

## SOLVING THE PROBLEMS ASSOCIATED WITH BULKING AND FOAMING BY ULTRASOUND

### Kirkby in Ashfield STW, UK



Figure 1.a



Figure 1.b

#### I. Specification of the plant

Size	26,800 PE
Inlet flow	6,800 m <sup>3</sup> /d
Type of biological process	Activated Sludge Process (ASP)
ASP configuration	Anoxic/Aerobic reactor plus Final Settlement Tank (FST)
Sludge age	10 days
Stirred Specific Volume Index (SSVI <sub>3.5</sub> )	110 mL/g (averaged)
O&M problem existing in the ASP	Excessive growth of filaments (bulking sludge)
Dominant filamentous bacteria	<i>Microthrix Parvicella</i>

#### II. Objectives of the ultrasound application

<b>Targets to be accomplished</b>	
<ul style="list-style-type: none"> <li>• Eliminate the O&amp;M problems associated with the excessive growth of filamentous microorganisms</li> <li>• Avoid the need for any other solution (CAPEX &amp; OPEX saving)</li> <li>• Remove the risk of non-compliance and level consent</li> </ul>	
<b>Assessment of the performance</b>	
<ul style="list-style-type: none"> <li>• Minimize the foaming layer of the FST surfaces</li> <li>• Decrease the SSVI<sub>3.5</sub></li> <li>• Reduce the turbidity of the final effluent</li> </ul>	

#### III. Installation of the Ultrawaves ultrasound system

Type of installation	Permanent full-scale inside a container (see figure 1.b)
Location	RAS stream (see figure 2)
RAS flow	9,000 m <sup>3</sup> /d
Ultrasound power installed	4 kW installed in April 2014 (see figure 1.a)

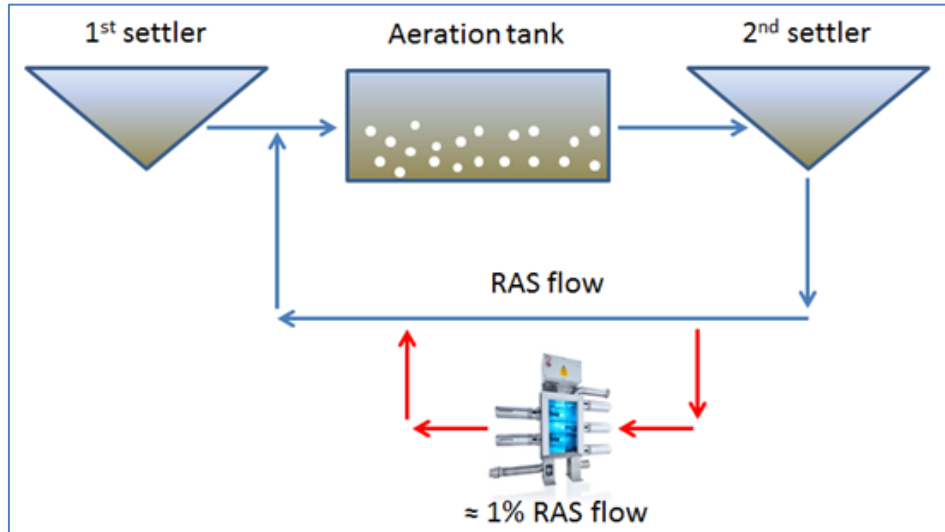


Figure 2: Implementation of the ultrasound technology into the ASP.

#### IV. Results

Complete elimination of the O&M problems associated with bulking sludge which was measured as:

- Tremendous reduction of the foam layer (see figures 3 and 4)
- Over 30% of decreasing in the  $SSVI_{3.5}$  (see figure 5)
- Circa 25% of diminishing in the turbidity (NTU) of the final effluent (see figure 6)



Figure 3: Performance of the ultrasound system on the anoxic zone 5 weeks after commissioning.



Figure 4: Performance of the ultrasound system on the FST 5 weeks after commissioning.

