

# Salisbury STW

## quality improvements

by  
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**S**alisbury Sewage Treatment Works is owned and maintained by Wessex Water, and is located at Petersfinger on the outskirts of the main town. It serves a population of 58,588 people. The Environment Agency's tightening of Phosphorus consent and outfall relocation has led to the need for Wessex Water to make significant modifications and additions to the existing works. The outfall relocation further downstream to the River Avon involved a new 1.5km pipeline outside the works across an existing flood plain.



Working area at Salisbury STW

Courtesy of WECS (Wessex Engineering and Construction Services)

### Existing works

Salisbury STW has the capacity to treat 492 l/s of crude sewage and has one stream which divides into two after Biological treatment. It then combines prior to the final outfall MCERT chamber.

The works are comprised of:

- Low level inlet works, including 3 No. Brackett Green screens (6mm, 2D); screenings macerators and dewaterers; detritor and grit classifier;
- Inlet pumping station;
- Storm overflow weir and storm tank feed pumps;
- 4 No. radial flow primary tanks with auto desludging;
- 10 No. circular biological filters (8 No. with mineral media, 2 No. with plastic media);
- Filter effluent pumping station;
- 6 No. radial humus tanks with auto desludging;
- Ferric sulphate storage tanks and dosing pumps for chemical P removal. Ferric is dosed into the feed to the primary tanks;
- 5 No. storm tanks;

- Sludge treatment comprising thickening using 2 No. drum thickeners; a single mesophilic anaerobic digester; digested sludge storage tanks.

### Consent

The driver for this project is the AMP4 National Environment Programme (NEP) and tightens the Phosphorus consent limit for Salisbury STW from 2 mg/L to 1 mg/L on an annual mean basis. The NEP also requires the works effluent discharge to the River Avon at a grid reference agreed with the Environmental Agency.

### Brief

A brief was issued to Wessex Engineering and Construction Services (WECS) to:

1. Upgrade the inlet works ferric dosing for efficiency and to introduce secondary ferric dosing into two parallel streams before secondary treatment. Secondary dosing involved construction of two flocculation tanks with mixers and a total refurbishment of the pump station required for pumping flows from the existing biological filters to the Humus tanks.

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2. Install a new 1.050m dia pipeline, outfall, and divert the treated effluent flows within the works to it. Within the works a new substantial final effluent chamber, storm overflow chamber and new MCERT measurement were constructed. The outfall is designed to allow a flow of 650 l/s to gravitate to the new outfall against a 1 in 25 year flood level.

## Construction

It was recognised that successful project delivery would depend on the quality of liaison with the site operational team. This was achieved with the assistance of the WECS in-house civils construction team as Principal Contractor. Due to the significant liaison necessary whilst working on an operational STW, including planning and phasing of works, the use of WECS lent itself perfectly to the project and enabled rapid and cost effective decision making when foreseen and unforeseen risk events occurred.

All civil works were hampered by the underlying gravels, bad weather during the winter months and high water table (approximately 300mm below ground level). As a result temporary works and dewatering were planned in some considerable detail. Dewatering methods were agreed with the Environment Agency prior to use and a combination of settlement tanks and cyclone filtration technology were used.

The flocculation tanks are both 7.5m square by 7m depth constructed using reinforced concrete. 3.5m of which is below ground level. Interlocking Larson piles were used to mitigate as much ground water as possible. These tanks allow efficient mixing of dosed ferric to enable the phosphate consent to be achieved.

The pump station refurbishment required total isolation of all incoming flows and therefore temporary overpumping capable of 550 l/s was installed using 3 No. centrifugal pumps with 8" suction and 12" discharge and telemetry linked back to the outstation.

## Environmental recycling

The underlying soil, gravel and concrete crushing of hardstand areas

enabled considerable savings which were achieved by reusing these materials as backfill.

## Instrumentation

An ortho-phosphate monitor was installed on the crude sewage inlet to provide a feedforward control system for the control of the primary coagulant dosing rate. On failure of the monitor, the dosing shall revert to the Wessex Water flow proportional dosing control.

To monitor the quality of the final effluent, the following has been installed on the final effluent pipeline in a cabinet type kiosk:

- Ortho-phosphate monitor;
- Iron monitor;
- Turbidity monitor;
- Ammonia monitor;
- Temperature.

The introduction of these monitors will enable operations to react efficiently and off site if required.

## Health & Safety

WECS employs a rigorous attitude to driving Health and Safety standards ever higher. A dedicated Health and Safety team undertook regular audits and four week look-ahead reviews in conjunction with the contract program and site team. Adopting this method has led to an accident frequency ratio significantly better than the industry norm. There were no incidents throughout this project with man-hours totaling 37,988 hours.

The construction activities and the commissioning of the new works were completed ahead of time and the effluent was fully compliant before the regulatory date.

**Note: The Editor and Publishers thank Darren Gregory, Construction Manager, and Shaun Hobbs, Construction Site Manager, both with Wessex Engineering and Construction Services, for preparing the above article for publication. ■**



Flocculation tank with Aki access steps

Courtesy of WECS (Wessex Engineering and Construction Services)