

Beckton STW

£190m upgrade of one of Europe's largest STWs nears completion, helping to create a cleaner, healthier River Thames

by Neil Cuthbert

Beckton STW, in the East London borough of Newham, is one of Europe's largest sewage treatment works, with a current population capacity of 3.5 million. The current expansion programme will enable the site to treat the waste of 3.9 million people when complete in 2014. As well as allowing for a population increase of up to 10% through to 2021, the £190m upgrade to the facility will enable Beckton to handle 60% more sewage during periods of heavy rainfall. Increased flows from the terminal pumping station at Abbey Mills and additional storm flows from the Lee Tunnel (currently under construction) will be treated at Beckton STW. This paper follows on from the one published in UK Water Projects 2012 and looks at the progress made over the last twelve months.



Aeration pipework manifold delivering up to 120,000Nm³ / hour of process air to ASP4 - Courtesy of Tamesis



Aeration diffuser grid system installation
Courtesy of Tamesis

Introduction

The upgrade of Beckton STW is part of Thames Water's London Tideway Improvements programme, which is made up of three major engineering schemes to help stop sewer overflows and improve water quality in the River Thames. This programme includes upgrading London's five major sewage works to treat larger volumes of wastewater and to a higher standard. It also incorporates the Lee Tunnel and the proposed Thames Tunnel, designed to prevent pollution entering the Thames from 35 sewer overflow points along the river.

Thames Water selected Tamesis, a joint venture between Laing O'Rourke and Imtech, as principle contractor for the £190m project to upgrade Beckton STW.

Project summary

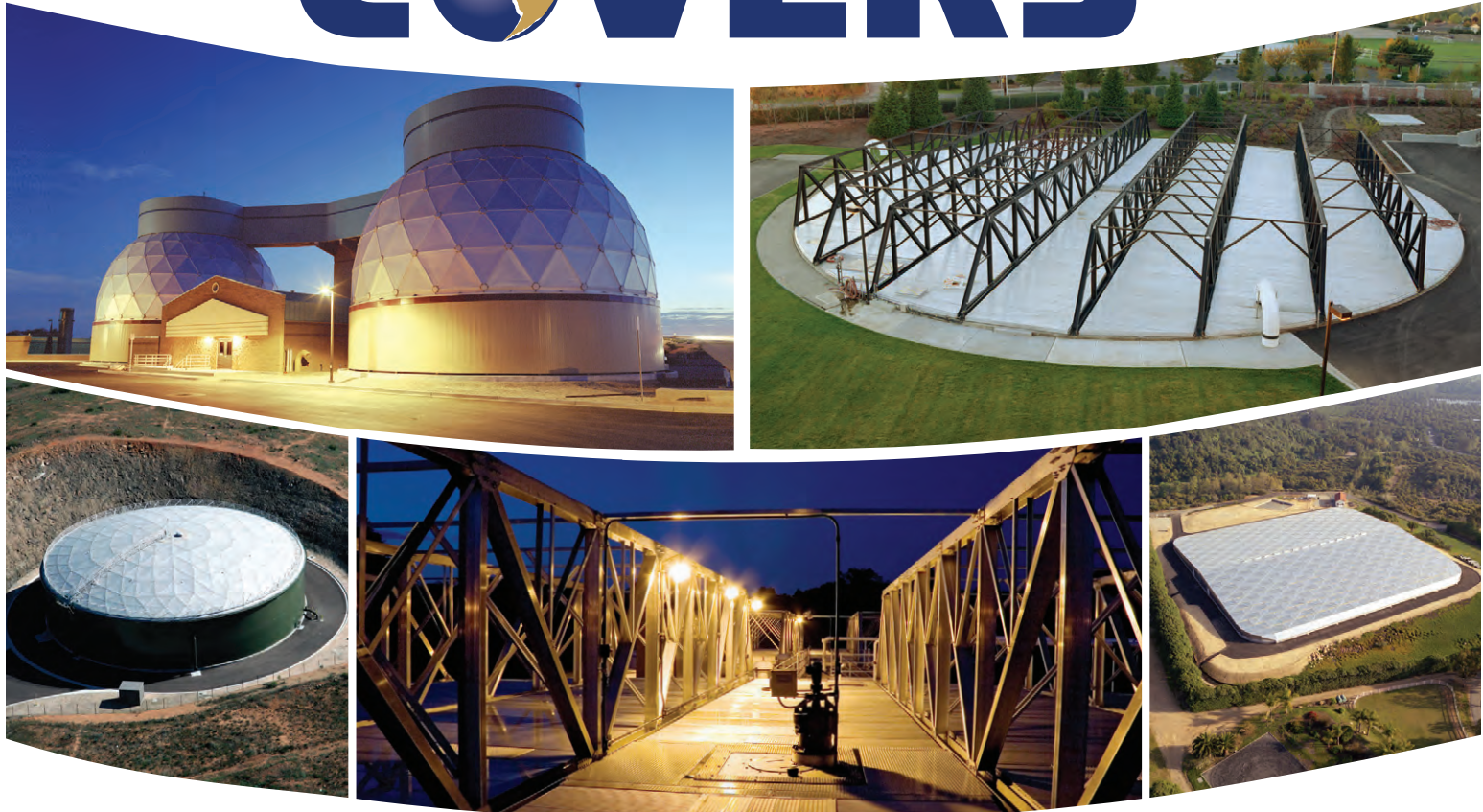
Designed to meet the improved environment standards required by the Environment Agency (EA), the project will help to protect the River Thames. The new works includes high efficiency aeration and pumping systems to minimise power usage for wastewater treatment. In addition, renewable power arising from wind energy, solar power, thermal advanced digestion and sludge power generators, will generate a substantial proportion of the energy required to operate the facility and help Beckton STW move towards becoming a power self-sufficient wastewater plant.

