

## Research into energy consumption for Extra MSA Services Ltd Sewage Treatment Plant

### Background

WPL have undertaken substantive research and development into energy saving options for their HiPAF submerged aerated filter sewage treatment range. This research has been undertaken with a view to reducing the whole life costs, energy consumption and carbon footprint, in line with the Water Utility 2020 initiatives.



As part of WPL's continuous product development, research work has taken place over the last 18 months on sites where WPL HiPAF plants have been installed, and provide real data that confirm assumptions made during the design and feasibility stages. The research work has been centred around the design of the aeration system and various scouring regimes, along with trials of different media configurations and blower efficiency.

The HiPAF benefits from being a low maintenance treatment solution, with the emphasis on reducing moving mechanical parts within the hostile environment of the treatment plant. However, savings of between 15% and 50% on electricity consumption provide a significant reduction in whole life costs, particularly in higher population equivalent applications. Dual speed blowers utilising variable speed drives is one option that has had favourable reviews from clients, and other design efficiencies both with regard to blower design and media configuration have brought significant savings to some existing clientele.

### Product Specification

WPL designed and provided a bespoke HiPAF sewage treatment plant which incorporated a below ground 150m<sup>3</sup> primary tank complete with integral pump station, Modular SAF Units, Lamella settlement tank, and tertiary Microscreen filtration system. The total package combined efficient processing, reliability and a robust design, whilst minimising visual impact on the landscape.

### The Sewage Treatment Process

The bespoke package effluent treatment plant at Beaconsfield MSA is designed to treat waste water from a maximum population equivalent of 3800 based on the ammonia load of 30.4kg/d that was specified by the design consultants. As such, the air compressors have been sized to deliver sufficient air to supply oxygen for the nitrifiers responsible for removing the ammonia load, whilst simultaneously providing enough air to scour the biozone media and preventing the biofilm from becoming too thick and anaerobic. Only two compressors are ever running at any time.



## Concept Proposal

Since commissioning Beaconsfield MSA effluent treatment plant in March 2009, flow data captured from site has revealed that the site is currently operating between 20-30% of full design load capacity. This has lead WPL to consider the impacts and consequences of attempting to reduce air supply in line with operating flows and loads as opposed to peak design flows and loads. The benefits to the customer would be significant savings on the electricity bills.

The preferred method of reducing energy consumption at Beaconsfield MSA would be to reduce the air supply during periods of low activity and thus low flows. From a 24 hour intensive flow monitoring survey carried out on 20th May 2009, it was identified that between 11pm and 7am of the following morning flow to the foul water treatment plant effectively stopped. During this period of time, it is proposed that the air supply to the biozones be reduced by 50%. This would be achieved by manipulating the air supply such that both actuators open simultaneously, allowing the air from a single compressor to deliver air to both process streams. This would involve reconfiguring the control panel accordingly.

## Benefits

Shutting down one compressor on 8 hours per day would yield a saving of 144 units per day. Based on 10 pence per unit this could potentially yield a saving of over £5000 per year.

Jerry Storer, Senior Operations Executive for Extra MSA stated "WPL have completed significant research into the energy consumption of the HiPAF plant sited at our service station at M40, Beaconsfield. This research has proven that optimising the air supply to our system can be achieved without compromising our EA consent and has therefore saved us considerable costs on our electricity bills."

Currently WPL are working at the above level of electricity savings by reducing the air supply, although they are also researching the possibility of increasing this saving to up to £10000 per year by reducing the blower use again during the periods of low flow.

## Conclusion

WPL researched sites where HiPAF Sewage Treatment plants have been installed to investigate how energy consumption could be reduced and therefore how cost savings could be made. Real data research allowed WPL to reduce the air supply to the plants therefore reducing the blower electricity usage, which has saved MSA Extra Services Ltd up to £5000 a year. WPL are continuing their product development research into the blower efficiency of their sewage treatment plants whilst also looking at the design of the aeration system and various scouring regimes, along with trials of different media configurations.

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WPL Ltd is an internationally-recognised leader in the design, manufacture and supply of standardised and bespoke environmental sewage, wastewater and commercial kitchen grease management process solutions.

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