

THE WASTEWATER TREATMENT PLANT PROCESS

The flow through the Lewistown Wastewater Treatment Plant begins with twin Archimedes screw influent pumps that lift the wastewater to an elevation that allows gravity flow through the liquid unit process treatment train and then to the Juniata River. Preliminary treatment for the wastewater includes mechanical screening, as well as grit and grease removal at the Headworks facility. The flow leaves the Headworks unit and passes through an influent magnetic flow meter prior to the primary clarifier distribution box. Influent flow and waste activated sludge are combined at the primary Clarifier distribution box prior to flow entering the primary clarification process. Co-settled waste activated sludge and primary solids are removed by primary clarification. The primary effluent is combined with return activated sludge in the RAS control chamber prior to the biological nutrient removal process.

The biological process consists of two parallel four-stage Bardenpho trains and three secondary clarifiers for the biological removal of nitrogen and chemical precipitation of phosphorus. Biological oxygen demand oxidation and nitrification are achieved in the aerobic (with air) zones of the bioreactors, while denitrification occurs in the anoxic (without air) zone. Internal mixed liquor recycle provides a source of nitrate-rich mixed liquor suspended solids from the aerobic zone back to the head of the anoxic zones. MLSS discharge from the bioreactors to the final clarifiers for gravity separation. Clarifier effluent is then disinfected by an ultraviolet light disinfection system and reaerated prior to discharge to the Juniata River. Settleable solids, including primary sludge and waste activated sludge, are cosettled in the primary clarifiers and pumped to the anaerobic digesters. Primary and final clarifier scum are also pumped directly to the anaerobic digesters for processing. The typical anaerobic digester operation provides a complete-mix, heated primary digester with pumping to a second and third digester for storage and further stabilization.

Stabilized biosolids are pumped to the centrifuge units for dewatering and landfill disposal. Solids removed during preliminary treatment, which include rags and grit, are conveyed to dumpster containers for landfill disposal prior to entering the treatment train. The design of the WWTP provides for total nitrogen and total phosphorus removal from the wastewater to meet Chesapeake Bay Tributary Strategy and National Pollutant Discharge Elimination System target limits.