Tamesis contract scope

Work began in June 2010 and the project is due for completion in March 2014. Industry-leading innovations have been incorporated

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Aerial view of the new ASP4 activated sludge process stream
Courtesy of Thames



ASP4 Full Bridge FSTs Scrapers are the largest of their type in the UK
Courtesy of Thames

into the project including the extensive use of precast concrete panels (Design for Manufacture and Assembly) for construction of the final settlement tanks (FSTs) and aeration tank walls.

This has significantly reduced the on-site construction requirements, whilst maintaining quality and increasing site safety and construction reliability.

Thames has brought together the complementary in-house skills and experience of its partners, proven experience of the global supply chain, and specialist design skills of Hyder Consulting, to meet Thames Water's project drivers and quality, programme and financial objectives.

Progress - Existing works upgrade

Since the last feature in UK Water Projects 2012, the Beckton STW upgrade project has made great progress. On the existing works upgrade, the new raw sludge thickening plant, which includes 7

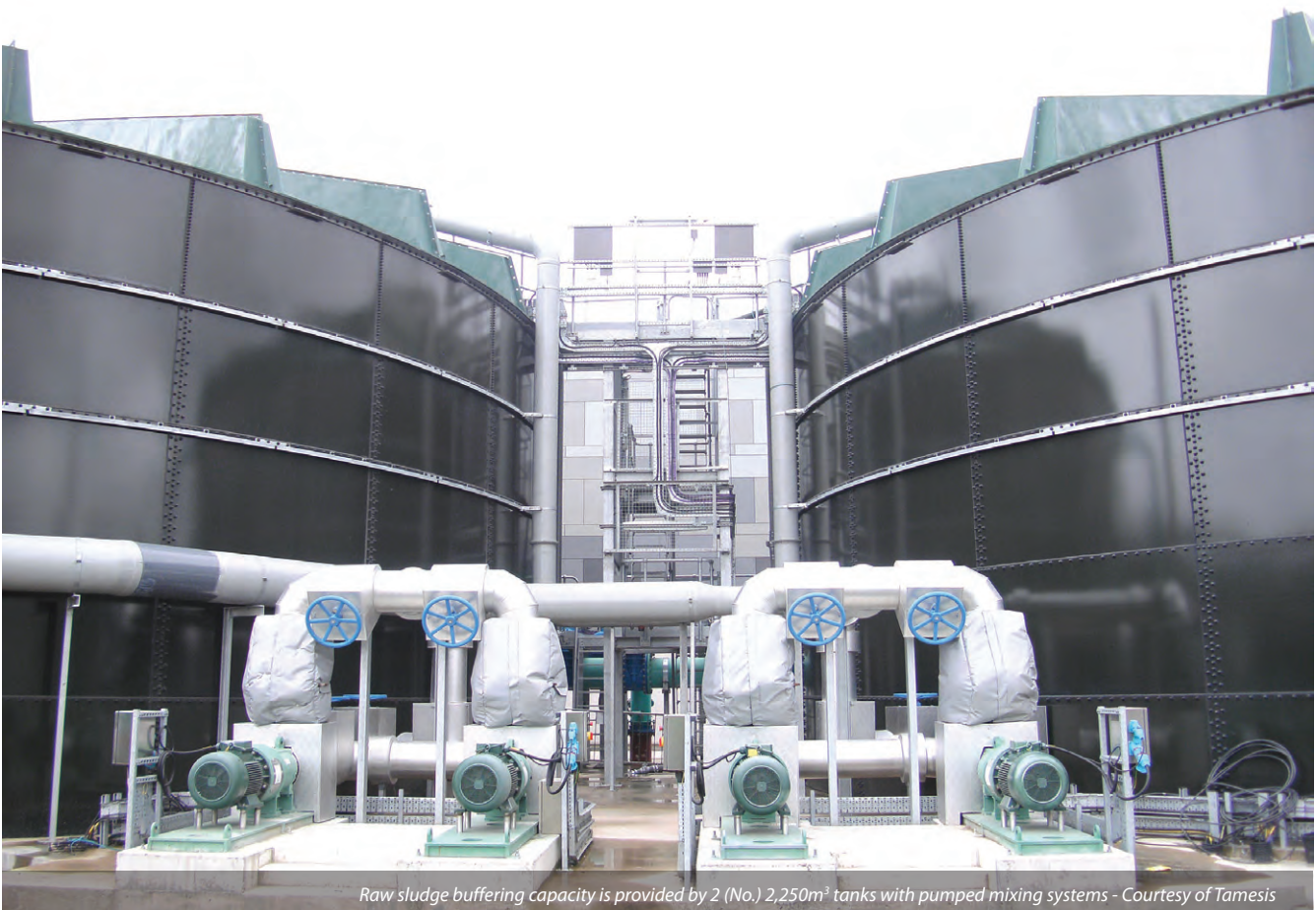
(No.) drum thickeners processing up to 636m³ an hour of 1.25% dry solids sludge, is now operational and in preparation for reliability trails along with extensions to the existing SAS thickening plant.

