

Piethorne WTW

by

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In order to comply with the most recent European Union water quality directives and reduce the risk of cryptosporidium outbreak at the Piethorne and Wickenhall Water Treatment Works (WTWs), United Utilities (UU) undertook a programme of improvements.



Left to right - Chemical Dosing, MCC Control Building and 2nd Stage Filters

Courtesy of KMI+

Introduction

Piethorne and Wickenhall WTWs are of key importance to the water supply in the surrounding area and across the wider region. They are both designated base load plants.

The scheme solution involved discontinuing the washwater recycle process at both sites and decommissioning the press at Piethorne. The process wastewaters could then be mixed and balanced before being released at a controlled rate to a new discharge pipeline. The new pipeline connects into the local sewer network near Newhey with a new 1,500m³ detention tank to control the release of flows into the network.

The discharge pipeline enabled the decommissioning of dewatering of the Piethorne and Wickenhall WTW sludges at Piethorne and also allowed the discontinuation of press liquor discharges to Kitcliffe Reservoir.

Due to a limit on the combined abstraction flows from the various sources that feed Piethorne and Wickenhall WTWs, they can never be operated at maximum output together. The design capacity of the

discharge pipeline was therefore based on the most onerous combination of respective plant flows and water quality events.

MWH (UK) undertook the Solution Identification and Development (SID) stage of the project on behalf of UU. In order to meet construction deadlines and compliance dates determined by the Environment Agency (EA), it was necessary to phase the works into four distinct contracts:

- Piethorne WTW
- Wickenhall WTW
- Detention Tank
- Discharge Pipeline

The first design and build contract was awarded to KMI+ in January 2006. The other contracts followed on over an 18-month period. Work on site commenced in July 2006 at Piethorne WTW. This was followed in February 2007 by the commencement of work on the 1,500m³ detention tank. The pipeline contract work was started soon after, in March 2007 with the final Wickenhall WTW contract commencing in July 2007.



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Piethorne WTW

New construction work comprised:

- New second stage filters
- Second-stage dirty backwash pumping station
- Second-stage clean backwash tank
- Interstage pumping station
- Discharge balancing tank
- Chemical building
- Associated dosing equipment for sulphuric acid, sodium hydroxide, lime and sodium hypochlorite and point of application dosing kiosks
- Emergency generator & diesel storage
- Pipelines
- Foul pump station

In addition to this, the existing first stage filters required refurbishment and installation of new launder troughs and media. Similarly, the existing dirty washwater tanks were converted into first stage filter clean backwash tanks.



Re-profiled entrance to Works, Clarifier and Chemical Building Courtesy of KMI+

Wickenhall WTW

New construction work mainly comprised:

- Temporary Sodium Dihydrogen Orthophosphate (SDO) storage and dosing system
- Removal of existing Orthophosphate storage and dosing system
- Installation of SDO storage and dosing system within the existing pumping station
- Replacement of a split casing pump within the pumping station
- Relocation of the service water booster pumps, pipework and cables
- Modification of existing access stairs and provision of new access platforms, ladders and staircases
- Installation of Sodium Hydroxide storage and dosing system within the existing pumping station
- Removal of existing Sodium Hydroxide storage and dosing system
- Installation of Sulphuric Acid storage and dosing system
- A building above an existing dosing chamber to house new dosing equipment
- An underground chamber to house a new static mixer and dosing equipment with a building above to house new dosing equipment
- Baffle walls and curtains within the existing contact tank
- Software and SCADA modifications

The chemical storage and dosing systems were installed within an existing pumping station basement. This basement housed the original Sodium Dihydrogen Orthophosphate (SDO) storage and dosing system. Before any of the necessary new chemical systems could be installed it was necessary to provide a temporary SDO storage and dosing system. Other modifications and relocation work required in the pumping station also had to be completed before the main work could begin.

