

Saving Endangered Eels in the Netherlands With a Fish-Safe Pumping Station

Challenge

The Dutch water board responsible for polder drainage in a village about 200 km (124 miles) northeast of Amsterdam wanted to upgrade a 68-year-old pumping station to improve water pumping efficiency and protect European eel and perch along a critical fish migration route. The water board sought one main contractor to help design the project, specify requirements, and serve as the main contractor to coordinate all other contractors and suppliers.

Solution

Flowserve engaged with the water board during the preliminary design phase to provide the engineering expertise needed to retrofit the existing vertical pumps in the Oostermoer pumping station in De Groeve with highly efficient, direct-drive electric motors and fish-safe pump hydraulics. The project was completed on time, with Flowserve coordinating all of the construction and commissioning. As a result, the water board achieved its goal of passing 95% of eels and fish through the pump station unharmed.



Modernizing a 1955 drainage pumping solution

The Hunze en Aa Water Resource Board operates the Oostermoer pumping station on the Leiding 2 watercourse. It drains from a polder area near De Groeve in the Netherlands. There, the water is discharged into the Havenkanaal, which connects to the Zuidlaardermeer lake.

Constructed in 1955, the pumping station originally contained three vertical screw pumps powered by diesel engines with a low-efficiency drive line consisting of a belt and gearbox. The facility was largely unchanged except for when one of the diesel engines was replaced with an electric motor in 1994. Two pumps had a capacity of 200 m³/min. (53,000 gpm) at a head of 1.5 m (2.13 psi). The third pump had a capacity of 100 m³/min. (26,417 gpm) at a head of 1.5 m (2.13 psi).

The Oostermoer pumping station is located along a migration route critical to aquatic life, especially the endangered European eel as well as perch and other fish. Changes in the design and operation of the pumping station would have to protect fish by enabling them to pass through the pumps unharmed. The water board also specified that fish must be able to swim through the station when pumps are not running.

In addition, the water board overseeing the facility wanted to replace the aging equipment in order to increase pumping efficiency while slightly reducing the station's overall capacity to 400 m³/min. (105,669 gpm).



Saving Endangered Eels in the Netherlands With a Fish-Safe Pumping Station



Early in the design phase, Flowserve specialists evaluated the condition of the Oostermoer facility. The concrete civil works along with discharge nozzles and the original vertical pump housings were confirmed to be in excellent condition after decades in operation. They would be reused.

Flowserve then considered the feasibility of redesigning the 68-year-old pumping station to make it safe for fish. Our specialists utilized digital modeling to demonstrate how Flowserve fish-safe impellers would perform in the Oostermoer facility. The positive results persuaded the Hunze en Aa Water Resource Board to partner with Flowserve.

Updating powertrain and environmentally friendly hydraulics

To meet the water board's requirements for pumping capacity and protection of marine animals, Flowserve recommended replacing two of the original pumps with Flowserve VOP-1200 vertical, axial-flow units with fish-safe impellers.

The proprietary, forward-swept design creates space between the impeller veins and guide blades. This enables fish to move through the pump unharmed. Additionally, Flowserve customizes the impeller design to align with the specific requirements of the project, including the existing nozzle head diameter, flow rate and head.

These two pumps can meet the new required overall station capacity of 400 m³/min. (105,669 gpm). That meant the third original pump was no longer needed. In its place, the water board wanted to create a passage through which eels and perch can swim through the station when the pumps are not operating. Flowserve collaborated with the water board's ecologists and an independent consulting firm to design and construct the passage through the pumping station — the first ever in the Netherlands.

Lastly, to improve the efficiency of the Oostermoer station pumps, Flowserve recommended upgrading the existing indirect diesel engine drives with direct-drive units using IE5 permanent magnets.

A proven partner for engineering flood control

Flowserve has a long history of successful flood control and drainage projects in the Netherlands. Our proven engineering expertise and high-capacity pumping solutions led the Hunze en Aa Water Resource Board to select Flowserve to assist with the project's design phase. The water board also wanted one point of contact to lead the entire project execution. Flowserve was selected as the main contractor.





Saving Endangered Eels in the Netherlands With a Fish-Safe Pumping Station

Fish-safe technologies provide capacity for years to come

Upon completion of commissioning, the water board engaged an independent consulting firm to test the new Oostermoer pumps. The consultants tallied and measured eels and perch on the polder side of the pumping station. Then they monitored the passage of fish through the pumping station and into a storage basin. The consultants counted the fish and verified their condition.

The result: 100% of the European eels and 95% of the perch survived the journey through the pumping station.

Superior project management to meet tight timeline

By reusing the existing concrete civil works, discharge nozzles and cast iron vertical pump housings, Flowserve satisfied the water board's requirements and completed the Oostermoer project on time.

As the main contractor, Flowserve ensured the tight project timeline was achieved. We coordinated with municipalities to obtain necessary environmental permits, while keeping neighbors informed of work progress. We also supervised civil and electrical contractors in addition to technicians who installed and commissioned the fish-safe pumping units.

It's another drainage project successfully completed by leveraging Flowserve's decades of global flood control experience, superior engineering capabilities, and complete portfolio of fluid motion and control equipment and systems.



To obtain additional details about our CVP pumps designed for vital large-scale infrastructure applications, please get in touch with us at waterindustry@flowserve.com.

Flowserve Corporation
5215 North O'Connor Blvd.
Suite 700
Irving, Texas 75039-5421 USA

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

©2023 Flowserve Corporation. All rights reserved. This document contains registered and unregistered trademarks of Flowserve Corporation. Other company, product, or service names may be trademarks or service marks of their respective companies.

PUSS001228-00 (EN/A4) September 2023