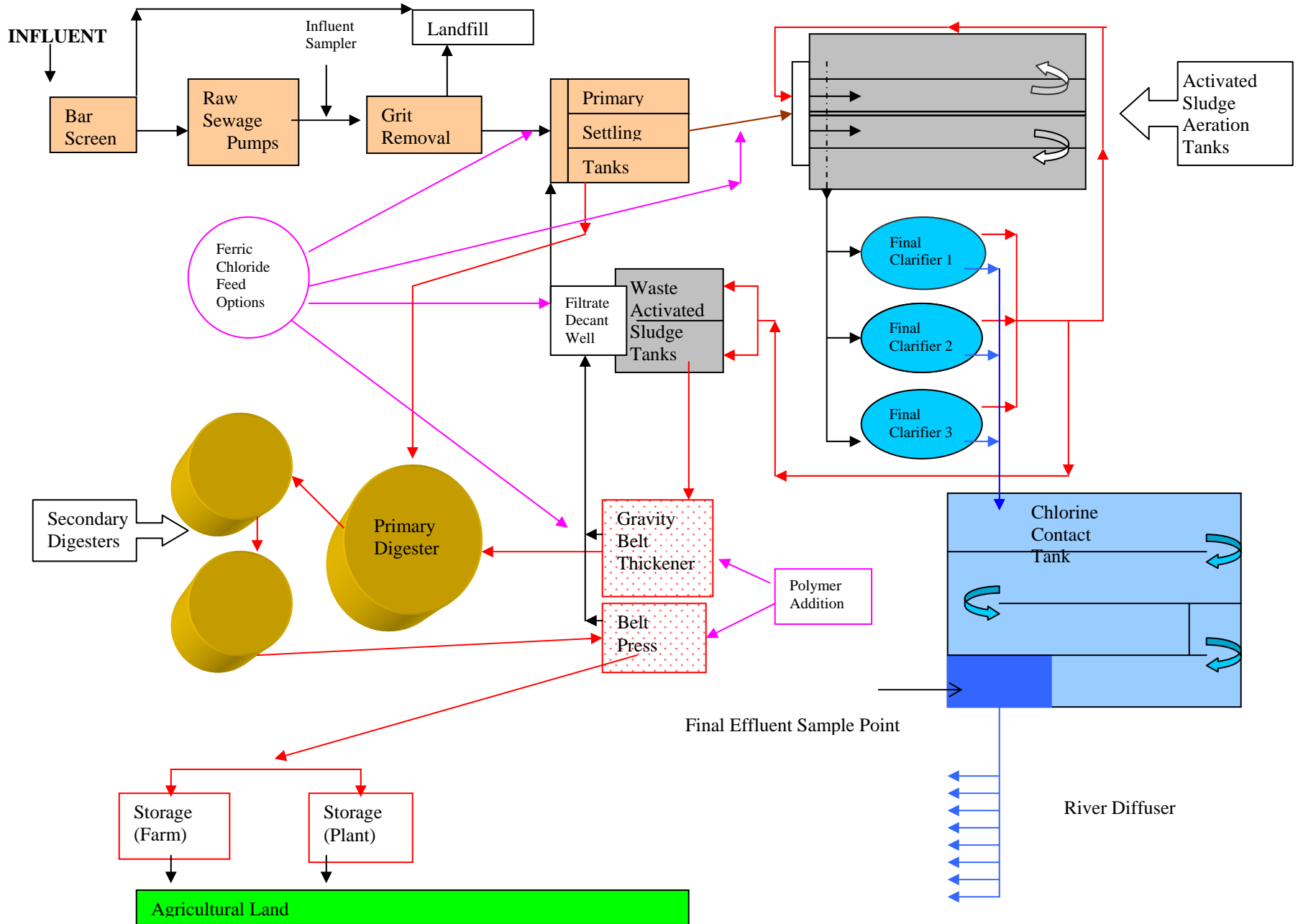


CHIPPEWA FALLS WASTEWATER PLANT FLOW CHART



FACILITY DESCRIPTION

The City of Chippewa Falls Wastewater Treatment Facility is located on western edge of the city adjacent to the Chippewa River. The purpose of the facility is to remove wastes from the sanitary sewer system waters before discharging the treated water to the Chippewa River. The facility is owned and operated by the City of Chippewa Falls Department of Public Utilities. The facility provides physical and biological treatment to obtain a “secondary level” of treatment. The physical treatment is provided by bar screen, grit removal and primary and secondary clarifiers. Biological treatment is provided through the activated sludge process in which micro-organisms and bacteria are allowed to grow and reproduce in the liquid in the presence of oxygen. The organisms feed upon the organic matter in the wastewater. The treatment plant is designed to treat a flow of 5.6 million gallon per day (MGD), and produce an effluent quality of < 25 mg/l biochemical oxygen demand (BOD), < 30mg/l total suspended solids (TSS) and < 1.3 mg/l total phosphorus (TP).

Preliminary Treatment

- (1) Influent Control Structure – An average of 2.4 MGD of wastewater enters the treatment plant site from the east and west through 30-inch diameter sewers and the flows are combined at the plant influent structure.
- (2) Mechanical Bar Screen - The mechanical bar screen is the first treatment unit. Large materials and debris are removed from the sewage, which are then disposed in a sanitary landfill.
- (3) Raw Sewage Pumps - The screened sewage is lifted five feet above grade by one of five raw sewage pumps located in the lowest level of the treatment plant control building. Each of the five raw sewage pumps is variable speed having a maximum capacity of 3600 gallons per minute (gpm). Once lifted by the raw sewage pumps, the sewage then flows by gravity through the remainder of the treatment plant until discharge through the river diffuser system.
