ACE

Aquatic Control Engineering



Upper Thurne Integrated Drainage Improvements

Client: Broads Internal Drainage Board
Location: Norfolk Broads

When the Upper Thurne Integrated Drainage Improvements Project came to tender — a programme to replace 11 of the 14 pumping stations across the catchment, managed by the Water Management Alliance on behalf of the Broads IDB — ACE put forward a solution that addressed the limitations of traditional approaches head-on.

Most of the existing stations were built in the 1950s, some on foundations dating to the 19th century, with canister pumps throughout. The original specification called for more of the same. But canister pumps carry inherent design penalties that matter in a catchment like this.

ACE proposed the Pentair VDX mixed flow suspended bowl pump with permanent magnet (PM) motors - a fundamentally different approach to the challenge. The VDX1-450 achieves design flow of 375 l/sec and can operate across the full range from 555 l/sec down to 150 l/sec without throttling or efficiency loss. PM motors maintain constant torque regardless of speed, remain efficient at low speeds, and generate no excess heat. Cast construction throughout - nodular iron elbows, bowl and bell mouth, bronze impellers, dry motors elevated above flood level - reduces maintenance liability and extends asset life.

Unlike canister pumps, which require full removal for servicing every two years, VDX suspended bowl pumps allow above-water access to motors and mechanical components without dewatering the sump.

Several stations are adjacent to residential properties, holiday homes, and heritage assets, so noise was a concern. During acceptance testing at Pentair's factory in the Netherlands, the pumps were tested at 1m distance with a decibel meter whilst pumping at full design flow. They recorded under 60dB. Quieter than a dishwasher.





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The Eel Regulations 2009 require all land drainage pumps to use fish-friendly technology. ACE produces blade strike models in accordance with NEN 8775. With eels present throughout the Broads system, compliance was non-negotiable. The VDX impeller geometry, combined with PM motor speed control, allows the pump to handle the full flow range whilst maintaining safe passage.

Working with partners Landustrie, ACE supplied the Rotating Landustrie Cleaner — a hydraulic rotating arm capable of handling a 500kg debris payload, designed to keep intake screens clear without the visual bulk of a traditional gantry.

Precast concrete headwalls were developed with JKH Drainage Units, with pipe stubs cast directly into the headwall so site teams can bolt pipework straight to flanges. No formwork. No on-site casting. The headwalls were fitted with AQUIKO stoplogs and HDPE non-return valves, manufactured in-house. Near-neutral buoyancy minimises head loss; they open far wider than traditional cast iron flap valves, reducing fish and eel contact risk at the outfall.

11 Stations

Replaced in one of the most ambitious IDB infrastructure upgrades in a generation.

6,300 Hectares

Of land and 708 properties protected against flooding within the UK's most complex and ecologically sensitive drainage systems.

150l/sec - 555l/sec

VDX1-450 operates without throttling or any head loss artifice, eliminating the energy waste as with canister pumps.

NEN 8775

Specific blade modelling provides a fully Fish friendly system, also complient with Eel Regulations 2009.



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