Taunton (Ham) STW Quality improvements

a challenge to meet tighter ammonia standards

by

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Taunton (Ham) STW sits near the village of Creech St Michael, five miles West of Taunton and half a mile from the River Tone. The works serves a population equivalent of some 80,000 and includes up to 20 tanker loads of waste per day from septic tanks, cess pits and industry. Some 30 years ago, Taunton Sewage treatment works was moved from the edge of town to its current location at Ham. However, storm treatment facilities were retained at the original location (Priory). Effectively the two locations behave as one, with flows through the STW limited to what can be fully treated.

Taunton (Ham) STW Quality improvements courtesy Wessex Water

Under storm conditions a penstock at Priory closed to restrict the flow passing along the 5km sewer to the STW. Storm flows were treated by two storm flow settlement tanks before discharge to the river. Under intense storms, flow spilled directly from the sewer to the river through a combined sewer overflow (CSO).

A 'blind' tank was provided at Ham to collect first flood storm flows and return flow to the inlet works after the storm.

Flow arriving at Ham STW was lifted by three screw pumps, passed through duty/standby coarse raked bar screens, through a single detritor; through flow measurement channels; and settled in three primary settlement tanks (PST). After primary treatment, flow was then split between an activated sludge plant (ASP) and percolating filter plant. The ASP comprised two lanes of surface aerators.

Humus tank treated effluent passed through lagoons before discharge to the River Tone. Treated effluent from the ASP discharged directly to the river.

Before the project, 60% of the flow was treated by the percolating filter plant and the balance by the ASP.

Scheme purpose

The purpose of the scheme at Ham is principally to achieve a tighter ammonia standard (reduced from 15mg/l to 10mg/l) to make conditions conducive for the breeding of Salmonid fish. In addition, the scheme will permit the reintroduction of tanker wastes to the site and provide for growth in the catchment up to 2017 (estimated at 8%).

At Priory a linked scheme is being implemented to eliminate unsightly discharges of screenings from the CSO and storm tanks at Priory to the River Tone.

New works

The principal works provided under the Ham scheme are;

* construction of a third ASP lane fitted with fine bubble air diffusers;
* refurbishment of the two existing ASP lanes.

Flow entering the new ASP lane passes into an anoxic zone serving as an anoxic selector with thirty minutes retention. For the refurbishment of the original two ASP lanes, surface aeration equipment comprising rotating vanes was removed and the lanes

fitted with diffusers for fine bubble diffused air. In addition, an anoxic selector zone was provided at the start of each lane to prevent formation of bulking sludge and filamentous algae.

In addition to the new process plant the following additional works were undertaken:

* re-screeding of two of the three inlet screw pumps and replacement of bearings for all three;
* provision of a 'trimmer' pump at Ham inlet works to work in parallel with the screw pumps. The pump is sized such that the total flow lifted will allow optimisation of the utilisation of process capacity in conjunction with reducing volumes of storm flow discharged at Priory;
* provision of band screen fine screening plant between the detritor and PSTs;
* replacement of flow measurement flumes with in-channel flow measurement to reduce headloss in inlet channels and facilitate installation of fine screens;
* provision of dedicated re-circulation pumps for percolating filters.

Following completion of these works, the new ammonia standards will be achieved for the works as a whole through the following adjustments:

* changing the flow split so that the ASP treats 60% of the flow and the percolating filters only 40% of the flow;
* raising the MLSS in the ASP plant to increase the sludge age and so promote more nitrification;
* introducing re-circulation for the filters coupled with the lower organic loadings to promote nitrification here.

Construction/contractors

The works have been undertaken under Wessex Water Alliancing arrangements with *Costain Ltd* as main contractor and *Carl Bro* as design Consultant. *Costain* has sub-contracted the procurement and installation of treatment process plant to *MEICA*.

Implementation strategy

Lack of available process capacity had brought a halt to the tankering of waste to the works some time before the start of the project.

The new ASP lane needed to be completed before any of the existing plant could be released for refurbishment so that adequate treatment capacity was in place to maintain the existing qualitative standard while the works were under way. Once the new ASP lane had been completed and the FBDA plant shown to meet the new standard, the first of the two existing aeration lanes could be released for refurbishment: this was achieved in time for the Christmas break at the end of 2003.

When the first of the existing ASP lanes had been refurbished and shown to achieve the new standard, then the second lane could be released for refurbishment. Completing the refurbishment of the first existing ASP lane was necessary to achieve the new consent in time for the regulatory date. The refurbished lane was seeded by the end of February 2004 and sampling and testing showed that it was achieving the required standard by this date.

Refurbishment of the second existing aeration lane is now well advanced and due for completion by mid-May 2004. Major works, such as those carried out at Taunton (Ham) STW will never be quickly implemented because of the need to maintain full operation of the works while the new works is implemented. However, careful planning will permit the time scales necessary to achieve the objectives to be established, so that adequate time can be allowed to satisfy regulatory constraints.

Good communications between all parties involved and a regular programme of design review meetings will allow a number of design issues to be kept to a minimum.

Lessons learned

The project was a great success due to the following factors:

* early realisation of the complexity of interaction between the Priory and Ham sites identified the need to establish how the project objectives for each could be pursued separately but without detriment to the objectives for the other;

* early agreement on the process solution for Ham enabled development of the detailed solution for Ham independently of the solution for Priory. This was important as the catchment hydraulic model took many months to complete and awaiting its completion would have prevented meeting the regulatory dates for the Ham STW works.

* good cooperation between the operations, engineering and other departments of Wessex Water ensured that appropriate provisions were made in the development of the design and allowed scheduled milestones to be met on programme;

* experienced and capable designers and contractors staff were motivated to deliver for least cost and proactively looked to save time on the programme wherever possible. ■

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