Detention Tank

New construction work comprised:

- 1,500m³ detention tank
- Control kiosk
- Extensions to the existing Combined Sewer Overflow (CSO) chamber
- Connecting pipework
- Storm Return Pumps
- Scavenger Pump
- Storm Return Rising Mains & Flow Switch Chamber
- Pressure relief vent (buried pipework)

The land on which the detection tank was constructed was the site of a sewage treatment works that had been landfilled to its then-present levels. The site had also formerly been a landfill site so had the potential for contamination. The access road to this site was narrow and also used by local residents. This road also passed over an access bridge crossing the River Beal. Investigations undertaken by Kier Engineering Services indicated that the bridge was capable of carrying the required 40T articulated road wagons and 40T crawler crane loads anticipated. A speed limit of 5mph was strictly enforced over the bridge for all loads over 18T in order to minimise dynamic loading and to reduce the risk of impact with the deck edge protection.

Discharge Pipeline

The route of the 3.4km discharge pipeline incorporated highway, agricultural land, railway proximity and included the construction of a pipe bridge over a river crossing. From historical data provided by UU, a section of abandoned main approximately 800m long was identified. Site investigation determined that the existing main was suitable for slip lining with the proposed discharge main. This removed the need to construct the pipe bridge, saving the project an



View of Cofferdam to 2nd Stage Filter Interstage Pumping Station and Dirty Backwash Tank across Kitcliffe Reservoir Courtesy of KMI+

estimated eight weeks and reducing the pipeline by 500m. It also negated the need to export excess material and import reinstatement material, therefore reducing wagon movements. At another point, the pipeline was installed via a single directional drilling operation where it passed under the River Beal and a main road before rising 80m through rock.

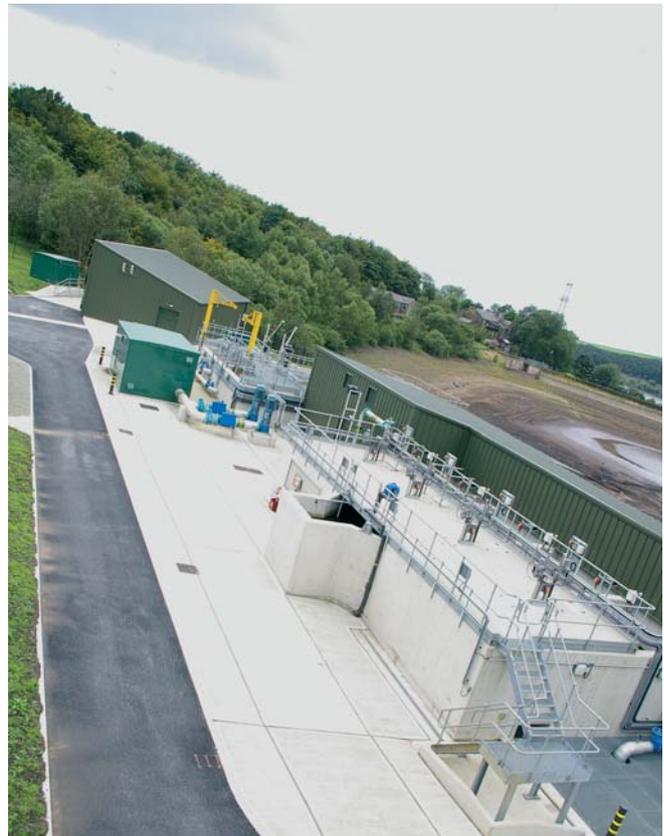
Summary

This was a highly complex project involving construction works at three major sites and a connecting discharge pipeline. Construction work was phased as it was necessary for the works to be complete on the discharge sewer and detention tank before commissioning work at the water treatment works could be completed. Temporary treatment facilities needed to be provided before construction could begin at Wickenhall WTW. Construction work commenced in July 2006 and the whole of the works was successfully handed back to UU in November 2008.

Project Details

Client: United Utilities
 Capital Value: £21million
 SID Phase Designer: MWH (UK) Ltd
 Principal Contractor & Detailed Design: KMI+ (Kier, Murphy, Interserve and Mouchel)
 Main Process Plant Suppliers: PCM, Filtec
 Principal Sub-contractors: Sheet Pile UK; Fussey; JB Fabrications;
 Access Metalware: TCS
 Construction Period: July 2006 - December 2008

Note: The Editor & Publishers thanks John March, IA+ North CDM Coordinator Manager, for providing the above article. ■



Left to right - Chemical Building, Chemical Dosing, MCC Control Building and 2nd stage Filters Picture

Courtesy of KMI+

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