- (4) Vortex type Grit Removal - The pumped sewage flow enters a circular grit chamber for further removal of coarse materials and sand. Flow is applied at a rate, which allows organic solids to remain in suspension while sand and grit settle to the tank bottom. The sand and grit is pumped to a grit classifier where again hydraulic flow conditions separate heavier solids out. The grit is then conveyed to a dumpster and disposed in a sanitary landfill.

Primary Treatment

- (5) Primary Clarifiers - Sewage enters the three (83’ x 30’) rectangular primary clarifiers. The primary clarifiers remove approximately 60 % of the suspended matter, and 30% of the BOD. Solids which are settled are moved to hoppers in the clarifier bottoms by sludge scrapers. The solids are pumped to the anaerobic digesters.

Secondary Treatment

- (6) Aeration Basins - Effluent from the primary clarifiers flows to the aeration tanks where the organics in the wastewater are reduced by micro-organisms in the presence of oxygen. The aeration basins also remove phosphorus biologically through the use of anaerobic and anoxic zones.

(7) Aeration Blowers - Air is introduced into the aeration tanks through a system of pipes and diffusers. Three 2,250 cubic feet per minute blowers located in the blower building provide air to the aeration tanks. Each of the blowers is driven by a 150 horsepower variable speed electric motor.

(8) Final Clarifiers - The aeration tank effluent flows into three final clarifiers. The final clarifiers collect solids from the activated sludge process and return them to the aeration tanks where the microorganisms consume and break down the organic matter.

(9) Activated Sludge Pumps - Activated sludge that is settled out in the final clarifiers flows to the pumping station. Return sludge is pumped to the aeration tank to maintain an active population of microorganisms. The excess solids produced by the biological treatment process (waste activated sludge) are pumped to the waste activated sludge tank.

(10) Waste Activated Sludge (WAS) Tanks - Waste activated sludge (WAS) is pumped from the RAS/WAS wet well to the WAS holding tanks. The WAS holding tanks are aerated with 3 positive displacement blowers driven by electric motors. The WAS is then settled, decanted, and run through a gravity belt thickener (which thickens the WAS from < 1% solids to 5% - 7% solids), and pumped to the digesters.

