

# Yorkshire Water's Large FFD Programme update on progress with £250m Freshwater Fish Directive

by  
Noel Feather BSc, CEng, CEnv, MICE, FCIWEM & Peter Caldwell BSc, CEng, MICE, MCIWEM

**Y**orkshire Water (YW) are investing over £250 million in waste water treatment works as part of their commitment to the Fresh Water Fish Directive (FFD) in the AMP4 period. This article provides an update on progress with these schemes since the introduction in UK Water Projects 2007. Also covered in more detail are the large schemes at Knostrop WwTW and Neiley WwTW. The last year has been challenging. However, Yorkshire Water and their contract partners have delivered the capital programme on time and on budget, and Yorkshire Water is in the enviable position of achieving the goals and visions set out at the offset, whilst upholding an excellent health and safety record.



*Aerial photograph of Neiley WwTW showing restricted site available for construction*

*photo Peter Smith Photography*

## Programme Update

For Yorkshire Water the FFD programme involves unprecedented upgrades to 23 of the largest treatment works. In response to this challenge YW created a strategic FFD Vision that is being carried through the FFD programme. Prior to commencement of the AMP4 period YW undertook a Strategic Study to develop a Management and Design Guide to give direction to bring the Vision to reality.

Having completed the study YW and Arup, as Framework Technical Consultants, have been able to quickly progress feasibility and tendering to the extent that by early 2008 Contracts have been awarded for all major FFD schemes. As a consequence of this YW should be in a position to complete all their schemes well within the regulatory timescale.

The first schemes to be commenced at Esholt (serving Bradford) and

Halifax were described in UK Water Projects 2007. The Esholt Phase 1 works and the Halifax scheme are now complete. The new activated sludge plant at Neiley is complete and good progress is being made with work at Knostrop (serving Leeds). These schemes are covered in more detail later.

**The remaining schemes and a summary of progress are contained below.**

- \* The scheme at Lundwood (Barnsley) is progressing towards completion with main contractor Earth Tech Morrison (ETM). The site was flooded during major floods which hit South Yorkshire in June 2007 as can be seen in the photograph on page 39.
- \* The major treatment works for the City of York at Naburn is being upgraded by Black & Veatch. The first phase of the scheme was completed early in 2008.
- \* The rationalisation scheme involving the existing treatment

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To complement Yorkshire Water's work on UIDs and FFD, we're also delighted to have joint funded the construction of a fish pass in the Worth Weir, which has gone on to become a multi-award winning partnership initiative.

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New Activated Sludge Plant under construction at Knothrop WwTW

photo courtesy Peter Smith Photography

works at Denaby, Mexborough and Burcroft in South Yorkshire is being constructed by Watermark. The upgraded treatment works at Denaby was substantially completed early in 2008.

\* The first phase of the Spen Valley scheme was also awarded to ETM and involves a new activated sludge plant and associated sludge treatment facilities at Mitchell Laithes (Dewsbury). This scheme is currently programmed to be completed ahead of the contractual requirement of July 2009.

The second phase of the Spen Valley is due for completion towards the end of the AMP4 period and has been awarded to Mott MacDonald Bentley (MMB).

\* Of the remaining schemes the contract for new treatment plant for Huddersfield has been awarded to Morgan Est, whilst that for Harrogate South has been awarded to Laing O'Rourke.

Arup are project Managers with Turner & Townsend as cost consultants. The Arup role includes feasibility, tender preparation and appraisal, site supervision, Project Management under the NEC and CDM coordinator.

The existing works comprises inlet screening and grit removal, primary settlement, biological filters and humus tanks. Sand filters were installed in 2002 to provide tertiary treatment to 50% of the flow. Storm water is held in two storm tanks and sludge is dewatered through two belt presses. The existing assets are maintenance intensive and insufficient to meet the new Ammonia standard.

The Arup feasibility identified a number of improvements to meet the FFD requirements and Yorkshire Water's FFD aspirations.

### Neiley WWTW scheme

Yorkshire Water's Neiley Wastewater Treatment Works is situated near the town of Brockholes, south of Huddersfield. The works serves a population equivalent of 60,000, with an FFT of 18,749 m<sup>3</sup>/day, treating flows from the Holmfirth catchment. Improvements to the works are required to ensure compliance under the revised effluent discharge consent standards imposed under the Freshwater Fish Directive (FFD), reducing the Ammonia standard from 10mg/l to 3mg/l. The compliance date for the FFD is the 31st March 2009 and the scheme cost is £7.6 million.

