

# Holdenhurst STW

## inlet screens and screenings handling plant replacement

by James Henderson

**H**oldenhurst Sewage Treatment Works in Bournemouth, Dorset serves approximately 160,000 people. The inlet screens and screenings handling plant were aging, and had reliability issues. In April 2012 Wessex Water commenced a £2.1m scheme to replace the existing inlet works with the installation of new escalator screens, compactors, washwater facilities and intelligent motor control equipment.



*Kuhn compactors & launder channels - Courtesy of Trant Construction Ltd*

### Working on a live site

It was recognised that a successful transition during construction would require detailed advanced planning and close cooperation between project team partners and Operations due to the inability to divert the incoming flows during construction. The plant had to be kept fully operational throughout the duration of the upgrade.

### Key partners

- Wessex Engineering & Construction Services (WECS) undertook project management, design management, operations interface, ICA, commissioning as well as acting as principal contractor with responsibilities for demolition and construction.
- Trant Construction, an AMP5 framework contractor for Wessex Water undertook the detailed design for the electrical and ICA, as well as procurement, installation and commissioning of the mechanical & electrical installation.
- Trant Systems Electrical (TSE) manufactured, installed and commissioned a new intelligent motor control centre (IMCC) for the inlet works and screenings handling.
- Grontmij were responsible for the outline and detailed design for the civil, mechanical and electrical aspects.

### Technical details

Inlet flows to Holdenhurst are separated into two inlet works streams (Stream 1 and Stream 2). Full flow-to-treatment for streams 1 and 2 are 950l/s and 475l/s respectively and on both streams the flow passes through coarse screens, grit removal and fine screens.

The AMP5 scheme improvement provided:

- New replacement fine screens and screenings handling for Stream 1.
- New coarse and fine screens and screenings handling for Stream 2.
- Incorporating duty/standby Kuhn screenings compactor units.
- Washwater pumping station.
- High pressure booster pumping package with automatic filtration.
- IMCC - new control equipment to be located in the existing inlet works MCC building.
- Inlet PS wet well repairs.

Repair/refurbishment work included:

- Isolation of the wet well and incoming flow diversion.
- Repairs to damaged concrete, involving the removal of all





Longwood fine screens - Courtesy of Trant Construction Ltd



Holdenhurst Inlet Works - Courtesy of Trant Construction Ltd

the existing soft or contaminated concrete, reinstatement of the walls and base with sprayed concrete, and protection of the concrete with a chemical resistant coating to provide a 10-20-year design life.

- Repair isolating penstocks.
- Structural strengthening of the wet well through the addition of an internal RC frame.
- Replacement of the concrete cover slab with pitched GRP cover fitted with access hatches.

#### Construction phase

Crucial to the upgrading process was construction planning to keep the plant fully operational throughout the upgrading process. The construction sequence required very close cooperation between WECS, WECS Civils, Operations and Trant so that each screen could be removed, channel modified and new screen reinstalled, all whilst the stream was kept online.

Construction began in April 2012 with WECS Civils construction teams commencing with clearing the site, advanced civil works and preparation of the existing works for conversion to accept the new equipment. Trant Construction joined WECS on site in June 2012. In order to keep the plant fully operational the 7 (No.) screens to be replaced were being taken out one at a time and in a sequence that meant each stream continued in use throughout the entire operation.

Early advanced installation included the installation of the screenings compactors on the Stream 2 fine screens as the original equipment had failed.

#### Inlet screens specifications

##### Stream 1:

- Replacement of the existing step screens with 3 (No.)

Longwood Engineering fine screens (escalator, 6mm 2D apertures).

- Replacement of 6 (No.) screenings screw conveyors (2 (No.) per screen) with a combined screenings launder trough.

##### Stream 2:

- Replacement of the existing coarse screens with 2 (No.) Longwood Engineering coarse bar screens (Model: ER, bars at 19mm spacings).
- Replacement of the existing step screens with 2 (No.) Longwood fine screens (escalator, 6mm 2D apertures).

