

Ballymena Wastewater Treatment

£10m Northern Ireland scheme extends existing facilities

by Keith Hitchcock BSc, CEng, FICE, MCIWEM

The existing bio-filter works at Spencestown were constructed in 1939 and subsequently extended with activated sludge plant. In 1992 a new primary, activated sludge and sludge digestion and thickening plant was built outside the urban area at Tullagharley with treatment shared between the original Spencestown bio-filter plant and the new Tullagharley ASP. The Tullagharley works were planned to be constructed in two stages but delays in implementing the second stage resulted in severe overloading.



Tullagharley STW: Ex works (background); new works (foreground) Courtesy Atkins Water and Water Service NI).

The new 20 Mld DWF works capacity now being built at a cost of £10 million will provide growth to 2027. However, even though the domestic population of the service area is predicted to be only 60,000, this is increased to a population equivalent of 150,000 for the activated sludge plant to allow for extensive and strong present and future industrial wastewaters.

Atkins Water are managing the design and build partnering contract with the *Purac Brand Consortium*, a joint venture between process equipment contractor *Purac Ltd* and civil contractor *Charles Brand Ltd*. The new works should be operational in late 2004.

Short term measures to overcome the current overloading include a *BOC Vitox* oxygen injection to supplement the *ASP* blowers and *ACAT* odour treatment sprays at Spencestown to reduce odour from the overloaded Spencestown bio-filters which had caused complaints from local residents.

The current project removes all the main treatment process to Tullagharley, leaving only preliminary and storm treatment at the original works site. It was considered better to replace the

preliminary treatment plant with modern compact process plant in an odour controlled building rather than re-equip, cover and odour control the existing units.

The building is to be odour controlled with dry scrubbers and there is a separate room for skips for the washed compacted screenings and washed grit. Existing storm tanks are being re-equipped with *KSB Amajet* mixing pumps and covered – more for visual impact rather than for odour release.

Inlet works

The inlet works includes an automatic diversion of preliminary treated flows to the storm tanks when the continuously monitored pH is outside the normal range and might otherwise hinder the activated sludge process. This can arise when, for example, an industrialist is cleaning tanks with an alkaline solvent.

Flows for full treatment are to be pumped to Tullagharley from a new compact wetwell pumping station. The project at Spencestown will result in a much smaller treatment works site and a more acceptable neighbour to future development in the remaining site.



Standards

Treatment at Tullagharley is required to comply with 15, 25 and 3 mg/l of BOD, suspended solids and ammonia 95%ile standards and a P standard 1 mg/l as an annual average standard. These are more stringent than the present standards as the increased flow provides less dilution in the River Main.

Ferric aluminium sulphate dosing of the incoming wastewater to remove phosphorous in the primary tanks is to be continued but automated to be flow proportional, with a third larger primary tank added to the existing two. Present gravity de-sludging is to be replaced by a pumped system automated to timers with blanket detectors to automatically increase de-sludging if needed.

The existing activated sludge plant has a diffused air tapered aeration system and this is being enlarged fourfold with the addition of two much larger tanks. The *Vitox* plant is not to be included in the final works. Primary effluent from the existing and new tanks and the return activated sludge are mixed before distributing flows to the two existing and two new aeration lanes, each with anoxic zones and four sequential aeration zones. Six new *High Speed Tech Oy Ltd* centrifugal blowers are being provided running up to 30,000 rpm on maintenance free magnetic bearings. The mixed liquor is combined before re-distribution to the two existing and two new final tanks. Sludge from the final tanks is withdrawn through adjustable bellmouths controlled to individual magnetic flow meters.

Although it is anticipated that the ASP effluent will satisfy the discharge consent standard under normal conditions, *Water Service* require the additional safeguard of tertiary sand filters particularly to allow for uncertainties in the industrial wastewaters. A set of six *Severn Trent Tetra* sand filters is being provided together with a new lift pumping station.

Sludge strategy

The present *Water Service Sludge Strategy* is to tanker thickened sludges to the Duncrue Sludge Incineration Works in Belfast as land disposal is not generally acceptable. *Water Service* have previously only gravity thickened at Tullagharley but in order to guarantee the required 5% dry solids output, drum thickeners are to be installed following a number of trials of different thickeners. Waste activated is blended with primary sludge and polymer dosed before thickening in the two drum thickeners. Thickened sludge may need to be mixed with some unthickened-thickened blended sludge as the thickening trials found that it is difficult to limit thickening to a 5% dry solids output and a thicker sludge would be difficult to store and pump. The existing works four large storage tanks with de-cant facilities for gravity thickening are to be supplemented with a fifth tank to provide 28 days thickened sludge production to allow for maintenance and breakdowns at the Duncrue Sludge Incineration plant in Belfast. The storage tanks are to be covered and odour controlled together with the sludge pumping station, thickener building, import facilities and air expelled from the export tankers during filling.

Contract

The contract was tendered by four pre-qualified consortia of process and civil contractors and a preferred bidder was selected to develop his design in consultation with the employer before the contract was awarded to ensure that the works would fully meet with his requirements. The ECC type C contract (target with activity schedule) was selected to allow for employer participation and a partnering ethos and *Water Service* are still very much involved with *Purac/Brand* in detail design and equipment selection during the contract. ■

Note: *The author of this article, Keith Hitchcock, is Project Manager for Atkins Water.*



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Civil Engineering

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Planning Supervisor

Project Management

Laganwood House, Newforge Lane, Belfast, BT9 5NX

Tel: (028) 90662121 Fax: (028) 90663162

32B Westland, Dublin 2

Tel: (003531) 677 2197 Fax: (003531) 671 4450

8 Columba Terrace, Londonderry, BT47 6JT

Tel: (028) 71341784 Fax: (028) 71311033

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