

Flexible over-pumping system for pump station refurbishment

A case study



www.pumpsupplies.co.uk

Thames Water's
£16 million
refurbishment
and extension of
Bishop's Stortford
STW involved
Pump Supplies
engineering
a solution to
over pump the
station during
the overhaul
of the adjacent
Hallingbury Road
pumping station



Temporary pump discharge arrangement

The UK's largest water and wastewater services provider, Thames Water, treats in the region of 2,800 million litres of sewage per day. Its £16 million refurbishment and extension of Bishop's Stortford STW in Hertfordshire as part of its AMP4 programme involved Pump Supplies engineering a solution to over pump the station during the overhaul of the adjacent Hallingbury Road pumping station (PS).

A planned and timed project for main contractor Black & Veatch, Pump Supplies lent its skills and expertise to design a one-off flexible system within a confined space, thus reducing the overall capital expenditure of the scheme.

The market town of Bishop's Stortford has a population of about 35,000 however the busy M11 motorway, expected enlargement of the nearby Stansted Airport, and the train links to London and Cambridge, show that the population is likely to increase in future to 45,000.

As a result, Bishop's Stortford STW with a population equivalent of 52,000 is now at full capacity, leading to the requirement from Thames Water to extend and refurbish the current works to a 2016 design horizon of 72,000, 483l/s total works flow.





Installed pumps in the enclosed working space

The sewage treatment works is fed by two main pumping stations – Hallingbury and Stansted Airport, as well as a number of minor pump stations. It is a traditional works operating a bio-diversity treatment process.

Within the scope of Black & Veatch's (B&V) remit was the need to overhaul Hallingbury Road pumping station. It comprises four submersible pumps for dry weather flows (DWF) acting on a duty, assist and standby basis handing flows forward to Bishop's Stortford STW for treatment, and two shaft driven pumps for the storm weather flows (SWF), pumping to three 1000m³ capacity storm tanks at Hallingbury PS.

The pumping station is unusually situated in a low level area requiring the pumps to lift the

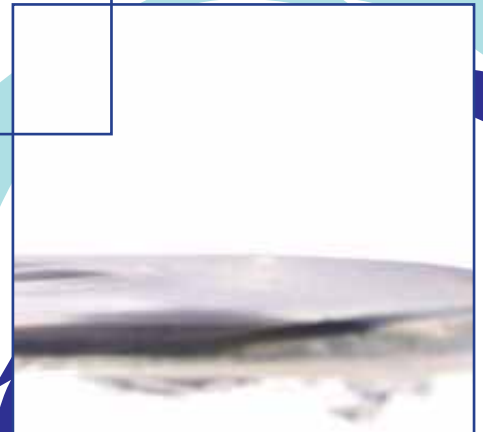
matter some 28m of static head and 500 metres to the STW.

It therefore requires large pumping units to lift the high heads of water.

The existing C type impeller pumps were blocking, failing and cavitating on a weekly basis, mainly due to the large amount of rags, fibrous waste and debris the pumps had to deal with, requiring the site to be attended regularly for maintenance by the Thames Water team.

A temporary over-pumping scheme was needed to allow the £1 million refurbishment work at Hallingbury Road to take place, whilst ensuring uninterrupted operation of the pumping station and minimising down time. This involved a clean out of the DWF and SWF wet wells, installation of new Flygt N-Pumps and new MCC.

The existing C type impeller pumps were blocking, failing and cavitating on a weekly basis, mainly due to the large amount of rags, fibrous waste and debris the pumps had to deal with, requiring the site to be attended regularly for maintenance by the Thames Water team.



In assessing the job, and due to the compact nature of the site and enclosed working space, Pump Supplies proposed in its design to use the temporary pumps firstly as temporary replacements for the storm pumps, whilst the existing units were replaced and new ones tested and commissioned, and then to use the same pumps with some control adjustments for the second phase of the job in the dry weather flow section where the work was of a more critical nature.

Commenting, Pump Supplies' contract manager, Rob Bessant, said: "The criterion was to cover the 400 l/s storm weather flow to the storm tanks and between 80 l/s and 381 l/s for the DWF. By installing two Flygt NT 3312 180kw explosion proof pumps controlled by variable frequency drives, we could set a maximum speed for the storm pumps, and then once that element was complete, reprogramme the drives for the DWF aspect. In this way we reduced the amount of pumps which were required and the labour cost of the job as a whole.

"Because space was at a premium we simply would not have had enough room for four temporary pumps and allow room for B&V's contractors to get the existing pumps out.

"The configuration of 175m of pipework connected to the temporary pumps, together with digital flow meters, ultrasonic level

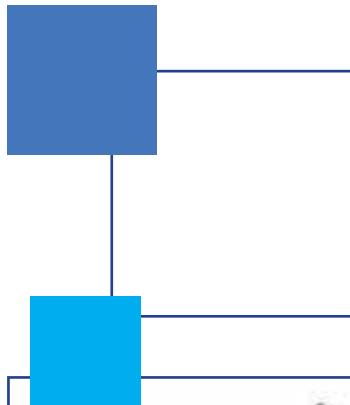


Flow meter, valves and pipework arrangement

controls, gate valves and 2 no. 200kw variable frequency drives, allowed us to send the correct flow to the correct destination, depending upon what part of the site was being worked on. The flow meters also enabled us to control the amount of flow through the works so it was continual throughout the day rather than a series of purges, which helps the system work better altogether."

