

# Long Reach STW

## £27m works extension project for Thames Water to increase treatment capacity and improve quality standards

by David Hilton BSc (Hons) C Eng MI MechE CEnv

Long Reach Sewage Treatment Works is located in the Dartford area on the edge of the River Thames, and the existing works was designed to treat flows up to 311MLD. It serves a catchment area of 518km<sup>2</sup> with a current population equivalent of 836,593. The works receives flows from parts of Bexley, Bromley, Croydon, Dartford, Sevenoaks, Tandridge and Tonbridge & Malling. The catchment extends to the boundary with Southern Water and includes part of the Thames Gateway development area. The aim of this Thames Water project is to increase the treatment capacity to 346MLD with an increased quality standard. Long Reach STW is one of a number of projects grouped under the 'Thames Tideway' banner.



### Consent

Once completed, the extended sewage treatment works will be required to handle increased incoming sewage flows from an increased population equivalent of 894,362 and achieve the following consent:

Consent	Suspended Solids (mg/l)	BOD (mg/l)	Ammoniacal Nitrogen (Nmg/l)
Average	25	n/a	n/a
95%ile > 15 deg C	50	22	4.5
95%ile 13 - 15 deg C	50	22	6.0
95%ile < 13 deg C	50	22	9.0
Upper Tier > 15 deg C	125	58	18.5
Upper Tier 13 - 15 deg C	125	58	23
Upper Tier < 13 deg C	125	58	33

This will be achieved by the construction of new Aeration Tanks together with further sludge thickening units. Ancillary works, including increasing the power supply and updating the C&I and SCADA, are also to be undertaken.

Work on the project commenced in May 2010 and is due for completion in September 2012.

### Project team

The client is Thames Water and the Contractor's team, GBJV, is formed from a Galliford Try Infrastructure and MWH Treatment (formerly Biwater Treatment) 50/50 joint venture, with staff provided by both companies. Process, mechanical and electrical designers for the project are MWH Treatment staff, and the civil designers are Mott MacDonald staff.

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### Project scope

The existing works is a conventional activated sludge plant, which uses diffused air aeration. The treatment process comprises 6mm two-dimensional fine screens, constant velocity grit channels, screenings conditioning and grit washing facilities, primary sedimentation tanks, aeration lanes using diffused air aeration, final settlement tanks, return activated sludge/surplus activated sludge pumping stations, sludge treatment, storm tanks, storm pumping station, washwater pumping stations and distribution systems, and an outfall to the River Thames.

The extended treatment being constructed under this project comprises:

**Aeration:** 3 (No.) additional lanes of diffused air equipment. Each lane is 8.3m wide, 80m long and 6m deep and comprises a two pass system with upstream anoxic zones. Each lane is equipped with two point dissolved oxygen control. A pump mixing system is being installed within the RAS channel to ensure even loading of RAS solids within the new and existing aeration lanes.

Following an extensive procurement exercise in line with Thames Water's guidelines and processes, it was decided that the lanes will be equipped with ITT Sanitaire 9" membrane diffuser elements. The design maximum duty air demand is 28,000 m<sup>3</sup>/hr, and this is being provided via the construction of a new blower house, which houses 4 (No.) Howden blowers arranged on a two duty/two standby basis. A 1,000mm diameter stainless steel header main is being provided to transport the air from the blowers to the ASP lanes.

**Blowers:** The replacement of the blowers in the existing blower house, with 5 (No.) Howden blowers arranged on a three duty/two standby basis to cater for the increased demand. The design maximum air demand is 88,700 m<sup>3</sup>/hr. Substantial development of the existing blower building to accommodate the new blowers, transformers and switchgear will be necessary.



New Picket Fence Thickeners

Courtesy of GBJV

**Thickeners:** The provision of an additional 2 (No.) 15m diameter Picket Fence Thickeners from MWH Treatment to supplement the 2 (No.) existing Thickeners.

The provision of an additional 2 (No.) 1.5m wide Ashbrook Simon-Hartley Aquabelt Thickeners to supplement the 3 (No.) existing thickeners with standby capacity, and the upgrade of the associated polymer system.

**Odour control:** To deal with the odours emanating from the existing and additional sludge treatment plant, odour control systems are being provided under this contract. The odour control systems will be two stage arrangements comprising a biofilter first stage with a dry carbon polishing second stage.

**Final Settlement Tanks:** The existing 12 (No.) 30m diameter Final Settlement Tanks are to undergo a general refurbishment together with the addition of MWH Treatment automatic scum return systems. The sludge draw-off system will also be automated via a system of actuated weirs, flow meters and sludge blanket meters.



New Odour Control Unit

Courtesy of GBJV



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**Power supply:** The existing 3.5MVA power supply to the works will be upgraded to 7.5MVA at 11kV via 2 (No.) new underground cable feeders from the EDF distribution system. This contract requires the construction of a new Intake Substation Building and associated transformer compounds.

The new EDF 11kV Intake Switchboard will be connected to the 2 (No.) 7.5MVA transformers which, in turn, shall be connected to a new 3.3kV Intake Switchboard.

**Power generation:** New 3.3kV diesel engine driven generator(s) shall be provided at Blower House No. 2, to provide power in the event of loss of incoming supply to the Blower House Switchboard.

The new standby generator will be capable of operating in parallel with the EDF supply, and also in parallel with generation within Finning's Power Complex (which supplements the EDF power supply).

**SCADA:** A new SCADA system will be installed to monitor all the plant on the site utilising the 'Wonderware' system.

**Challenges and initiatives**

- Due to ground conditions adjacent to the Thames, all structures, pipelines etc. are constructed on piled foundations. Approximately 2,000 piles of various sizes have been installed as part of the works, using a combination of driven cast-in-situ and CFA piles.
- To avoid environmental impacts, all excavated materials from the new tanks are being retained on site and re-used as part of the on-site landscaping works.
- Interfacing on a day to day basis on all aspects of an existing process stream, in one of Thames Water's largest treatment works.
- Delivering the project within the target cost, whilst at the same time operating the procurement process on the



Steelwork for new blower house construction

Courtesy of GBJV

basis of minimum whole life cost.

- Thames Water are still developing the 'Wonderware' SCADA as their system of choice, and this will be the first project in the region to integrate it.

**Conclusion – current status**

At the time of writing, construction of the new deep aeration tanks is well advanced, along with the new blower house and intake substation. All of the main civil construction elements are due for completion by August 2011. Refurbishment of 4 (No.) of the 12 (No.) existing FST tanks is complete, and the glass lined steel tanks for the Picket Fence Thickener mechanisms have been installed.

The project remains on target to be delivered within time and budget. Final commissioning and 28 day testing is due to commence in April 2012.

*The Editor & Publishers thank David Hilton, a Project Manager with MWH Treatment, and M&E Manger with the GBJV on the Long Reach project, for preparing the above article for publication.*



New ASP lanes

Courtesy of GBJV



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