‘Fixed media to remove nitrogen’

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THE PROBLEM

The Beechworth wastewater treatment plant (WWTP) is a lagoon-based system. During the wetter months of the year, wastewater is polished via chemical assisted sedimentation for phosphorus removal and discharged to a local waterway. The wastewater discharge contains elevated nitrogen (as ammonia) during the cooler months due to limited nitrification at the WWTP which presents compliance challenges and potential environmental impacts.

THE SOLUTION

With the aim was of improving nitrogen/ammonia reduction in shoulder seasons (Spring, Autumn), a number of options were explored including mechanical BNR; IDAL conversion; ammonia stripping and fixed media.

Ultimately fixed media, “Aquamats”, and diffused aeration was installed in Lagoon 4 of the secondary lagoons. The surface area of the media provides the nitrifying bacteria a habitat, ability to retain population and improves contact with wastewater.

THE PERFORMANCE

The nitrifying bacteria has colonised on the “Aquamats” and since last October a significant reduction ***across Lagoon 4*** in both Total Nitrogen and Ammonia has been achieved. The upgrade is currently achieving its design objective of reducing ammonia levels across Lagoon 4 by at least 6 mg/L.

Lessons from this innovative, passive and relatively low cost improvement could potentially lead to the use of this technology at other North East Water sites. Correlation of improved lagoon performance to the desludging work may also prove beneficial.

Figure 2: Aquamats prior to the lagoon being filled, May 2013.

THE RESEARCH

Lagoon performance and limitations were researched and understood

- Overall lagoon performance is seasonally dependent
- Nitrogen/ammonia removal water temperature dependent (12C)
- Nitrogen/ammonia removal occurs between secondary lagoons 2-4
- Nitrifiers present in substrate all year round

Figure 1. Mean monthly wastewater discharge total nitrogen and total ammonia (2003-2011).

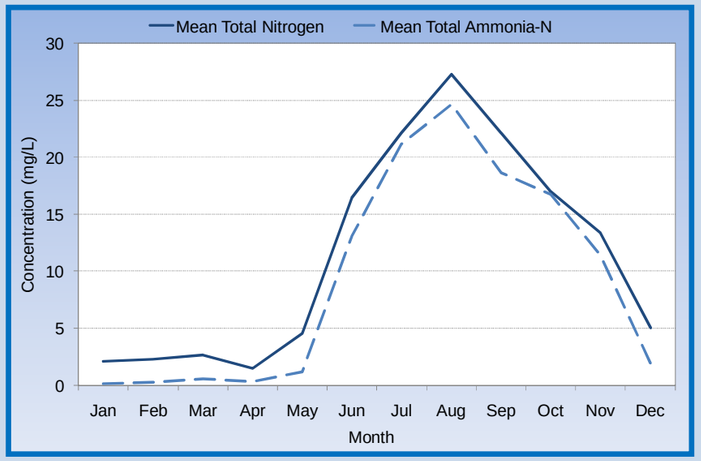

Figure 3: Aquamats installed in Lagoon 4, June 2014.

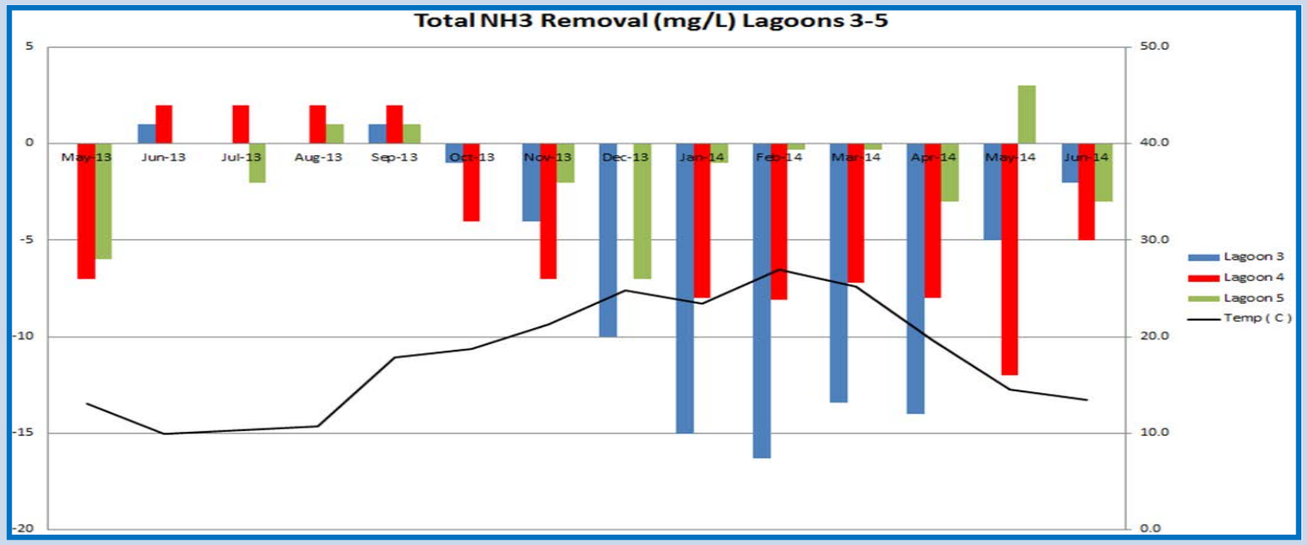

Figure 4: Ammonia reduction across Lagoons 3-5 and water temperature.