

Claudy & Sion Mills

two new Northern Ireland wastewater treatment works

by
Tom Buick MChemEng (Hons), CEng, MIChemE, CSci, CEnv,

The towns of Claudy and Sion Mills in Northern Ireland are currently served by wastewater treatment works which are both nearing the end of their operational life. To comply with the requirements of the Urban Wastewater Treatment Directive Legislation, Northern Ireland Water are providing two new wastewater treatment works. The basis of both projects is the NEC ECC Option C 'Design and Build' Contract under the Integrated Wastewater Framework (IWWF) which will serve growing populations forecasted to a design horizon of 2030.



Claudy WwTW

photo courtesy Enpure

Design Philosophy

To rationalise the design, procurement and installation process it was decided that the process design of both wastewater treatment works would be kept as similar as possible. Although the WTWs serve differing projected populations, Sion Mills - 5000, Claudy - 3500, the final effluent discharge standards which the two works shall meet are similar, differing by only 5mg/l ammonia.

Final Effluent Discharge Consents are:

- * Sion Mills 30/50/15 mg/l BOD/SS/NH₄;
- * Claudy 30/50/10 mg/l BOD/SS/NH₄.

The main biological treatment process which was selected as the most cost effective over the plant lifetime was the *Enpure* Inclined Bubble Aeration (IBA) system. The main reactor configuration provides the benefits of the fully mixed 'racetrack' system similar to an oxidation ditch combined with the inherent oxygenation efficiency of fine bubble diffused aeration.

Progressing from their initial outline stages both designs were subject to a single Value Engineering study, the outputs of which were

simultaneously integrated into both designs. The individual treatment works designs and commissioning sequences were each subject to HAZOP analysis and a further client initiated Design Review. The similarities of the designs reduced the timescales required to carry out these workshops and integrate the outputs into the finalised plant designs.

Northern Ireland Water, the Client, employed *Shearwater Consortium* to provide the two new wastewater treatment works, and through the Regional Project Manager, (RPM) *Halcrow Mullholland and Doherty*, provided *Shearwater* with guidance to design and construct both wastewater treatment works. These will serve growing populations forecasted to a design horizon of 2030.

The *Shearwater Consortium* team consisted of the following:- Enpure Ltd - Process & M & E Designers/Contractors; Lagan Construction Ltd - Civil Contractors; GEDA Ltd - Civil Contractors'; WS Atkins PLC - Civil Designers.

Process systems

The common elements for both works are as follows:-

Combined storm overflow - Separating high storm flows and removing unsightly material from the overflow prior to discharge into the receiving watercourse.

Preliminary treatment - Removal of 'rag' and grit from the remaining flows which are deposited into a skip for removal from site.

Storm holding - Controlling flows passing through the main treatment processes, holding excess flows for return to treatment or settlement prior to discharge to the receiving watercourse dependant on storm duration.

Biological treatment - Activated Sludge (IBA) system designed to remove solids and biological contaminants from the incoming flows, this is achieved by contacting the incoming flows with returned mixed liquor and aerating the combined flows in a set of 'racetrack' reactors. The mixed liquor produced is allowed to settle out in a set of circular final settlement tanks, producing an effluent suitable for discharge into the receiving watercourse.

Sludge treatment - Sludge generated as a result of the biological treatment is transferred to a thickening system. Thickened sludge is held in a mixed storage tank prior to being removed from site by tanker. Contaminated liquor from the thickening process is returned to the main biological treatment process for treatment.

Associated systems - A Control Building houses the control panel and other mechanical and electrical systems required to operate the works automatically 24 hours a day, 7 days a week, with minimal operator intervention. A standby generator is also provided to ensure that treatment continues even in the event of a power cut. A pumping station returns 'dirty' site drainage to the main biological treatment process for treatment.

Site specific details

Although the process systems were kept as similar as possible, each site presented its own individual challenges and opportunities.

Claudy WwTW

In addition to the main wastewater treatment works the contract involves replacing three small nearby wastewater treatment works (Clagan, Glenshane Road and Kinculbrack) and Pinewood Crescent Pumping Station, located on the existing treatment works site. New pumping stations and a network of rising mains are currently being installed to transfer crude sewage from the areas served by these works to the main Claudy Works for treatment.

The design and control philosophy for the whole newly extended Claudy sewerage network enables maximum use of the pumping station assets which are designed with their own individual storm holding capacity and storm overflow systems. The pumping station shall transport a limited flow of crude sewage to the main works while locally discharging flows generated as a result of the pumping station catchments storm conditions.

Shearwater have installed and commissioned the new wastewater treatment works on the existing site adjacent to the existing works and are planning to seed the activated sludge lanes prior to transferring the incoming gravity network flows. Once all of the pumped flows from the outlying pumping stations are being treated the commissioning of the new process units shall be finalised and all of the redundant wastewater treatment works process units can be decommissioned and demolished. *Civil Contractor for the Claudy WwTW was: GEDA Ltd*

Sion Mills WwTW

Due to site area constraints Shearwater are currently installing the new wastewater treatment works, on the same site as the existing works, by means of a phased construction approach. To maintain effective treatment of the incoming flows from the gravity sewerage network, portions of the new plant are being operated under a temporary flow control regime whilst re-using elements of the existing process systems.

Process commissioning of the newly constructed wastewater treatment works systems have enabled decommissioning and demolition of sections of the existing works to make area available for the installation of the remaining systems of the finalised wastewater treatment works.

Temporary process system installations which are required by the phased construction approach have been specifically designed to act in different modes of operation during each phase of construction and to be integrated into the finalised wastewater treatment works, thus maximising their usage. *Civil Contractor for the Claudy WwTW was Lagan Construction Ltd;*

Current progress

Work on the new **Claudy Wastewater Treatment Works** contract commenced on 6th February 2006 and is planned for completion and handover by 17th July 2007. At present the main process systems of the new works are completed, and activated sludge seeding and biological treatment took place on 25th April, with full transfer of crude sewage from the outlying pumping stations by end May 2007.

Sion Mills Wastewater Treatment Works Contract commenced on 29th May 2006, and the work is planned for completion and handover by 3rd December 2007. The first 'preparation phase' of the three construction phases was completed in January 2007. Work is currently ongoing on the second 'transition phase' to enable seeding of the new treatment process in June for biological treatment. The third 'completion phase' is planned to start 24th September 2007 to finalise construction work prior to full commissioning with final demolition of the existing works taking place throughout November 2007. ■

Note: The Editor & Publishers wish to thank Tom Buick, a Senior Process Engineer with Enpure Ltd for producing the above article for publication.

Odour Control by ERG

25 years of experience supplying odour control systems to the waste water industry



← **High efficiency chemical scrubbing systems** catalytically enhanced with Odorgard™ or upgradeable



← **Reliable biofilters** fully enclosed, 95-98% H₂S removal using specially conditioned biomedium



→ **Low cost dry media filters** for any gas flow - annular, double bed, deep bed, containerised - single or dual media - Activated and impregnated carbon, and oxidising dry media



ERG (Air Pollution Control) Ltd

T: 01403 221000

F: 01403 221001

E: info@ergapc.co.uk

www.ergapc.co.uk





Storm Tank at Sion Mills WWTW

photo courtesy Enpure



IBA Lanes at Claudy WWTW

photo courtesy Enpure