

Whole Cycle Tuesday

Takeaway

Wastewater treatment starts well before the plant gate. Keeping excess rainwater out of sanitary sewers gives operators more room to do the job the system was built for: treating wastewater and protecting the waters that receive it.

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*"Nature does not hurry,
yet everything is
accomplished."*

— Lao Tzu

Heavy Rain and Wastewater Treatment

A heavy rainstorm does more than fill streams and puddle roads. It can also send a surge of water through the pipes leading to a wastewater treatment plant. Plants are built to handle changing flows, but a large storm can push far more water through the system than it sees on a dry day.

How does rain get into a sewer? In older systems, stormwater and sewage may share the same pipes. Even where they are separate, rainwater can enter sanitary sewers through cracked pipes, leaking joints, manholes, and improperly connected drains. Groundwater can seep in as the soil becomes saturated. Utilities call these unwanted flows *inflow and infiltration*, or I/I.

The first challenge is volume. Pumps, screens, settling tanks, and other treatment equipment have limits on how much water they can handle at once. When flow rises quickly, wastewater spends less time moving through each treatment step. At the same time, the incoming sewage may be more diluted with rainwater. A lower concentration of pollutants per gallon does not make the surge harmless: the plant still has to move and treat every gallon.

Biological treatment can be especially sensitive. Many plants rely on communities of microorganisms to break down organic matter and remove nutrients. A sharp change in flow and wastewater characteristics makes those processes harder to control. High flows can also strain the settling tanks that separate treated water from biological solids. Operators must watch both the water leaving the plant and the microorganisms they need for treatment to continue after the storm.

In the most severe events, the problem can begin before water reaches the plant. If sewer pipes or pumping stations cannot carry the flow, sewage may back up or overflow. In a combined sewer system, excess stormwater mixed with sewage can overflow to a nearby waterway. A sanitary sewer system can overflow too when I/I overwhelm its capacity. These events depend on the design and condition of the local system; heavy rain does not automatically trigger an overflow.

Utilities manage wet weather by monitoring flows, maintaining equipment, repairing leaky sewers, reducing improper stormwater connections, and, where appropriate, adding storage or treatment capacity. The lesson is that wastewater treatment starts well before the plant gate. Keeping excess rainwater out of sanitary sewers gives operators more room to do the job the system was built for: treating wastewater and protecting the waters that receive it.



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