

Chester WwTW

storm tank discharge and inlet works

by Mary Alexander CEng., MIMechE, MSc, BEng(Hons)

Dwr Cymru Welsh Water's (DCWW) wastewater treatment works (WwTW) in Chester is located on the north bank of the River Dee close to Chester city centre. The WwTW is bordered by Sealand Road Industrial Estate, the Greyhound Retail Park and a residential area. Chester WwTW caters for the entire Chester catchment, which equates to a population equivalent of approximately 126,076. Flows from the catchment arrive at the works by gravity, and there is a requirement to treat full flow to treatment (FFT) of 922 litre/second, and one in five year storm flow of 2610 litre/second. The main process elements on site are an inlet works comprising screening and grit removal, storm storage, primary settlement, biological treatment (activated sludge plant) and final settlement. There is also a sludge treatment centre on site which treats indigenous and imported sludges.



New screens 1,2,3 (facing)

photo courtesy of Dwr Cymru Welsh Water

Existing Inlet Works and reason for the scheme

Chester WwTW has three discharges to the River Dee through two outfalls; a final effluent outfall and a storm outfall. Flows to the storm outfall comprise of flows from the storm tanks and discharges from the parent CSO (overflow from the works inlet channels into the works bypass channel). Flows to the works, storm tanks and river are all pumped by three sets of pumps (foul pumps, storm pumps and river pumps). The existing inlet works had four automatically raked bar screens which discharged screenings into two hydraulic ram type screenings presses. The compacted screenings were then dropped into a skip. The inlet screen had bars spaced at 20mm. They were also dilapidated and did not remove screening from the incoming flow efficiently. The screen in the storm overflow channel was designed to lift up out of the flow to prevent damage to it due to the velocity entering the channel in storm conditions. However, this occurred almost every time it operated which allowed unscreened flows to pass to the storm outfall via the River Pumps.

The screens, screenings handling equipment, skip and MCC room were housed inside a portal frame building. There was also an odour control system in the building which was out of service, a pair of pumps to provide washwater to the screens and another pair to

provide launder water for the screen in the storm overflow channel, which allowed the screenings from it to be transferred to the hydraulic press used by the screens in the bypass or FFT channels.

Screened flows pass to the two detritors downstream and then onto the FFT and storm pump sumps. When the incoming flow beats the FFT pumps, the inlet penstock to the storm pump sump opens allowing it to fill and the storm pumps to operate. However, when this occurs the level in the FFT sump drops which shuts one of the FFT pumps off and reduces the flow to full treatment.

Background

The purpose of this scheme was to meet the requirements of an AMP4 Quality driver to improve the aesthetics on the River Dee (an OFWAT monitored project output). The output will be achieved by screening all flows into the works to 6mm. Funding for the project came from two sources; Planned Capital Maintenance (PCM) and Quality. The PCM funding allowed for a complete overhaul of the existing inlet works and the Quality funding for screening of the parent CSO. Although the two requirements were different, it made sense to combine the two schemes to ensure greater efficiency of work and budget and minimal disruption to the operation of the WwTW.



The old screens and screenings were housed in this building (left) & demolition (right)



photo courtesy of Dwr Cymru Welsh Water

The project

The scheme included the feasibility design, peer review, whole life costing, selection of the best option, detailed design, construction and commissioning for the scheme. The scope included feasibility, detailed design, construction and commissioning of the refurbishment of the inlet works including; 6mm screens, screenings handling, new MCC including PLC control. The inlet works needed to be kept operational whilst the construction works are carried out. The scope also includes reinstating the existing automatic emptying of the storm tanks and optimisation of control of the Foul and Storm pumps control to ensure the FFT is always passed forward to the works for treatment.

The scheme worth £3.9 million, was started in October 2007 and was carried out during the winter months to meet the deadline for the March 2008 output. The full scheme is due for completion by August 2008. Throughout the installation work, the inlet works at the WwTW had to be maintained and kept operational to enable the works to continue to treat FFT coming in. The timing of the scheme meant that not only did the work have to be carried out while maintaining FFT, but it was carried out during adverse weather conditions and this added complication had to be taken into consideration. In addition, there was a large badger population on site, which had to be acknowledged and worked around.

Scheme Specific Details

- * PE 126,076;
- * FFT 922 l/s;
- * SOCA 1844 l/s;
- * 1 in 5 year storm flow 2610 l/s;
- * Demolition of existing screens building;
- * Decommissioning and removal of existing screens and screenings handling equipment;
- * 4 No. 6mm screens to be installed in the existing channels to screen SOCA flows;
- * 2 No. screenings handling units;
- * 1 No. 6mm screen to screen 1 in 5 year storm flow;
- * Construction of one new screen channel to screen flows to the parent CSO and an emergency by pass;
- * Modification to the existing bypass channel to create an additional screen channel for SOCA flows;
- * Full MCC, ICA, SCADA package;
- * PLC control of inlet works;
- * Decommissioning and removal of the existing MCC;
- * Reinstatement of the existing automatic emptying of the storm tanks;
- * Modifications to the existing Foul pumps PLC control.

Progress to date

The aesthetic driver on the River Dee was achieved in time for the March 2008 outputs, and total scheme completion is due in August 2008, within the 12 months contract period.

The partners

The partners working on this AMP4 scheme for DCWW as an asset management alliance included Costain as the civil construction partner, Imtech Process as the M & E and Process design partner and EC Harris as the cost consultants. UUOS are the operating partner at Chester WwTW. Whitleys was the tier one supplier for civils and Faber Maunsell was the civil design partner. Metec was the tier one supplier for the mechanical installation and steelwork and MCS for the MCC and electrical installation. The screens and screenings handling equipment were designed, supplied and installed by the Longwood Engineering Company Ltd.

All the partners and tier one suppliers worked closely together to ensure that the scheme was completed and delivered for DCWW with minimal disruption to the operation of the Chester WWTW and the local area.

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Silver Street
Huddersfield
HD5 9BS

T: 01484 424545
F: 01484 437379

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Contact: steve.baker@fabermaunsell.com

Faber Maunsell
Enterprise House
160 Croydon Road
Beckenham, Kent
BR3 4DE

T: +44 (0)20 8639 3719

F: +44 (0)20 8663 6723

www.fabermaunsell.com

