

Cross Hands WwTW Growth Scheme

£3m expansion to accommodate food park

by
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Cross Hands WwTW, located in South Wales some 15 miles east of Carmarthen, is on one of the main road corridors to Ireland. Due to its location, it is subject to significant growth and in particular an Industrial Agri-Food Park, is being developed as a joint venture between Carmarthen County Council (CCC) and the Welsh Assembly Government, and forms a critical part of Carmarthenshire's Regeneration Strategy. Dwr Cymru Welsh Water (DCWW) have completed a fast track expansion of the wastewater treatment works at Cross Hands to provide capacity for treatment of Trade Waste from food processing factories, additional factory workers and the domestic residential expansion that goes with growth.



Cross Hands WwTW: Construction underway on congested site

courtesy Dwr Cymru Welsh Water

Existing WwTW

The existing WwTW treated a mixture of domestic sewage and industrial effluent from an equivalent 7266PE and comprised screening, primary settlement and secondary treatment by plastic media biological filters to achieve a discharge consent of BOD<20; SS<30; Amm-N <7 mg/l prior to discharge to the Afon Gwili.

Early discussions between the interested parties, CCC, Welsh Assembly Government and DCWW produced estimates of the industrial effluent likely to be generated by the food processing industries, the domestic sewage from the factory workers and the associated housing development in the catchment. This resulted in a projected increased load equivalent to 5504PE, i.e 76% increase in treatment capacity.

Funding for the project was jointly provided by DCWW, and CCC. It has also been part funded by the European Union's Objective One programme through the Welsh Assembly Government and has received more than £1 million from the European Regional Development Fund.

The receiving watercourse, the Afon Gwili is a relatively small river having an RE1 classification that is not subject to any water quality drivers, but the application of the Environment Agency's (EA) 'no deterioration' policy resulted in a projected consent of BOD<12; SS<18; Amm-N<4.2 mg/l.

In order to achieve this consent in a reliable way it was decided that a 2 stage biological process would be necessary. Reuse of existing



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assets on site and flexibility of process treatment were paramount during the initial optioneering process of the design phase. Two lanes of activated sludge (AS) treatment were adopted for the secondary treatment process with the existing plastic media trickling filters retained as nitrifying filters and followed by final sand filtration for tertiary solids removal.

The design adopted comprises pre-treatment of the gravity domestic sewage stream by an inlet CSO limiting the forward flow to SocA, mechanical screening to 6mm x 6mm, grit removal, fat removal and lift pumps for the foul flow to the AS plant inlet mixing chamber. Flows in excess of foul treatment flow are lifted to circular storm tanks providing in excess of 2 hours storage.

The industrial estate effluent (both trade effluent and workers domestic) is pumped to the plant where there is a mechanical 6mm x 6mm screen prior to entering the AS plant mixing chamber, where it mixes with the gravity domestic foul and the returned activated sludge (RAS).

The AS plant comprises two lanes each 5m wide x 20m long x 5m liquor depth and having an aerated contact zone. Aeration is by fine bubble diffused air with fixed taper achieved by diffuser spacing and a single dissolved oxygen (DO) meter controlling the air control valve to each lane. Duty, assist, standby blowers are provided, each housed in acoustic enclosures and driven by variable speed drive motors.

Mixed liquor suspended solids (MLSS) meters in each lane and in the common outlet from the AS lanes give triple validation of value to the control system. Double validation of blower pressure and dissolved oxygen (DO) are also incorporated to provide reliability of process control.

Settlement is provided by a 10m dia conical base settlement tank from where the RAS is returned to the AS mixing chamber and the SAS can be wasted direct to gravity thickening.

An Alfa Laval drum thickener is fed directly with SAS where it is thickened to 5% after polyelectrolyte dosing and prior to storage. Sludge is removed from site by tanker to a sludge processing centre and it was felt that the on site thickening was necessary to prevent an increase in tanker road traffic. Operation of the SAS wasting/thickening can be controlled by either time or MLSS.

Settled secondary treated effluent is pumped to the biological nitrifying filters which operate at high wetting rates achieved by continual recirculation. Tertiary treated effluent is passed via two continuous sand filters, supplied by *Hydro International Ltd*, to the final sampling chamber.

Thickener filtrate and sand filter dirty wash water are returned to the AS plant for re-treatment.

New plant and equipment are controlled from a new MCC incorporating ProfiBus linked intelligent starters, Mitsubishi PLC and fibre optic link to the existing MCC.

Initial commissioning of the process has been restricted to one of the two AS lanes and one of the two nitrifying filters. The additional treatment capacity will be brought on line as the load from the Industrial Park increases when companies move their food processing operations to Cross Hands Food Park.

Detailed design, procurement, construction and commissioning were carried out by Morrison Construction (Civil) and Imtech Process (process and M & E) working as part of the Welsh Water Asset Management Alliance and in specifically with the operator Kelda group.



Cross Hands WwTW: Screening of industrial park flows

courtesy Dwr Cymru Welsh Water



Cross Hands WwTW: MCC kiosk and tertiary sand filters

courtesy Dwr Cymru Welsh Water

The project required a reduced programme completion time that necessitated a rapid design and build approach where the on site construction programme for the £3m project was to be completed within 9 months and to within budget. This was achieved through a collaborative working approach between the civil and process partner, which included a number of innovative solutions, including onsite recycling and utilisation of temporary works design into permanent works design. It must also be recorded that the site maintained a first class safety record throughout the works with no major incidents reported.

All this contributed to an excellent achievement on a tight site, where there was a need to keep the existing process operating at all times to maintain the discharge consent and where there were many process interfaces to manage. ■

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