#### Compactors specifications

4 (No.) Kuhn KWP 300/1200 wash press units, each sized to handle 4.5m<sup>3</sup>/hr of screenings and 2 (No.) Kuhn KWP 400/1200 wash press units, each sized to handle 8m<sup>3</sup>/hr of screening. Each screenings handling unit is provided with a discharge pipe to deposit screenings into a receiving skip.

Advanced M&E works and the early installation of the new IMCC streamlined the removal and replacement of the screens. On completion of installation, each item of plant was full connected, tested, and commissioned, then followed a period of process proving before the next screen removal could take place.

#### IMCC specifications

A new IMCC, based upon a form 4a Type 2 construction, utilising a certified distribution system (busbars, rated at 400 amps, fault rating 30kA/1 second), was designed, manufactured and installed by Trant Systems Electrical (TSE). The mechanical design process encompassed the client's specification, WIMES 3.01 specification, BS7671 and the requirements of BS EN 60439 (& BS EN 61439) with regards IP rating requirements, clearances and creepages, protection against electric shock, temperature rise and mechanical operations.



Screenings handling system - Courtesy of Trant Construction Ltd



IMCC (intelligent Motor Control Centre) – Courtesy of Trant Construction Ltd

The panel consisted of:

- 200A incomer with surge protection.
- 5 (No.) 1.5kW VSD screen drives.
- 5 (No.) 1.5kW DOL brush drives.
- 4 (No.) 5.5kW reversing DOL compactor drives.
- 2 (No.) 7.5kW reversing DOL compactor drives.
- 2 (No.) 1.1kW DOL coarse screen drives.
- 1 (No.) TP&N 63A feeders for high pressure washwater panel.
- 1 (No.) TP&N 100A feeders for low pressure washwater pump MCC.
- 2 (No.) TP&N 16A feeders.
- 1 (No.) 16Way SP&N distribution board for washwater valve actuators.
- 1 (No.) 8Way TP&N distribution board for knife gate valves and penstock actuators.
- An ICA section containing Siemens PLC, Pulsar level controllers and conditioning equipment for the monitoring of the plant status, flowswitches, pressure switches, etc.
- 9,000l storage tank with duty/standby filtration to provide solids free wash water for both streams.
- A Bollfilter fully automatic backflushing filter type 6.19 - duplex dual basket filter was installed to filter final effluent washwater to 0.5mm in two dimensions, before entering the washwater booster set break tank.
- A Grundfos washwater set has been installed to supply the inlet screens and associated launder troughs, screenings handling units and a number of standpipes.

The washwater system is designed to achieve a duty at the washwater set outlet of 16 l/s @ 51m. The set consists of 3 (No.) booster pumps which transfer final effluent from the break tank to inlet works equipment and hydrants connected to the washwater mains.

The pumps are variable speed driven and operate on a duty/assist/standby basis, based on the pressure in the delivery main. An accumulator is utilised to pressurise the washwater main and limit the number of stop/starts of the booster pumps.

All drives were connected utilising dual PROFIBUS networks to the PLC. TSE worked closely with WECS ICA & Automation team to deliver the project to the client's requirements.

The completed works were handed back into the control of Wessex Water's Operations Division in December 2012, with all staff fully trained in the operation and maintenance of the new equipment.

Works continued on site from June through to October 2012, which included the installation of new low pressure washwater submersible pumps into an existing final effluent chamber, the installation of a low pressure wash water delivery main and the installation of a high pressure wash water booster system.

The scheme, completed under budget and ahead of programme, was orchestrated through a multi-disciplinary teamwork. All partners, WECS, Trant, Grontmij and Operations worked very closely from contract inception through to project completion to ensure a successful outcome.

#### Washwater system

- New FE P/S to feed all inlet works equipment on Streams 1 and 2.

*The Editor & Publishers would like to thank James Henderson, Operations Manager with Trant Construction Ltd, for providing the above article for publication.*



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