

Meeting the nutrient neutrality challenge using newly developed biological technology

“The BIV project has provided an invaluable opportunity to work closely with an academic partner in both progressing our understanding and optimising performance of our unique BNR technology.” - Adam White, Plantwork Systems Ltd

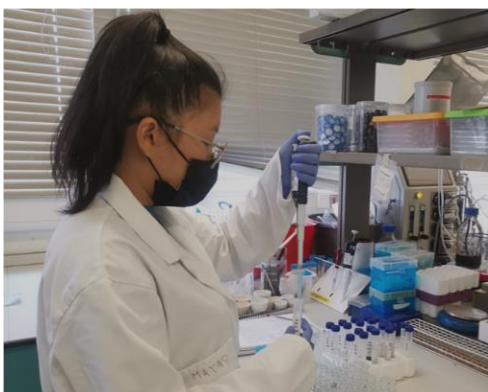
AIM:

To protect our water bodies from eutrophication, regulations on nutrient discharge limits are being tightened. This has significant impact on the water industry as well as the environment as most existing nutrient removal technologies are expensive to install and require significant amounts of energy and chemicals. This results in pollution levels being reduced in the receiving water bodies, but being increased in the air and soil due to the technology having a larger carbon footprint and producing more chemical enriched sludge for disposal. There is thus a major requirement in the wastewater treatment market for a more sustainable nutrient removal technology which uses less energy and no chemicals.

Plantwork Systems Ltd (PWS) has designed, built and operated a prototype biological nutrient removal plant branded as NUTREM[®]. PWS will work in partnership with the University of Southampton (UoS) to optimize the process to achieve very low levels of both nutrients in the final treated effluent i.e. less than 5 mg/L of TN and less than 0.5 mg/L of TP using the full-scale operating treatment facility at Petersfield STW in Hampshire.

RESULTS:

Meeting nutrient neutrality is a pressing challenge particularly in the south of England as Natural England started to require nutrient neutrality from the year 2020. To help meet this new challenge and achieve sustainable nutrient removal with chemical-free processes, PWS collaborated with UoS to optimize their NUTREM[®] technology. NUTREM[®] was originally developed by PWS to provide a viable biological nutrient removal technology suitable for use in the UK. In this project, two reactors, each with a working volume of 47 m³, were operated at the NUTREM[®] demonstration plant. Samples from the reactor and other points such as fermenter and influent were taken and analysed weekly. Two complete process cycle analyses were carried out across two distinct cyclic configurations. After the optimisation, the total nitrogen concentration was reduced from 13-31 to 5-11 mg/L when total phosphorus remained as low as 0.04-0.28 mg/L without any addition of chemicals or additional filtration unit. The results demonstrate that NUTREM[®] plant has great potential to achieve nutrient neutrality cost-effectively and sustainably.



“This BIV project provides an excellent opportunity to demonstrate how the collaboration between academics and industry partners allows a combination of strengths from both parties to support the practical application with fundamental research.”
Dr Yongqiang Liu, University of Southampton

