

Canterbury WWTW Digester Refurbishment and Upgrade

Client: Southern Water

Location: Canterbury

Value: £670k

Duration: 16 Months

In Brief...

Canterbury WTW serves a population of 73,394 and has four digester tanks, each with a capacity of 1500m³ sludge, at approx. 12.8m dia. x 11.9m. As part of Southern Water's AMP6 upgrade works, Barhale were contracted to fully refurbish and upgrade two of these digesters. The works included purging the digesters out of service; draining down and cleaning the digesters; carrying out necessary surveys and ensuing repairs; replacing the old gas mixing system with a new chopper pump system and all associated pipe-work; installing new temperature probes; testing & commissioning and conducting a 28 days reliability test.



Customer Benefits...

The works took place in an extremely challenging working environment that presented some of the highest risks within the industry. The team worked near contaminants and gas, next to a highly flammable DSEAR zone, and on glass-lined digester walls, which can be easily damaged. Even minor errors in this area carried the risk of affecting the digesters' structural integrity and the release of methane/hydrogen sulphide gas in the atmosphere, which would have affected Southern Water's legal obligations under its waste management permits, among others.

Despite these challenges, Barhale finished the works to the required or even higher specifications, within programme and budget, and without a single incident. The life of the tanks is now extended by 7 to 10 years and the risk that lower gas quality might bring the entire process to a halt has been completely removed through the new chopper pump system. The new systems are also significantly more efficient and much easier to maintain. Moreover, the digesters can now take more sludge imports and increase the production of gas, which in turn increases the production of electricity which can be sold to the network or reused to power the site.

Technical Features...

We worked on one tank at a time in order to maintain the site operational requirements. The full works entailed the following operational stages:

Draining and Cleaning

We reduced the feed to each tank while maintaining heating and mixing operations, until the gas quality dropped below 56% methane. We then isolated the gas line from the digester allowing unwanted gas to escape through the Whessoe valve. In collaboration with Southern Water operational teams, we stopped heating & mixing in the digester, we locked off all equipment and purged the digester. We fully drained down each tank with full clean and grit removal using screening process machines and saved the client significant time and costs in the process. Specifically, we drained tank 1 to a pre-agreed level at which Southern Water anticipated presence of grit in the sludge based on tank age and usage to date. The remaining sludge/grit was tankered away to another facility, but at great extra cost. To save those costs to the client, we agreed with them a different method for draining tank 2, which relied on continuously monitoring the sludge composition and tankering away sludge at the actual grit level. This level turned out to be much lower than the client had anticipated; as a result, more sludge was drained through their existing process, and less removed off site, in a shorter period of time, and at less cost.

Inspection and Repairs

We inspected the entire structure internally and externally by first using a drone and issued a detailed report for options to carry out further works. We then installed internal scaffolding to clean and carry out shot blasting to the roof, top ring and support purlins.



Old gas mixing system



Decommissioning digester



Structural survey drone

Technical Features Cont...

We replaced damaged 'U' bolts and re-coated the inside of the roof and top ring with 3 coats of epoxy paint. We removed all of the old mastic from the sheet edges (prior to shot blasting) and re-pointed with Sikaflex TS+. We re-coated the base ring and fitted 14 Zinc (GR5 McDuff) sacrificial anodes onto each of the vertical seams on the base ring for the ongoing protection of the tank walls.

New Installations

We installed new STM Jet Nozzles and Roatmix floor mounted double nozzle assembly complete with internal pipework. We replaced 8 no. temperature probes and 10 no. high level valves (5 per tank) and 2 no. drain valves (1 per tank). We removed and replaced 4 no. pressure relief valves (Whessoe valves) on top of the tank, including through installing new pressure switches.

We fully disassembled and removed the existing gas mixing systems on both digester tanks and replaced it with a Vaughan HE8K10-25, 22kW 4 Pole TEFC IP55, IE3 external Vaughan chopper pump system. We installed field wiring and upgraded the existing panel starters to suit the new pumps and control philosophy.

Testing and Commissioning

We tested and commissioned all new equipment to ensure compatibility with the pre-existing equipment and site telemetry system.