

Merstham STW

works upgrade to comply with the AMP5 quality consent to the 2021 design horizon

by Charles Graham

The historic village of Merstham is built on the marshlands of Surrey and dates back to pre-Roman times. The current population is circa 7,000, with future growth expected to exceed 10,000 by 2021. The village lies north of Reigate and the STW is situated within the local green belt to the south-west edge of the village, 500m from large recreational lakes and bordering a Site of Interest for Nature Conservation (SINC). Thames Water also designated the Merstham site as a Site of Biodiversity Interest. The area is prone to flooding and the sewers are very storm responsive.



Undertakings

Thames Water instructed GBM, a joint venture of Galliford Try, Biwater (now MWH) Treatment and Mott MacDonald, to upgrade the works to provide treatment to allow compliance with the AMP5 quality consent to the 2021 design horizon.

The Thames Water scope of work was to:

- Install primary settlement tanks and final settlement tanks with desludging, descum, weir cleaning system.
- Install a new ASP plant treating 100% of total flows, structured as 2 (No.) lanes, configured to allow zones to be taken out of service for aeration system maintenance. The associated aeration system is also to be installed.
- Install new return activated sludge (RAS) and surplus activated sludge (SAS) pumping stations.
- Install a new TT plant with 3 (No.) gravity sandfilters, together with proper backwash system (discharging to a return liquors well). The AMP4 temporary disc filters are to be removed.
- Upgrade of the washwater system to accommodate the increased demand.
- Relocate the existing final effluent flowmeter to avoid surcharge from the receiving watercourse/flood plain.
- Modifications of the inlet pumping stations, together with the 5 (No.) interconnection stations.
- Install 1 (No.) grit trap to remove all grit particles larger than 0.2mm.
- Install new storm/balancing system.
- Install a return liquors pumping station (RLPS), discharging downstream of the inlet storm separation and flow measurement.
- Install connection pipework from new TT plant to the RLPS, and from the new SAS thickening plant to RLPS.
- Install a new air-mixing system in the sludge holding tank, together with a new decant system.

Small footprint

As the site did not have adequate space, at least 3 (No.) of the old percolating filters were expected to be demolished. Because the



Aeration Lane 2 under water test - Courtesy of GBM JV



Final settlement tanks under water test - Courtesy of GBM JV



Primary settlement tank distribution chamber & tanks - Courtesy of GBM JV

site had to be kept in full service during the works, temporary sludge storage or tanker-away would have to be considered during the construction when the sludge holding tank needed be taken out of service.

GBM originally suggested an alternative solution which would keep the existing biological filters and included an additional tertiary treatment stage consisting of n-SAF units to ensure compliance with the BOD. However, at the request of the client, they concentrated on the design and construction of the PST, FST and ASP works.

Because of the small footprint at the site, the original design included removing 2 (No.) of the existing filter beds and installing a temporary treatment plant during the construction, but the risks involved (such as plant failure) prompted a rethink.

New layout

A review of the project revealed that the original area of biodiversity was the flood plain at the southern edge of the site and did not include the original drying bed. With this area now available for construction, a revised design was prepared with changes in the position of the PST and FST tanks and a redesign of the ASP lanes to utilise this area, and these new plans were accepted.

The biggest benefit was that the new layout did not interfere with the existing process, therefore no temporary processing plant was required and the risk to both GBM and Thames Water was reduced.

Construction

The 24 month construction and commissioning period commenced in September 2011. The construction of the majority of the concrete structures up to the formation level as well as the bases to the PST, FST, ASP and storm tanks was undertaken by sub-contractors, directly supervised by GBM. This gave GBM surety of when the concrete sub-contractor came on site and provided a fixed price for the works, as all of the risk based works had been completed within the project team.

Early procurement of the steel tanks, pumps mixing systems and grit separators meant that the supply chain could work alongside the design and construction team allowing designs to be refined as sections were completed.

Resolving issues

The limited space on the site encouraged GBM and Thames Water to share the main office compound releasing the former Thames Water offices as welfare units. This meant that Thames Water operations, including the area manager, were working alongside the site team and were involved with the daily aspect of the project, allowing quick resolution of issues as they arose to the satisfaction of the Thames Water Operations team, whose buy-in to the changes had been critical to the success of the project.

The issue of flooding in the surrounding area was resolved by the design team with a simple change to the discharge point of one of the delivery sewers which crossed an adjacent playing field that flooded during prolonged rain.

Conclusion

The de-risking of the project, through a combination of significant redesign and value engineering, minimised the impact of the construction phase on the existing process at the works, which had to remain 'live' throughout construction.

The project, which is 6 months ahead of programme, is due to be finished in May 2013.

The editor & publishers thank Charles Graham, Project Manager with GBM JV for providing the above article for publication.

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