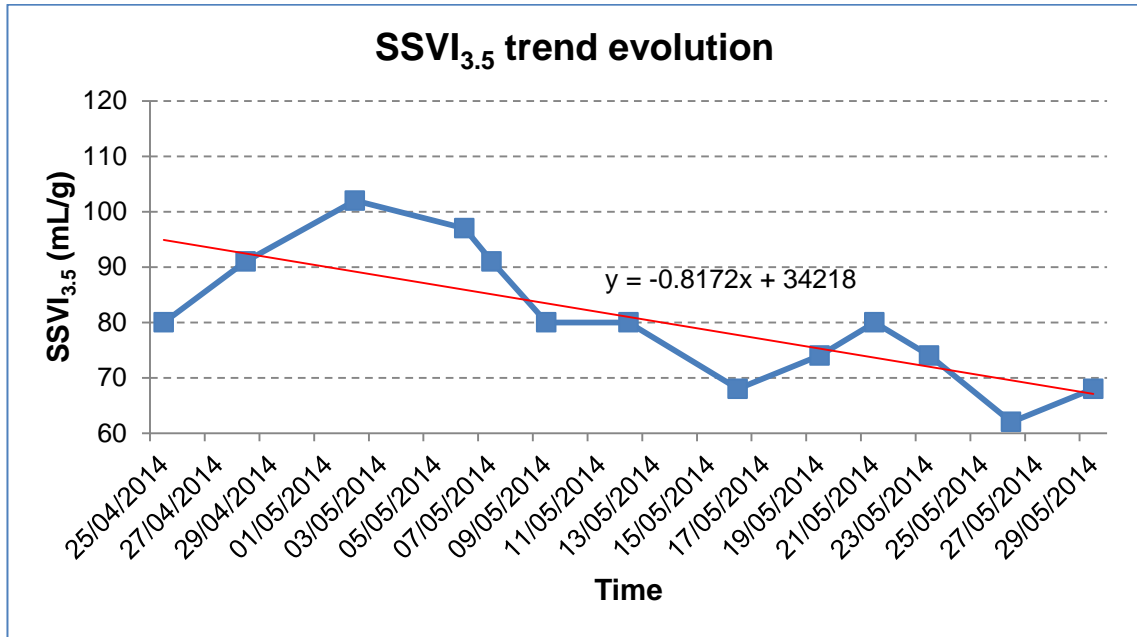


Figure 5: Evolution of the SSVI<sub>3.5</sub> from the commissioning until the 5<sup>th</sup> week.

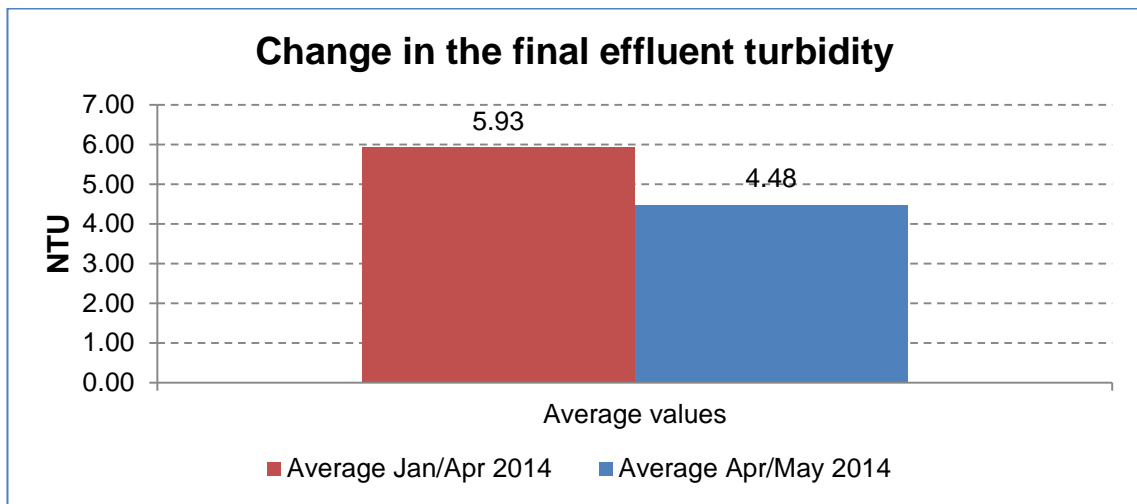


Figure 6: Change in the averaged NTU from the commissioning until the 5<sup>th</sup> week.

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*Note: Further details of this case study may be downloaded from the Ultrawaves Reactors Ltd website in the Technical Papers section (8<sup>th</sup> EWWM presentation and paper).*