Riverside STW

major upgrade to increase capacity and generate enough electrical power to run the entire works

Located in Rainham in East London, Thames Water's Riverside Sewage Treatment Works treats wastewater from approximately 400,000 people. The works has been in operation since the 1920s and, as a part of the London Tideway Improvements scheme, is currently undergoing a large-scale upgrade. The £64m double project will increase the capacity of the works to meet the predicted increase in flows, in addition to the construction of a new sludge digestion plant. Part of the works upgrade includes an interesting habitat enhancement scheme, which involves the creation of a wetland area to protect water voles and other indigenous species of plants and animals.

New thermal hydrolysis plant - Courtesy of Interserve Construction Ltd

Works upgrade

A key challenge for the works is to accommodate the predicted developments in the facility's catchment area, which will result in a 38% increase in maximum flows through the site. The location's hydraulic capacity will have to be sufficient for predicted flows to 2021. Interserve's in-house process design team was called upon to ensure an accurate model was created for this aspect of the job, with pinch points carefully identified and the model validated through close design coordination with Thames Water.

The upgrade project includes:

- The construction of 5 (No.) new aeration lanes, 2 (No.) new final settlement tanks and 2 (No.) flow distribution chambers. These will provide an additional treatment stream to the works.
- Provision of interconnecting process pipework to connect and re-configure the existing works.
- Upgrading of the returned activated sludge (RAS) and wash water systems.
- Installation of a new 11kV ring main with standby diesel generations and associated electrical equipment.
- Provision of a new 1,800mm diameter bypass pipe to provide additional storm flow capacity and modification of existing storm tanks to improve operation and capacity.

A particularly interesting element of the works upgrade is the installation of the new 11kV ring main, which involves the provision of high voltage switchgear. With 3 (No.) new gas engines also being installed, extremely sophisticated controls are required. Inserserve's electrical designers are working with a specialist supplier to develop a complex power management system to meet this challenge.

Electrical work throughout the entire project has required a lot of input from Interserve's electrical design and commissioning team. The complexity of the installation has necessitated working on a section by section basis. To safeguard the operational treatment works, each element on the site has two sources of electrical supply at any given time. All electrical work has had to be carefully phased in order to accommodate this requirement, and to ensure that the facility could remain functioning risk-free.

Sludge treatment works

The existing sludge digestion plant at Riverside was constructed in the 1960s and abandoned in 1998. Since 1998 sludge produced at the site has been pumped to the Beckton Sewage Treatment Works for incineration. With rising population levels, the Beckton site will not be able to receive sludge from Riverside after 2015. To address this issue, the existing plant's 4 (No.) large digesters are being refurbished and reused, and will be able to handle 110te (de) of sludge each day when the new plant is operational.

Upon examining the contents of the 18m diameter structures, Interserve discovered sludge that had been abandoned for 16 years and was so solid that it required specialist equipment to remove it. Much of this sludge was screened and processed on site with very little having to be disposed of off site. Removal of the ageing roofs of the digesters was also a challenge, and Interserve used a 500T crane and complex temporary works design to achieve this. Refurbishment of the 4 (No.) large digesters is now complete.

The Riverside Sludge Treatment Works scheme comprises the following elements:

- Sludge reception facility to screen and mix the incoming sludge.
- Dewatering plant using centrifuges to thicken the sludge.
- Thermal hydrolysis plant reduces the volume of the final treated sludge so that fewer vehicles are required to transport the treated sludge from the site.
- Refurbished digesters with mechanical mixing and biogas collection.
- Dewatering plant using belt presses to further thicken the sludge prior to disposal to land.
- Polymer dosing plant to assist thickening.
- Combined heat and power plant to include 3 (No.) 3MW gas engines and 3 (No.) boilers to generate steam from the thermal hydrolysis process.

The thermal hydrolysis plant uses steam and pressure to heat and break down the sludge. The pre-treated sludge will be digested by anaerobic bacteria in the refurbished, enclosed tanks. The resulting material will provide better quality biogas, which will in turn be used to power combined heat and power (CHP) engines. The CHP engines will supply enough electrical power to run the entire Riverside works and allow for export to the National Grid during times of low flows.

Habitat enhancement scheme

A wetland area has been created as part of the scheme in order to promote a number of indigenous species of plants and animals, including water voles, that are known to populate the local rivers and former marshland.

During the project process, water has been transported to establish the wetlands in order to transfer protected species to the area as early as possible. However, once the project has been completed, the site will be self-sustaining thanks to a combination of rainwater harvesting and syphonic drainage systems to ensure the wetlands are hydrated automatically.

An area to the south of the site will include bat boxes, reptile refuges, a planting scheme of indigenous species and brush piles to encourage invertebrates. This latter area of raised ground has been created using materials from the site. Interserve is implementing a carefully conceived materials management plan in order to make this happen.

Undertakings

The principal contractor is Interserve, with responsibility for the design, construction and commissioning of all civil, mechanical and electrical elements of both the upgrade and the sludge digestion plant. The client is Thames Water.

Conclusion

The new sludge digestion plant and works upgrade are due to be complete in 2012.