(11) Ferric Chloride Storage and Feed System - Ferric chloride is the chemical used as a backup to the biological phosphorus removal process. Ferric chloride can be fed to either the primary influent for removal of phosphorus in the primary clarifiers, or to the primary effluent for removal of phosphorus in the final clarifiers. Ferric chloride can also be added to the digester feed line or to the decant well of the WAS holding tank which receives filtrate from the gravity belt thickener and belt press.

(12) Chlorine Contact Tank - Chlorination and dechlorination are the final two treatment processes. Chlorine is added to kill the remaining pathogenic organisms, thereby reducing the fecal coliform count. The fecal coliform count is used as a measure of pathogenic bacteria being present. Sulfur dioxide is then added to neutralize the chlorine before it passes over a rectangular weir and is pumped through a 36" pipe to the Chippewa River. Chlorine and sulfur dioxide are added May 1 through September 30.

(13) Effluent Pumps - Effluent pumps are provided at the effluent end of the chlorine contact tank. These pumps are used to discharge the effluent to the river through the river diffuser.

(14) River Diffuser – the river diffuser consists of an extension of the outfall sewer beneath the river bottom and extending approximately a third of the way across the river. There are 32, 4" nozzles to disperse the effluent thus reducing the acute toxicity of copper in the discharge.

Solids Treatment

(14) Anaerobic Digesters - Settled solids, or sludge, from the primary clarifiers, scum from the primary and secondary clarifiers, and thickened WAS from the WAS holding tanks are pumped to anaerobic digesters. The anaerobic digestion system consists of one primary digester and two secondary digesters. Sludge is stabilized at a temperature of 95 F. during a retention period of 20 days in each stage. Microorganisms act on organic matter, decomposing it in the absence of oxygen. Treated solids are then termed BioSolids. Each digester contains an external hot water heat exchanger and mixing equipment to aid digestion.

(15) Agricultural Sludge Disposal - Digested BioSolids are pumped through a belt press, which thickens the BioSolids to 17% - 20% cake solids. A conveyor then transfers the BioSolids to the application vehicle, which has a side discharge spreader. It is then applied to agricultural land or stored in a 6-month storage building at the City's farm in Wheaton Township or at a 3-month storage building at the wastewater plant for later disposal.

Miscellaneous

(16) MicroTurbines - Anaerobic digestion creates methane gas as a by-product. Micro Turbines are used to convert the gas to electrical power, for "peak demand" savings. Any excess gas is used to heat the Anaerobic Digesters. Heat generated by the Micro Turbines is used to 'preheat' the digester heating water.

(17) Emergency Generator - Emergency power for the wastewater treatment plant is provided by a 600 KW generator. The generator has sufficient capacity to meet essential plant electrical loads during power failure.

(18) Control Building and Laboratory - The treatment plant control building provides office space for plant operators and houses the supervisory control and data acquisition (SCADA) systems, motor control centers and the treatment plant laboratory. In the wastewater laboratory, a continuous testing program monitors influent and effluent quality levels.

Brief History

Initial portions of the treatment plant were constructed in 1952, including the control building, raw sewage pumping, and two digesters that today serve as secondary digesters. Secondary treatment facilities were added in 1968 to meet increasing flows and organic loads. Major additions included; four aeration basins, two final clarifiers, engine driven blowers and a new primary digester. A 1985 construction project increased the capacity of the preliminary treatment equipment, increased the pumping capacity, and added another final clarifier and installation of a new chlorine contact tank. Another major construction project was completed in 1997. It included modifications to the aeration tanks to accommodate biological phosphorus removal, facilities to house chemical feed equipment and solids handling equipment including a gravity belt thickener, a belt press, polymer equipment, a conveyor system and the BioSolids application vehicle. Also added were BioSolids storage buildings to insure six months storage capability. An unused tank was converted to a gravity settling tank for waste solids removal and a building added to house accompanying blower and pumping equipment. New Supervisory Control and Data Acquisition (SCADA) equipment was added to monitor the wastewater treatment and the water distribution systems. In 1999 a river diffuser system was installed to meet effluent copper limits. In 2004 new laboratory, office and personnel facilities were constructed, and 1950 era methane powered engines were replaced with MicroTurbines and electric motors.