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Let's Solve Water

Case study
PSS • Monitoring and control

Pressurized sewage solutions

Flygt products from Xylem enable ecofriendly greenhouse cultivations

The town of Brielle, near Rotterdam, the Netherlands, is located on the islands of Voorne and Putten on the Brielse Meer and has a population of approximately 16,000. In recent years, the existing centres of Brielle, including the nearby communities of Vierpolders and Zwartewaal, have been served by a good sewer system.

The background

Beginning in 2000, the Dutch held nationwide discussions about whether wastewater generated by Dutch growers, normally utilizing greenhouses, in the outlying areas of municipalities, such as Brielle, should be handled by the adjoining municipal sewer system. Households had been connected to the municipal system in the 1980s.

Before the end of 2000, the government decided that all growers should be allowed to discharge wastewater continuously into municipal sewer systems to avoid overflows into ditches and open waters.
The purpose was to limit the amount of processed water that contains pesticides, fertilizers and other contaminants that might flow into ditches and, consequently, into open waters.

In Brielle, this meant that waste water from the growers could be transported to the existing main sewage plant, which currently collects the water from nearby towns of Bollaarsdijk, Honaardweg and Schrijversdijk,

as well as from the country roads, water ways and pressurised sewage systems. It also handles water from the outlying areas of Vierpolders and Zwartewaal.

To handle this amount of wastewater, the Brielle borough council decided to install 208 pressure-pumping stations. Brielle's achievements became a model for other municipalities in Holland.

The problem

To prevent overflows, growers are required to drain off the wastewater. To achieve this, the Brielle Borough Council needed a maximum flow capacity, regardless of how many pumps are running simultaneously. The standard solution to a pressurized sewer system (PSS) glass area normally includes a number of high head grinder pumps connected via a network of small 90 mm pipes.

Here, capacity limitations forces growers to wait in line. For example, the system cannot handle more than two or three growers at a time. However, using Flygt pumps and controllers, Mr. Piet van Bruinesse of the Brielle Borough Council found a way to get around this problem. He connected a larger booster pump directly to the PSS pump stations with signal cables connected to a Flygt FGC controller.

In this case, when a local PSS starts, the booster pump receives a signal to help the smaller, local pumps by increasing the number of revolutions. This is not possible by measuring the pressure in the main pipe systems. Other requirements for attention include:

- Pipe speed between 0.4 and 1.1 m/s.
  The discharged waste consists primarily of rinsing water. Because the pipe speed may be less than the recommended speed of 0.7 m/s a larger diameter pipes was required.
- Cooling for the booster pump
  The pump only operates if the two forward pumps start up to ensure there is always sufficient water being transported.
- Running dry
  The booster pump can never run dry since "direct control" of the booster is activated when the pressure on the pumping stations start up. The booster is also installed at a lower level.
- Signaling
  For a safe running of the booster, the cable installation is of great importance, and a separate cabling schematic has been drawn up.
- Communication
  A permanent analogue line to the central post has been connected to the forward pumping station at Langestraat, which in turn is connected to the local government offices. The advantage of this is that the system is always online, thus simplifying adjustment.

The solution

"Despite the cheaper construction of the standard solution that consists of installations of individual wastewater treatment units, we needed a PSS system to avoid the risks of transporting slurry," explains Piet van Bruinisse. Other disadvantages of the standard solution were high-energy consumption, the lack of 100% cleaning and high maintenance costs, he pointed out.

The booster pump is not activated by pipe pressure but is controlled directly by the Flygt FMC controller. Starting pumping operations in the system, as well as the content of the forward 160 mm PVC pipe, the system ensures that the delivery of the booster pump is equal to the feed delivery of the forward pressure pumping stations. Hence, the pressure pumping station has the same. if not better, efficiency operating collectively as when operating individually.

The system is compatible with different suppliers of pumps, and the booster pumping station can be switched on. The pipe calculations for discharge with small stations and was incorporated in to the station. This shows that the average discharge per small pumping plant came out at about 4.5 l/s and was processed into a starting table for the booster pump. The small plants control the frequency regulator via a Flygt FMC controller to indicate a specific speed for plant.

An in-line booster station is being installed in the Koolhoekweg pressure pipe to move the discharge points of all the pumps located before the booster station. This pump enables the acceleration of pumping of the market growers' water. A bypass in the booster pit provides an additional discharge point in the event the booster does not work.

The benefits

"To ensure highest possible quality we maintained an intensified supervision during the installation phase and when adjusting the pressure pumping stations," says Piet van Bruinisse. "We will also continue the inspection to ensure proper installation of pipes and cables before filling the ditches."

The solution has proven a success, thanks by the way in which the pumps are coordinated. Performance is not based on pipe pressure but instead based on switching on the pressure pumps.

The lack of overflow has resulted in a better water environment and a return of fauna life to the ditches. Without the system solution, and the Flygt FGC booster pump connection, the growers would not be connected to a sewer system and overflows should occur today. The energy costs are significantly reduced because each pump has a maximum of flow. Since the installation, Brielle has experienced zero malfunctions in the system. The results, in brief, include lower energy consumption, flowless operation and no repairs or breakdowns, and minimal environmental costs.