

# Dover & Folkestone WwTW

## upgrade to full secondary treatment with provision for UV

**D**over and Folkestone wastewater treatment works is built into the side of a hill at Broomfield Bank, immediately adjacent to the B2011 coastal road and buried to minimise impact on the local environment. As originally designed, the works comprised primary treatment only but as the primary works neared completion a second contract has been awarded, adding a new underground treatment stage to provide full secondary treatment with provision made for a u.v. disinfection system, if required.



Dover/Folkestone (Broomfield Bank) roof beams over BAFF (courtesy Brightwater Engineering Ltd)

The primary treatment facility at Dover/Folkestone was completed in 1999 and comprises an underground concrete box housing primary lamella plate separators, together with peripheral equipment for the primary treatment of sewage arising from the catchment. In order not to detract from the local environment it was a requirement of the primary treatment contract that the works should be constructed completely underground with a top covering of earth so as to be totally unobtrusive.

New legislation meant that Southern Water was required to upgrade many of its coastal treatment plants and so secondary treatment would need to be added into the Broomfield Bank site. In line with planning constraints for the primary treatment works, the secondary plant would also be located with a below ground concrete box which would be a completely new structure due to lack of room in the existing primary treatment structure.

During 1998, a desk top study of available options to upgrade the Dover/Folkestone scheme was undertaken by Southern Water Services (SWS) and a number of process contractors, including *Brightwater*, to determine the best available solutions. Main considerations for the project were to determine suitable processes that could provide the required treatment levels on a saline influent and provide a plant with sufficient process security to allow for u.v. disinfection at some later date, together with the potential for further upgrading to allow for ammonia removal.

Having evaluated all possible options for the new secondary treatment plant, Southern Water's team of specialists determined that two process alternatives would be considered acceptable for this scheme, namely Biological Aerated Flooded Filter (BAFF) technology or conventional Activated Sludge technology.



Dover/Folkestone (Broomfield Bank) roof beams over BAFF (courtesy Brightwater Engineering Ltd)

**Experienced team**

It was at this stage that *MJ Gleeson* and *Brightwater*, one of Southern Water’s approved process contractors for BAFF technology, teamed up to tender for the work. This team already had an excellent track record of bidding and winning work over many years for numerous clients, including Southern Water. and in particular the experience of building similar *Biobead* BAFF schemes for other clients. Additionally, *Brightwater's* extensive experience of treating sewage with a high degree of salinity was to play a major role in the scheme. Tender documents were issued during December 1999 with an extended bid period due to the complexity of the scheme.

The overall works was to be designed to treat flows and loads arising from the 2020 design horizon population, as follows:

Average Flow	3DWF FFT	Average BOD	Max 7 day BOD	Average SS
l/s	l/s	kg/d	kg/d	kg/d
535	943	11000	13750	13300

The plant was designed to achieve a final effluent quality of 25 mg/l BOD and 125 mg/l SS when treating flows and loads as detailed above and with saline infiltration into the incoming sewage.

Process design for the overall works involved a balance between the cost of the chosen treatment process and its relative size and hence the cost of the excavation and subsequent cost of the box to contain the secondary process. This was complicated by the fact that the new construction had to be located adjacent to the existing pin jointed structure on the side of a hill into a chalk subsoil overlaying a harder rock stratum of ‘Melbourne rock’.

**BAFF solution favoured**

After an initial feasibility study the *Gleeson/Brightwater* team elected to pursue only the BAFF solution on the basis that the smaller box structure and hence smaller excavation (and so reduced cost) far outweighed any marginal cost penalty that the BAFF had over an activated sludge process. It is interesting to note that of the other two bidders, one offered a BAFF solution while the other offered an activated sludge plant.

**The ultimate design for the new plant, arrived at after careful consideration of numerous options, involved provision of a six reactor *Biobead* BAFF plant.**

The results of the pilot work, undertaken primarily for the Eastbourne contract (reviewed elsewhere in this publication) which was being bid more or less at the same time as Dover/Folkestone, would demonstrate *Biobead* to be capable of handling, with ease, the saline infiltration expected at this site.

After careful consideration of all aspects of the received tenders, the contract to provide secondary treatment at Dover/Folkestone was awarded to the MJ Gleeson/Brightwater team and work commenced on design mid 2000.

**Headache**

Whilst the equipment specification and design required careful attention to detail due to the saline intrusion in influent to the works, the major design headaches rested with *MJ Gleeson* and their designers *Balfour Maunsell*. Detail design of the new concrete box, adjacent as it was to the existing (essentially pin jointed) structure on the side of a chalky hill proved extremely taxing, with unusual and costly construction techniques being required.

*Gleasons* commenced work on site during Autumn 2000, adhering to a tight programme to work the excavation during periods of better weather to avoid the inherent problem of working with wet chalky ground.

The civil design and construction phase proved difficult due to problems involved with the location of the plant. However, potential problems have been overcome due to the thoroughness of civil design, careful planning and programming of the works and team relationships developed between all parties involved in the scheme.

Civil construction has reached the stage where the box is substantially complete, including the BAFF reactor tanks - with the exception of the roof structure which has been left off in order to facilitate the installation of internal mechanical and electrical components. The *Biobead* mechanical installation is now virtually complete (May/June 2002) media loading is underway and as each reactor is completed the roof is being installed.

The plant is due to be completed early summer 2002, commissioning being undertaken in late summer/autumn. ■

*Note: The Editor and publishers wish to thank Brightwater Engineering for producing the above article for publication.*