Flygt N-Pumps are the market's most efficient submersibles and offer sustained efficiency because fibrous material cannot build up on the impeller through its self-cleaning design. The pumps were installed vertically within the dry well design of the pumping station itself.

The SWF over-pumps were in place for an eight-week period whilst the in-situ pumps were replaced, tested and commissioned. The valves in the pipework were then swapped over to cover the DWF sent to the works. The second phase was critical and Pump Supplies' duty pump ran 24 hours a day for 105 days trouble-free – some 2,500 operating hours – with no failures, blockages or problems.





Pumped flow to storm holding tanks

Commenting Simon Blackman, site agent for Black & Veatch, said: "The final temporary works scheme took several months to plan; we were liaising with Thames Water operations closely to ensure that the process was not put at risk of failing. The pumping station drywell is 13m deep so the working at height issues posed a high risk for the installation activities.

"Pump Supplies worked with us to develop the final overpumping scheme and designed the temporary works. Due to space limitations we were restricted to 1no duty and 1no standby pump only which formed part of its proposal.

"The existing installation was blocking on a weekly basis regularly requiring night time call outs. Once the temporary pumps were in place we had no night time call outs and forward flows to both the storm tanks and main works were maintained at all times during the construction period.

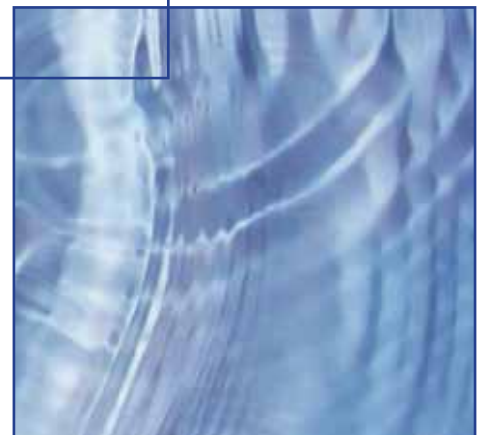
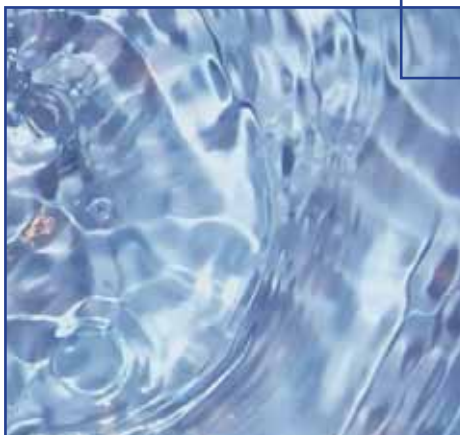
"The temporary pumps also provided us with an early indication of how the permanent installation was going to perform as they were from the same range. Six months on from final completion and nearly a year from initial commissioning the new pumps have not yet blocked or failed."

Pump Supplies further assisted B&V with the supply of four Flygt FS 3152 chopper pumps to handle the heavy build up of rags and fibrous waste in the DWF wet well. This was to allow new valves to be installed on the existing suction pipes to feed each new Flygt NT3231, 105 kw submersible pump – whilst still maintaining forward flows to the works.

As the UK's leading provider of Flygt drainage, sewage and sludge pumps, Pump Supplies worked in tandem with B&V to provide robust and reliable temporary pumping solutions for the project.

Key statistics

- **Pipework length** – 175 metres
- **Distance to STW** – 500 metres
- **Over-pumps** – Flygt NT 3312's 180kw Ex. Proof
- **DWF pumps** – 4 no. Flygt NT3231, 105kw explosion proof submersible pump
- **SWF pumps** – 3no. Flygt NT3312, 140kW explosion proof submersible pump
- **Combined total operating head on temporary line** – 38 metres
- **Static head** – 28 metres
- **Hours run approximately** – 2500



Pump Supplies Ltd

Port Talbot
Llewellyn's Quay
The Docks
Port Talbot
West Glamorgan
SA13 1RG
Tel: 01639 89 5815
Fax: 01639 89 2618
Email: sales@pumpsupplies.co.uk

Pump Supplies Ltd

Gloucester
Unit 1 The Old Airfield
Moreton Valence
Gloucester
GL2 7NG
Tel: 01452 30 3006
Fax: 01452 30 3335
Email: sales@pumpsupplies-glos.co.uk

Pump Supplies Ltd

Bodmin
15a Normandy Way
Walker Lines Ind Est
Bodmin
Cornwall
PL31 1EU
Tel: 01208 78 440
Fax: 01208 78 414
Email: sales@pumpsupplies-bodmin.co.uk

Pump Supplies Ltd

Winsford
Browning Way
Woodford Park Ind. Est.
Winsford
Cheshire
CW7 2JR
Tel: 01606 86 3343
Fax: 01606 86 3159
Email: sales@pumpsupplies-winsford.co.uk

Pump Supplies Ltd

Irish office
Wexford
Tel: (00353) 87 2310577
Fax: (00353) 53 59803
Email: bmcltd@iol.ie

www.pumpsupplies.co.uk

