

The Budds Farm Sewage Treatment Works (STW) operated by Southern Water treats waste water from the Portsmouth and Havant catchments. Prior to 2006, the STW at Budds Farm had 8 final clarifiers of 35m internal diameter. In order to meet the requirement of the projected AMP4 flows, the existing settlement tanks were modified and 2 new 35m diameter clarifiers have been built to operate alongside the existing 8 tanks. MMI Engineering was commissioned by Southern Water / 4D, to undertake a programme of computational modelling and hydraulic analysis for the 8 existing and 2 new clarifiers. The objective of this work was to calculate the performance of the clarifiers and to confirm the solids loading with and without internal modifications.

A verified and validated CFD modelling technique was used to determine the internal hydrodynamic performance of the final settlements tanks [1]. The simulations were performed in two dimensional, axis-symmetric co-ordinates with models for sludge settling, mixture density and viscosity.

Figure 1 shows contours of solids concentration for the new tank. It was found that the existing tank with Ø7m diameter stilling well (as built) would only work up to 70% of FFT.

The MMI designed McKinney baffle modification worked better at high solids loading and SSVI, enhancing the capacity and performance of the existing tanks by up to 26% in flow. The proposed new tank with Ø10m diameter stilling worked well up to 70% of FFT but the McKinney baffle influent modification enhanced the capacity and performance of the new tank by up to 20% in flow. MMI provides the capability to optimise the internal modifications prior to construction. In this case the investigation revealed that the influent design had a significant impact on the clarifier performance. A modified influent, designed by MMI, and incorporating a sloped McKinney baffle + deflection ring gave > 20% improvement in the site maximum forward flow. The recommended design of influent has been incorporated on all 10 tanks at Budds Farm (Fig 2).

## References

1. Burt, D. and Ganeshalingam, J., Design and Optimisation of Final Clarifier Performance with CFD Modelling, Presented at the CIWEM / Aqua Enviro joint conference on Design and Operation of Activated Sludge Plants, Leeds, UK, 19th April 2005.

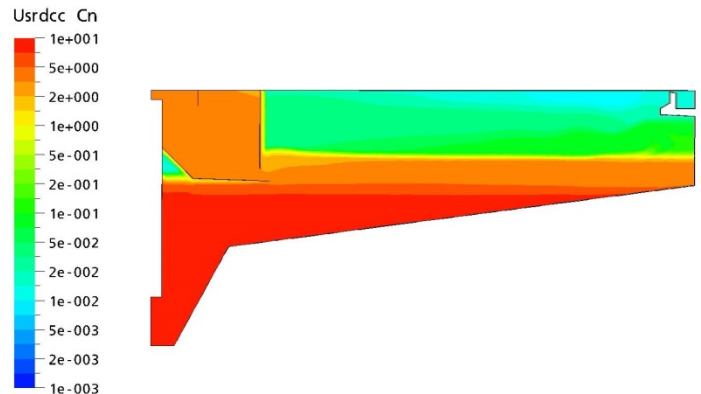


Figure 1: Solids concentration in log scale (0 to 10 kg/m<sup>3</sup>) for the new tank at FFT



Figure 2: New Ø35m tank with MMI Designed McKinney baffle & deflection ring