

£80m Sandown Wastewater & Sludge Project compact plant on brownfield site serves IOW

by Eleanor Harding, BEng

Southern Water's WwTP and Sludge Recycling Centre, with a project value of approximately £80 million was built to comply with the European Urban Waste Water Treatment Directive (91/271EEC). During the construction phase design changes were required to accommodate the latent environmental legislation, including the Shellfish Directive. The sludge recycling centre will not only cater for sludge arising from the wastewater treatment works but other treatment works elsewhere on the island.



Sandown WwTW – Primary settlement tanks (courtesy Southern Water)

The *Sandown Joint Venture*, an unincorporated joint venture between *Brown & Root* and *Aker Kvaerner* (now incorporated into *Skanska*) was awarded the contract by Southern Water for the design, construction and commissioning of the wastewater treatment works and sludge recycling centre.

The contract is an IChemE 'Green Book' with Target Cost, the project value is approximately £80 million and work commenced in 1999 for completion in 2002.

Design basis

* Wastewater Treatment	160,000pe
* Design Horizon for Equipment	2015
* Maximum Flow to Plant	3145 lps
* Maximum Flow to Treatment	1240 lps
* Sludge Recycle Centre Capacity ..	. 6300 tds per annum

Treatment plant description

The new works has been constructed on a disused solids waste disposal site. In order to construct the plant on a brown field site, it was necessary to design the works in a very compact form, consequently, for it's capacity, Sandown WwTW is one of the smallest plants within the SW region.

The WwTW provides preliminary and primary treatment prior to discharge to sea via a new 3km outfall. The treatment process begins with preliminary treatment through drum screens which provide screening to 6mm in two directions. These screenings are washed and compacted prior to discharge to skip. Screened wastewater is treated by detritors for grit removal and the grit is washed and transferred to skip.

Maximum design flowrate for preliminary treatment is 3145 l/s. Subsequent to storm flow splitting, the maximum flow for primary and secondary treatment is 1240 l/s. Six storm storage tanks are

provided to retain high flows for subsequent treatment, the first tank operates as a 'blind' tank, designed to take the first flush of each storm event. Sludge and cess liquors from smaller communities around the island are imported into the Inlet Works via air locks. Imported sludge and cess receives screening to 6mm or less.

Chemically assisted primary settlement is achieved by lamella plant settlement tanks which provide a small footprint solution. This plant provides sludge thickening to between 3% and 5% dry solids (w/w) The works was designed for saline influent, in particular this impacted on material selection and primary settlement process design. The solids removed from the flow are combined with the imported sludge and passed to the Sludge Recycling centre.

Two years into the contract Government redesignation of high natural dispersion areas (HNDA) meant that full secondary treatment was required. A secondary treatment plant provides fine secondary screening, biological activated flooded filtration (BAFF) prior to pumping to the new long sea outfall. This Secondary Treatment plant was designed to comply with the UWWTd.

Advantages of the BAFF plant are the high biological and solids removal capabilities combined with a small footprint plant and negligible odour emissions, which closely follow the philosophy adopted on the Primary Treatment Works.

Return liquors from the WwTW, sludge recycling centre and dryer are collected and returned upstream of the primary plant settlement tanks. A control system ensures that flows are balanced prior to their return for treatment.

Washwater from the primary treatment works is used for general process washwater requirements and washdown for the site. In addition, the site is provided with a clean water ring main.

Sludge plant description

The SRC receives indigenous sludge, grease from primary treatment, imported sludge and surplus activated sludge. The blended sludge is thickened to 7 to 8% dry solids (w/w) by belt thickeners. Thickened sludge is digested in three mesophilic, anaerobic primary digesters, sludge from the primary digesters and gravitates to two secondary digesters. The primary digesters are lagged and heated to achieve 35 degs C and the tanks are designed for a retention time of 12 to 14 days.

Digested sludge is dewatered and dried to produce dried, granular organic soil conditioner which is predominantly used by the Isle of Wight farming community. The drying plant has been procured in order to provide a suitable sludge disposal route that reflects the introduction of the latest legislation.

Dewatering is achieved by centrifuges which are fed from the Secondary Digesters prior to being transferred either to the sludge dryer or to agricultural trailers. Dewatered sludge is transferred to the drying plant which achieves 92% dry solids by a direct heating system. The dryer has a capacity of 2 tonnes of water evaporation per hour.

Biogas from Primary and Secondary Digesters is collected and stored in a common gasholder prior to use as a fuel to provide heat to the digestion plant and as a fuel for the Dryer. Any excess biogas is treated via a flare stack. In addition, waste heat from the dryer is recycled to add to the heating process.

Odour control

All process units, including the inlet works and primary treatment plant, are fully enclosed and foul air extracted into an odour control system. The odour control system reduces potential odours from

the works to near undetectable levels at the site boundary by a two stage wet chemical scrubber package. The first stage is an acidic scrubber, the second stage is an alkaline scrubber. In addition, the odorous air is passed through a catalyst reactor vessel and finally through a polishing carbon filter. The Inlet Works building and sludge buildings are ventilated and the air is treated by a dry physi-sorption carbon filter units.

Works performance


The works has substantially reduced pollution in the forms of solids and bacteria entering the Solent and English Channel whilst at the same time delivering flows to the sea 3km from the shoreline providing better protection for the Island's beaches. Solids entering the sea were reduced by up to 50% by the primary treatment works, with the addition of secondary treatment, solids reduction has been increased to 85%.. ■

Note: The author of this article, Eleanor Harding, is Senior Process Engineer with Aker Kvaerner.


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