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Measured methane emissions from a metropolitan wastewater treatment lagoon in Victoria Australia are substantially higher than report emissions based on emission factors

Mei Bai et al.

Correspondence to: Mei Bai (mei.bai@unimelb.edu.au)

S1. Aerator operating time

There is a total of 53 aerators distributed in four zones within Pond 1 (Fig. S1), but not all are operating at the same time. The chart in Figure AS1 shows the example of the period when some aerators were operating (full load > 90%) in red and some were not working in white (0 load). Based on the laser setup, we focused on aerators 41, 42, 36, and 34 (for the southwest laser) and aerators 19, 18, 17, 13, 16 and 14 (for the southeast laser), and examined how they contributed to methane emissions when they were switched on/off.

The aerators operating time during the winter measurement campaign as an example can be found in Figure S1.

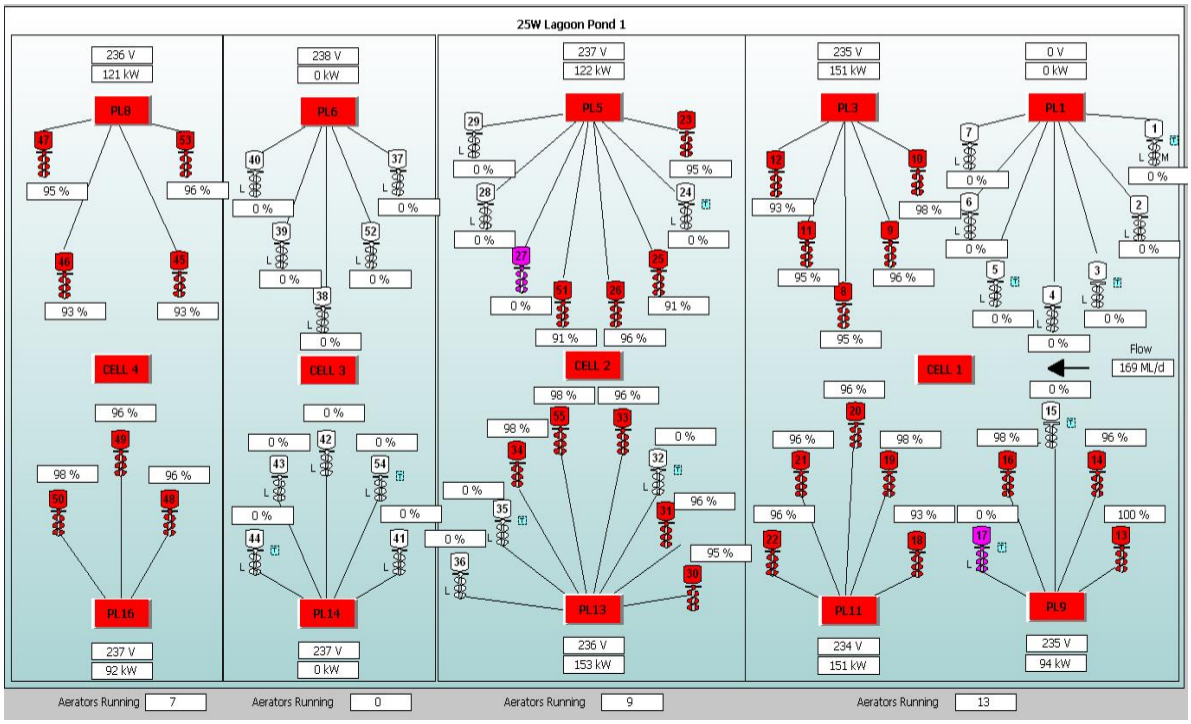

Figure S1. Aerators operating map during winter campaign at Melbourne Water WTP 25W Pond 1. Red, aerators on, white, aerators off. The vertical lines separated Pond 1 into 4 cells (zones), cells 1 to 4 counted from east to west.

S2. Wastewater flow rate

The wastewater flow rate at 25W Pond 1 was calculated based on the inflow of the wastewater from the 25W pot and outflow of wastewater to the Activated Sludge Plant (ASP) and return of Waste Activated Sludge (WAS) as ML per day. Flow through Pond 1 = (flow into 25W pot) - (flow into 25W ASP) + (WAS flow from 25W ASP). The average daily effluent flow through 25W Pond 1 during the winter campaign was 108.61 ML day^{-1}, ~10 % less than the summer flow rate of 119.5 ML day^{-1}. A flow diagram is shown in Figure S2.

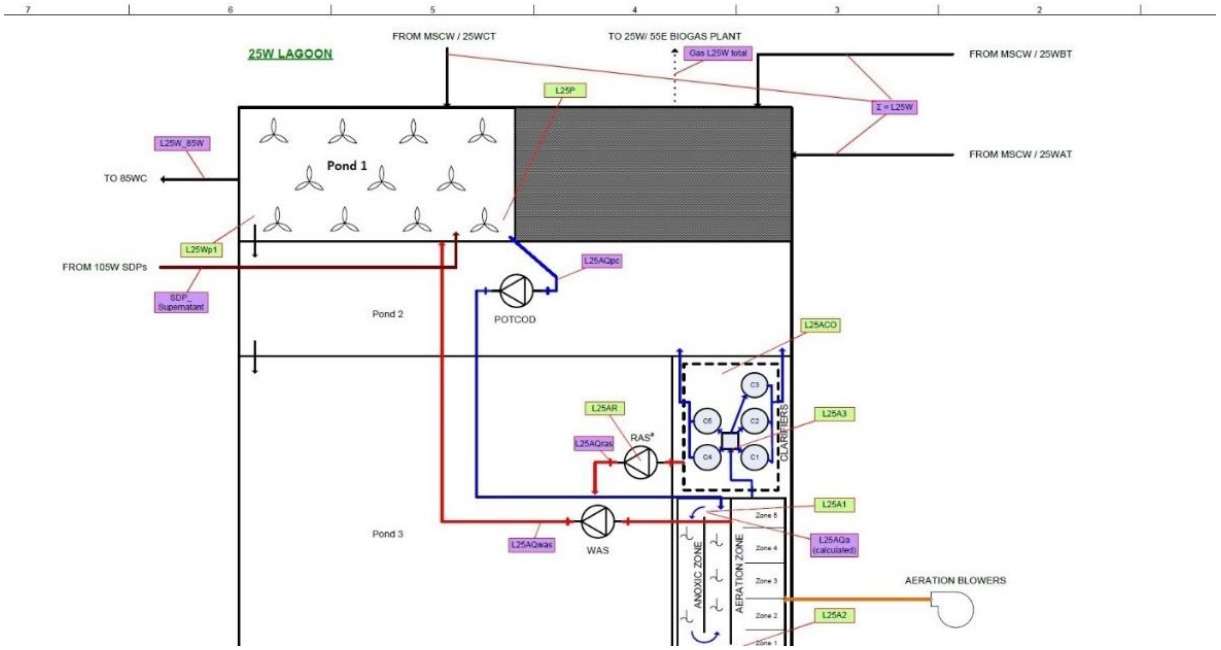

Figure S2. Flow diagram showing wastewater flow though 25W Pond 1.

S3. Wastewater sampling locations

Figure S3. Drone sampling locations (latitude and longitude) at Pond 1 on the 10 September 2024 (at 5, 50, 100, 150, 200, 350, 500 m from the cover area). (Map source: Image ©2024 Airbus, Google Earth).