3 (No.) odour control units have been commissioned and associated GRP covers installed to the coarse screens, grit channel, fine screens, storm overflow and primary settlement tank feed channel.

Refurbishment work on the site's existing assets is nearing completion which includes replacement of 48 (No.) FST scrapers on activated sludge plant (ASP) 3 and the addition of scum removal systems on all 72 (No.) FSTs.

Progress - New activated sludge stream

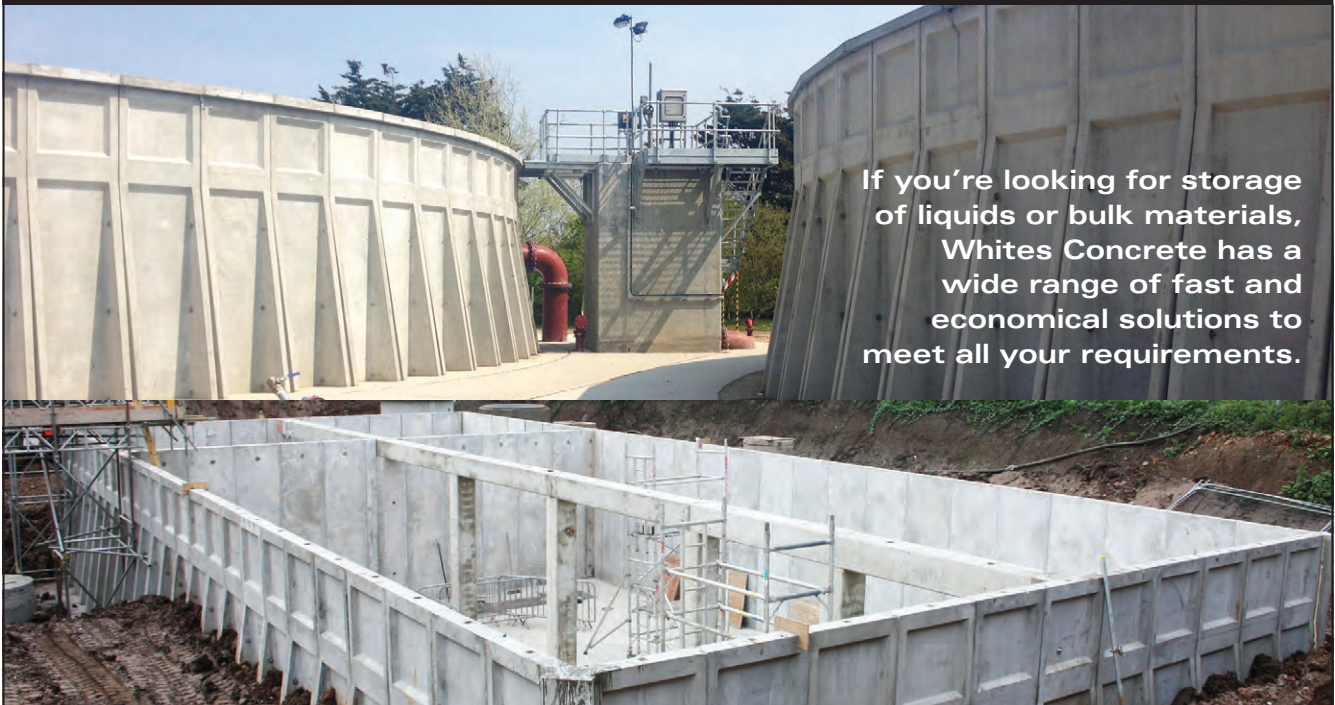
To facilitate the increased treatment capacity, the upgrade project is delivering a new activated sludge process stream, referred to as ASP4, which has been built alongside the existing ASP2 and ASP3 plants.



