

Stewarton Wastewater Treatment Facilities

£1.1m project enhances water quality in west of Scotland

by
Kenny Dallas

Stewarton lies at a crossing point of the Annick Water, six miles from Kilmarnock in the west of Scotland. Tighter environmental consents required improvements to the town's wastewater treatment plant to enhance water quality in Annick Water, a river which runs through North and East Ayrshire and home to a healthy population of trout, salmon, minnows, eels and freshwater shrimp. The Stewarton works, which serves a population of around 7,000, is a conventional trickling filter plant and investment was needed to provide additional dosing and pH correction processes and refurbishment of the filter arms, scraper rail and storm return system.



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courtesy Scottish Water Solutions

The original scope for the project had included installation of new sand filters and pumps but after site investigation an alternative method using chemical dosing rather than filtration was developed to meet the drivers. This solution saved around £400,000 from the original budget for the project.

Treatment

The concrete structures of the primary sedimentation tanks required remediation work and, as the tanks were in a poor condition it was not proposed to automate desludging.

The trickling filters were retained but now operate as double filtration units, enabling one set of three filters to be identified as primary filters, and the other three as secondary filters. Whilst the effluent is of a good quality, Alternating Double Filters required an operator to change the filter sequence and given that sewage was also weak did not warrant ADF treatment.

As with the existing ADF operation, one humus tank was identified as the primary humus tank and the other as secondary. The filter arms were refurbished by *Simon Hartley*.

A new dosing chamber was installed on the line from the secondary filters before the filter effluent passes to the secondary humus tank.

The new consent required phosphorus removal. This is achieved by the use of a chemical coagulant Polyaluminium Chloride (PAC) supplied by *Kemira*. The benefit of utilising PAC is the reduced impact upon pH levels which are consented at 5.0 - 9.0. This removed the need to implement pH correction and led to a further cost saving.

A coagulant dosing system was installed as a package plant supplied and installed by Framework supplier *MCS (Siemens)* complete with pumps operating as Duty/Standby controlled by a PLC. The method of dosing is flow proportional but rather than being controlled from the works inlet flow meter it features a preset diurnal flow pattern installed into the PLC, however the option to change to flow proportional dosing remains available.

The diurnal variation determines a dose rate that over a 24 hour period will deliver a full daily quantity of coagulant. The dosing pumps are equipped with a manual calibration tube which enables the dosing pumps to be recalibrated each time the dose rate needs to be changed.

Wastewater Treatment & Sewerage



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The new rate is programmed by means of an HMI within the control kiosk. The dose rate at commissioning is set at the calculated rate based upon a molar ratio which can change on the full scale works and therefore the rate will be changed to suit the actual conditions that result in phosphorus consent compliance. This rate will only change on an irregular basis, for example if the incoming phosphorus concentration changes over a period of time.

Each pump has its own hose terminating in a hose connector. Flexible pipework connects onto the hose connector and run on to the dosing chamber. The pipework is double contained and external pipework lagged with termination of the dosing pipe at the open pipe which minimises the risk of crystallisation of coagulant and subsequent blockage.

The dosing pumps take coagulant solution (delivered and used as a concentrated solution from a bulk storage tank).

The tank features an external delivery point with a *Camlock* coupling. It also has an ultrasonic level detector to indicate the tank contents that will alarm at a preset level and an external “cat & mouse” external indicator.

The partnering team consisted of **Scottish Water Solutions and ABV (Amec, Black & Veatch)**. ■

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