The Editor & Publishers thank wish to thank Thames Water Limited and Interserve Construction Limited for preparing the above article for publication.

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New aeration lanes - Courtesy of Interserve Construction Ltd

Riverside Sewage Treatment Works

Riverside STW is located at Rainham in the London Borough of Havering and treats sewage from approximately 400,000 people each day serving a catchment area of 1270km2. The works have been in operation since the 1920's, during which time the works have been extended significantly.

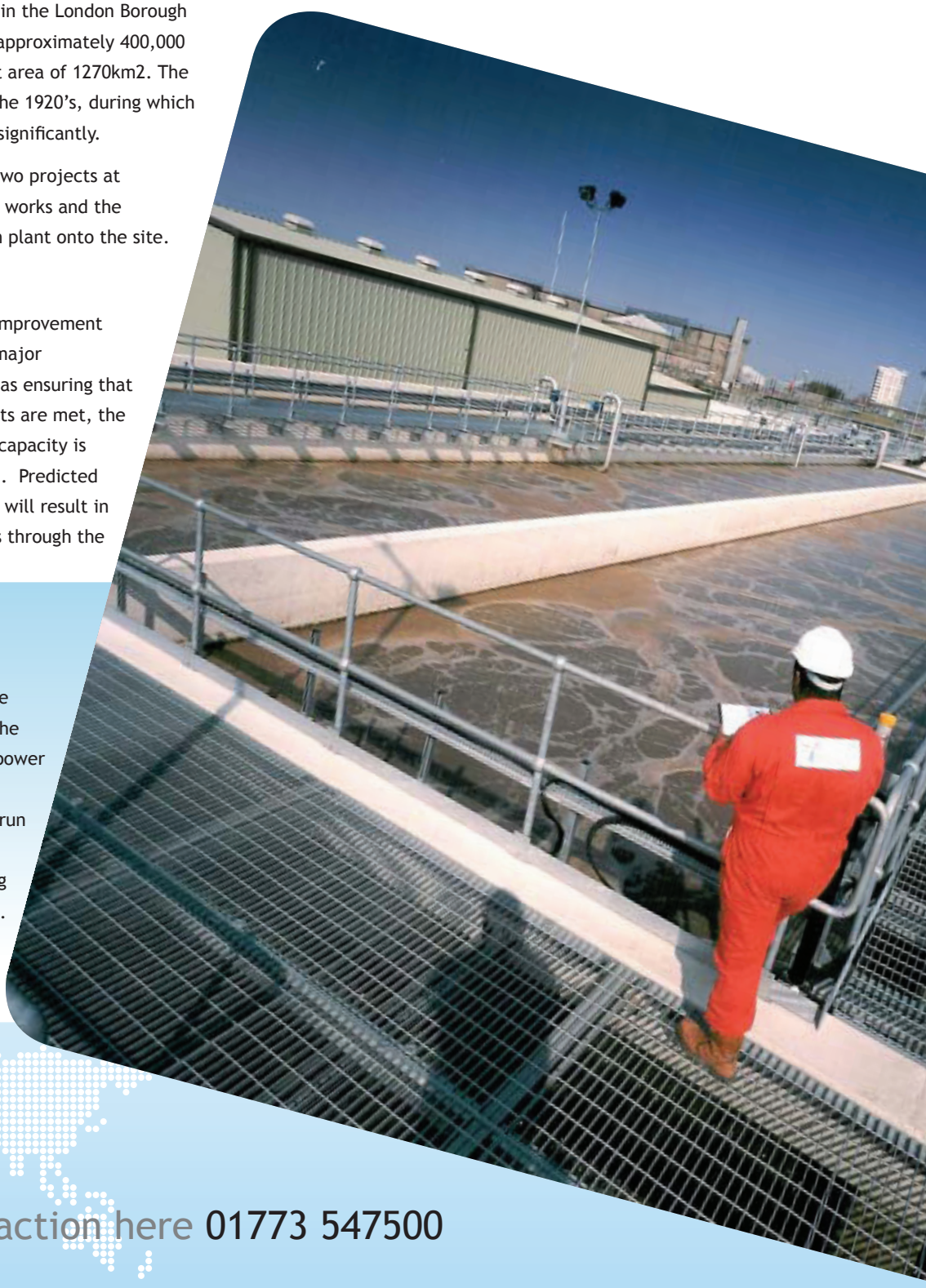
Interserve are currently working on two projects at Riverside: an upgrade to the existing works and the installation of a new sludge digestion plant onto the site.

The Works Upgrade

As part of the Thames Tidal Quality Improvement scheme the works are undergoing a major refurbishment and upgrade. As well as ensuring that new environmental operating consents are met, the works will ensure that the hydraulic capacity is sufficient for predicted flows to 2021. Predicted developments in the catchment area will result in a 38% increase in the maximum flows through the works.

Sludge Treatment Works

The scheme will provide a new sludge digestion capacity at riverside with the Biogas from digestion being used to power CHP Engines. The CHP engines will supply sufficient electrical power to run the entire Riverside works and allow for export to the National Grid during times of low flows through the works.



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