A new standby screen was installed to increase the limited capacity of the existing screening system along with an up rated washwater system. The existing filters are replaced by the construction of a new 'U' shaped Activated Sludge Plant consisting of four lanes with a total volume of 9,350m<sup>3</sup>. A major constraint on the scheme was the space to locate any new process units and all existing units had to remain in operation at all times. The new ASP is located on the site of one of the existing storm tanks which was at the end of its asset life requiring major refurbishment. This has been compensated by the construction of a new storm tank.



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A-Consult is proud to have been suppliers of groundbreaking structures on the Yorkshire Water project at Klostrop STW in Leeds.

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Installation of aeration pipe work in the new Activated Sludge Plant at Knostrop WwTW

photo courtesy Chris Mason Photography

The existing humus tanks were converted to Final Tanks and a new Final Tank constructed, optimised in volume following CFD modelling. Sludge treatment is carried out by the installation of two centrifuges to replace two ageing belt presses with the sludge cake generated transported to Huddersfield for incineration at Yorkshire Water's Calder Valley Sludge Incinerator.

The contract was awarded in June 2006 with construction beginning in July with installation of the centrifuges to enable early process improvements. The works were completed in April 2008.

#### Knostrop WwTW

Knostrop treatment works serves most of the City of Leeds catchment and has a population equivalent of around 1,000,000. The implication of the FFD requires a major upgrade to the treatment facilities on the site, largely by replacing the existing filter beds with an activated sludge plant. Additionally, a second project that interfaces with the FFD project is addressing problems with sludge management. The two projects are being constructed at the same time with a combined project value of £52.3 million.

Like the Neiley scheme, Arup are Project Managers for the scheme with Turner Townsend as cost consultants. Design and construction of the FFD scheme is being undertaken by a joint venture between Laing O'Rourke and Halcrow. The sludge scheme is being undertaken by Black & Veatch, also as a design and construct contract.

#### Knostrop FFD Project

Knostrop treatment works is divided into two streams - high level and low level. Each receives flow from a portion of the Leeds catchment that consists of domestic and trade wastes. Each stream has its own inlet works and primary settlement with each stream then receiving a mixture of activated sludge and biological filter treatment before being combined at the outfall.

One of the aims of the FFD scheme was to combine the flows prior to secondary treatment to provide better control of the treatment process and this is being done in the ongoing project.

The scheme provides the following new units:-

- \* 2no. 14m diameter cross-flow detritors on the high level stream.;
- \* 11no. 40m diameter final settlement tanks;
- \* A 66,000m<sup>3</sup> new activated sludge plant;
- \* conversion of an existing SBR to provide a further 68,000 m<sup>3</sup> of activated sludge treatment.
- \* refurbishment of an existing activated sludge plant and final settlement tank;
- \* inter-stage pumping stations and chambers.

The new layout will provide a much more compact works and provide a system that is easier to operate once the streams are combined using a uniform secondary treatment process. The overall footprint of the works will be significantly reduced. Furthermore, a large number of existing HV assets are being replaced and a new fibre



*Aerial photo of new works at Lundwood WwTW inundated by floods in summer 2007*

*photo courtesy of Peter Smith Photography*

optic communications system installed. This work is a mini project in its own right with difficult access and the need to keep existing systems working throughout the process.

Improved control and communication is a key part of the project and ultimately the control of the works will be automated.

### **Knostrap Sludge scheme**

The existing sludge scheme at Knostrap comprises storage, thickening and incineration for both indigenous sludge and imported sludge. Knostrap is a key sludge management centre for YW. Aging assets and the requirements of the new FFD scheme meant that a major overhaul of the system was required.

The scheme provides the following new units:-

- \* 5 no. 22m diameter x 12m high sludge storage tanks;
- \* Drum thickeners.

Additionally, the existing sludge import facility is being improved.

Once commissioned, the scheme will provide improved flexibility in the treatment of sludge at the site. The sludge scheme has been constructed in a very confined area of the existing works with numerous services structures within the site. Additionally, there are various activities being carried out both by YW operatives and by maintenance contractors that have required careful planning and liaison in order to minimise disruption and to ensure a safe working environment.

**On completion of both schemes, in late 2009, Knostrap WwTW will provide a high standard of service and maintain its vital role in the developing city of Leeds.**

**Note: The Editor & Publishers wish to thank Noel Feather and Peter Caldwell, Associates with Arup for producing the above article for publication. ■**