Raw sludge buffering capacity is provided by 2 (No.) 2,250m³ tanks with pumped mixing systems - Courtesy of Thames



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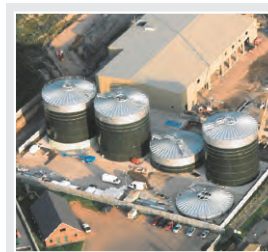


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ASP4 RAS/settled sludge pumping station - Courtesy of Thames

The new stream processes 30% of the total works incoming flow and comprises of 6 (No.) aeration tanks arranged in two streams of three lanes, each with a total volume of 22,500m³. To deliver process flows to the aeration tanks, 2 (No.) settled sewage/return activated sludge pumping stations have been constructed containing a total of 8 (No.) pumps (4 (No.) per pumping station) weighing a combined 80T and each capable of delivering 3,000l/s.

Downstream of the aeration tanks, 16 (No.) precast FSTs have been constructed containing 45m full bridge scrapers, the largest of their type in the UK. Final effluent from the new ASP4 plant passes through a new 700m long, 3m diameter tunnel before discharging into the existing works outfall channel and into the River Thames.

The ASP4 plant is now substantially complete and commissioning underway to facilitate introduction of seed sludge and process commissioning during September 2013. Once fully operational, a new control system will be implemented to manage flow spill across the three activated sludge plants, covering the works full range of flows up to 27m³/s.

Power upgrades

Power upgrades for the new process stream and existing works have formed a significant part of the project. The site's existing 6.6kV sludge ring has been replaced in its entirety and the PST, south west and sludge digestion substations have been fully refurbished including replacement of high voltage switchgear, transformers and associated power management control systems.

On ASP4, a new substation consisting of 11kV, 6.6kV, and 415v distribution systems is now operational and preparations are underway to commission 6.0MW of new diesel powered standby generation plant that will have capacity parallel with the grid during peak demand periods.



Settled sewage flow to ASP4 is lifted by 2 (No.) pumping stations capable of pumping a combined 10m³ per second - Courtesy of Thames

Renewable energy

Wind turbine: Further generation is being provided via a wind turbine generator, standing at a hub height of 64m with 72m diameter blades, offering the potential to generate 2.3MW of renewable power.

Thermal hydrolysis plant: Through another Thames project a thermal hydrolysis plant (THP) is in the process of being constructed on the Beckton site. The THP will process throughput of up to 115 tonnes of dry solids a day and will have the potential to generate almost 5MW of renewable energy.

The combination of this renewable energy generation will significantly lower the emissions from Beckton STW and hence the carbon footprint of the plant help the site move towards a power self-sufficient wastewater service.



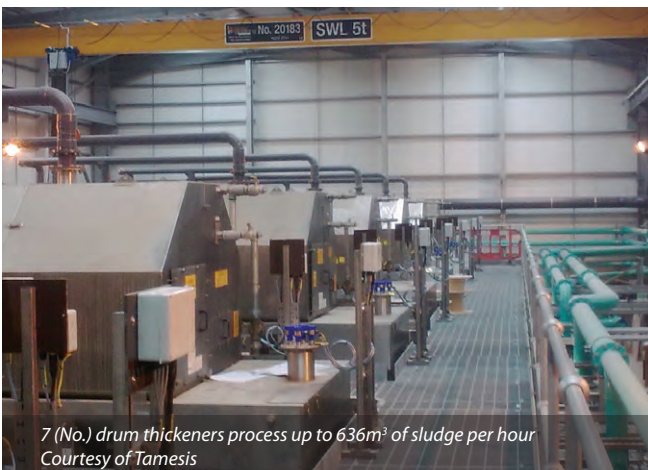
ASP4 substation - Courtesy of Thames

Conclusion

Collaborative working between Thames Water, Tamesis and the supply chain has been a key success factor on the project to date. The teams have worked very closely to ensure timely delivery and integration of the new plant, whilst maintaining continued performance of the existing works by effective management of all interfaces during the construction and commissioning phases of the project. With the continued progress resulting from this collaborative working to date, the project remains on track to compete both on time and within budget.

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7 (No.) drum thickeners process up to 636m³ of sludge per hour
Courtesy of Thames



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