



Project: Appledore

Location: Romney Marsh, Kent

Environmentally Friendly Pump Solution

Client: Environment Agency



Appledore pumping station is an Environment Agency (EA) asset situated on the Romney Marsh in Kent, nestled between Rye and Ashford on the Royal Military canal. The pumping station built in the late 1940's operated two axial flow pumps driven by Ruston Hornsby single cylinder oil engines, which were frequently operated for over 60 years.

The pumps and oil engines were run far beyond their design life and when eventually deemed inoperable, they were removed. One of the engines is now installed in a museum and three small temporary submersible pumps were put in place to maintain the levels, until a permanent solution was delivered.



The EA set some stringent parameters on the design criteria which needed to be met. The pumps must be fish friendly, use the most efficient pumping technology to pass 500 litres per second, per pump and most challenging of all, maintain the current winter levels in the drain.

The EA's South East MEICA team provided substantial input and guidance during the technical discussions around the works information and throughout the delivery of the scheme to ensure it met all expectations.



The pumping station was built with axial flow pumps, operating on suction (the impellor sits higher than the water levels on either side of the asset and situated above floor level within the station building). One of the benefits of this system is that the intake sump can be relatively shallow compared to what is required with a bowl/turbine pump, where the impellor is submerged. The shallow intake design created a challenge, as maintaining the axial pumps impellor position is undesirable because it relies on vacuum pumps to prime the system, which are additional items to maintain and notoriously unreliable.

Aquatic Control Engineering Ltd

www.aquaticcontrol.co.uk
info@aquaticcontrol.co.uk
01777 249 080

Aquatic Control Engineering are market leaders of innovative water flow control, maintenance and fish passage equipment. We are proud to supply our customers with high quality, innovative solutions and high standard installation services for over 20 years



Project: Appledore

Location: Romney Marsh, Kent

Environmentally Friendly Pump Solution

Client: Environment Agency



Various parties, including other pump suppliers, looked at the problem and could not find a way to install bowl pumps as getting the impellor submergence required to prevent cavitation simply was not possible.

The options seemed simple; either:

- 1) Allow the drain level to be 500mm deeper than it was designed to be
- 2) Major civil works to deepen the pump sump
- 3) Install the new pump as per the 1948 design and accept the use of a vacuum pump

Immediately option 1 could be discounted as this would flood considerable areas of Romney marsh, option 2 was economically unviable and option 3 deeply undesirable.



ACE were invited to take a look around the pumping station, as a company known for their innovative approach, the Environment Agency hoped they could produce a solution others had not yet considered. ACE quickly spotted an option which could work, the option was modelled by their partners, Pentair Nijhuis using their in house CFD (computational fluid dynamics) software. Nijhuis, is the division of Pentair responsible for manufacturing the fish friendly pumps based in Winterwijk, the Netherlands is renowned for its CFD analysis, so much so that it is recognised as the hydraulic centre of excellence within the whole \$6.3billion dollar group. This knowledge enables Nijhuis to offer incredibly precise CFD models which can be relied on and trusted for key decisions such as the one being made at Appledore with regards to maintaining the current sump levels.



The CFD models showed the solution worked and ACE had an option which enabled exactly what the customer required, a fish friendly submersible pump which would not require alteration to the pumping station forebay.

Aquatic Control Engineering Ltd

www.aquaticcontrol.co.uk
info@aquaticcontrol.co.uk
01777 249 080

Aquatic Control Engineering are market leaders of innovative water flow control, maintenance and fish passage equipment. We are proud to supply our customers with high quality, innovative solutions and high standard installation services for over 20 years



Project: Appledore

Location: Romney Marsh, Kent

Environmentally Friendly Pump Solution

Client: Environment Agency



The main challenge was overcome by ACE however, the Environment Agency had another requirement which must be met in the form of maintaining two lines of flood defence. ACE are renowned for their HDPE pumped flap valves; these valves are robust enough to have high velocities pumped through them, yet light and virtually buoyant neutral keeping the head loss extremely low. The low head loss reduces the amount of power the pumps require to pass the water through the valve, this is not only an economic benefit but also an environmental one as less electricity is used for every cubic metre pumped. The HDPE flap valve also reduces the carbon footprint further when compared to cast iron as it requires much less energy to manufacture, ship and install (shipping and installation due to the light weight nature of the valve). From an ecological perspective the HDPE door being much lighter ensures the valve opens much further than traditional cast equivalents which prevents the chance of a fish sticking it during passage.

Usually in these situations the second line of defence is in the form of an automated knife gate, this is however not an ideal solution because it must be driven by actuators, require regular maintenance and the control philosophy added to the MCC. ACE offered a much more robust and cost-effective solution in the form of our WaStop. The WaStop is an in-line check valve which could be installed directly behind the flap valve on the outfall thus providing two passive lines of flood defence with virtually no maintenance requirements. The only consideration that must be made when using the WaStop behind pumps is a breather pipe. When the pumps stop, the water reverses direction and can thus pull on the WaStop membrane, the simple addition of a breather pipe enables air to be drawn into the system preventing the vacuum pulling on the valve.

Aquatic Control Engineering Ltd

www.aquaticcontrol.co.uk
info@aquaticcontrol.co.uk
01777 249 080

Aquatic Control Engineering are market leaders of innovative water flow control, maintenance and fish passage equipment. We are proud to supply our customers with high quality, innovative solutions and high standard installation services for over 20 years



Project: Appledore

Location: Romney Marsh, Kent

Environmentally Friendly Pump Solution

Client: Environment Agency



To further ensure minimum ecological and environmental impact from our pumping systems ACE always operate our pumps with variable frequency drives. The drives allow the pumps to adjust their speed to follow either a fixed flow rate (as is the case at Appledore) or the most efficient working point depending on the real time hydrostatic head difference. The use of these drives is no longer optional if you want to minimise the impact to the environment and eco-systems of these assets, the great news is its an economic option too! The drives change the speed of the pump always keeping it far from its point of cavitation and towards its peak efficiency. This is critical to reduce the pumping stations operating carbon footprint and running costs. From an ecological perspective the more efficient the pump is operating the better the flow of water is to enable fish passage. The chances of a fish coming into contact with the impellor is in direct correlation with the pump's efficiency. The second benefit is the controlled slow start-up which these drives provide, this is important because course fish and eels look for shelter in our drains and frequently find it within the bell mouth of a pump. The slow start up provides a chance for the fish to escape whilst the pump speeds up to its duty point.

Team van Oord as Environment Agency PDU framework contractor in the South East, engaged with ACE and in partnership with the Environment Agency worked on the details such as the pipework layout to minimise bends which further aids efficiency until all parties were satisfied with the solution. Team van Oord replaced the outfall pipework, carried out surveys, provided all lifting and provided excellent project management.

As ACE delivered the project, we had a surprise visitor in the form of a ferret! This really was the cherry on the top for our site team who enjoyed looking after it whilst waiting for the RSPCA to collect it.

Aquatic Control Engineering Ltd

www.aquaticcontrol.co.uk
info@aquaticcontrol.co.uk
01777 249 080

Aquatic Control Engineering are market leaders of innovative water flow control, maintenance and fish passage equipment. We are proud to supply our customers with high quality, innovative solutions and high standard installation services for over 20 years