



On-site Effluent Treatment National Testing Programme (OSET NTP)

PERFORMANCE CERTIFICATE EXTENSION Environment Technology Ltd AES-38 OSET NTP Trial 12, 2016/2017

System Tested

The Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system participated in Trial 12 of the On-site Effluent Treatment National Testing Programme (OSET NTP). This is the first time a proprietary 'bottomless' treatment bed has been tested at OSET-NTP. To facilitate testing, the normally buried AES treatment bed was installed above ground within a fully lined and covered waterproof timber 'box' of the normal dimensions of an underground bed used to capture the treated effluent and drain it to a final effluent pump chamber in order to evaluate the treatment capacity of the AES bed. This certificate applies to treatment not effluent disposal.

ET provide a number of layout alternatives in their Design and Installation Manual. The plant tested, which was gravity fed from a 5,000L septic tank, was a Combination System layout comprising two lines of AES pipelines loaded via an equal flow splitter, installed in accordance with ET's 'Advanced Enviro-septic™ Complete Design and Installation Manual'. The plant tested was lined and covered, including an impermeable top cover eliminating the impact of rainfall as compared to a usual mounded grass surface which would only minimise the effect of rainfall intrusion. The results therefore can only be directly applied to a bed where there is no possibility of groundwater or rainfall intrusion into the bed including direct rainfall interception. The constructed bed was designed to treat 1026 litres of influent per day at a loading rate of 38 litres per metre of AES pipe. It comprised two 13.5 m long pipelines loaded in parallel via an equal flow splitter or distribution box over a 2.25m wide x 8.0m long x 300 mm deep sand bed with the sand grading complying with the AES manual. When the plant was operated at 1,000 L/day, it was at 97% of the advised plant's design capacity (i.e. a loading rate of 37 L/m of AES pipeline/day). Each 13.5m pipeline comprises two equal sections in series with an overflow weir between each section.

The discharge pump was a Waste-180VA pump in a 900 mm diameter x 1.1 m high chamber. Emergency storage within the plant layout tested was assessed as 1,929L (i.e. 46 hours at 1,000L/day). If an unlined bed is utilised the system will not require a discharge pump and hence operate without power. Removal of the pump station would reduce emergency storage to 1,611L.

ET advise there is no service requirement other than the standard septic tank clean-out.

Test Flow Rate

The Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system was tested at 1,000 litres/day (equivalent to servicing a 3-bedroom 5 to 6 person household) over an 8 month (35 week) period October 2016 to June 2017 followed by a 1 month (4 week) high load effects test involving 5 days at 2,000 litres/day then 1,000 litres/day over the following 3 weeks.

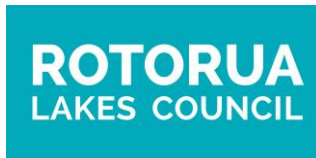
Testing and Evaluation Procedures

A total of 39 treated effluent samples of organic matter (BOD₅) and suspended solids (TSS) at generally six day intervals during weeks 9 to 35 were tested and evaluated against the secondary effluent quality requirements of the joint Australia/NZ standard AS/NZS 1547:2012.

A total of 16 treated effluent samples of organic matter (BOD₅), total suspended solids (TSS), total nitrogen (TN), ammonia nitrogen (NH₄-N), total phosphorus (TP) and fecal coliforms (FC) at generally six day intervals during weeks 23 through 35 were tested and the results benchmarked and rated on their median values. One sample of TSS (at 58mg/L) was an order of magnitude higher than all others. This result was investigated by the Management and Audit Committee (MAG) and considered to be an unexplained outlier and was not included in the benchmark rating analysis. In addition, the energy used by the treatment system was assessed on the mean of consumption levels over the 16 sample days.

General Performance

There were no issues associated with the installed AES plant which operated throughout the trial without attendance by the ET. The bed media developed quickly achieving very low BOD from the outset with TSS <10mg/L by week 7. This plant produced consistently very good effluent regarding BOD, TSS and NH₄-N removal with typical results of 2, 5 and 2 mg/L respectively, although TSS fluctuated 2 - 14 mg/L. However, denitrification was poor with TN of 30 - 50 mg/L throughout. Power consumption was very low with a median of 0.1 kWh/d, as it only related to the discharge pump. Bacteria removal was very good throughout with an overall median reduction of 3.01 log. The faecal coliform levels during the Benchmark period were better than that from a typical package treatment plant. Observations of the discharge from below the second section of one of the lines showed minor/negligible discharge from that second section after the



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overflow weir. Hence for the majority of the trial, discharge only occurred from the first 6.75m section of each 13.5m pipeline (ie the first half), which means that treatment occurred from about 50% of the AES pipes in the installed system. The plant performed well through the high flow test of 2,000 L/day with no significant impact upon BOD, TSS or TN.

AS/NZS 1547:2012 Secondary Effluent Quality Requirements

These requirements are that 90% of all test samples must achieve a BOD5 of < 20 g/m³ and TSS of < 30 g/m³ with no one result for BOD5 being >30 g/m³ and no one result for TSS being >45 g/m³. The Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system **achieved** a performance level of **100%** for BOD5 and **100%** for TSS within the **Secondary Effluent Quality** requirements for both the 90%ile and maximum limits above, with no results exceeding the maximums, apart from the single high unexplained TSS outlier which was deleted from the analysis. The Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system thus readily meets the secondary effluent quality requirements of AS/NZS 1547:2012 at the test flow rate of 1,000 L/day (ie at 97% of the plants advised design capacity or a loading rate of 37 L/m of AES pipeline/day).

Benchmark Ratings

The Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system **achieved** the following effluent quality ratings over the seventeen benchmarking results in weeks 20 to 35.

Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
BOD (mg/L)	2	1.5	A+	<5	<10	<20	<30	≥30
TSS (mg/L)	3	3.1	A+	<5	<10	<20	<30	≥30
Total Nitrogen (mg/L)	37	4.9	D	<5	<15	<25	<30	≥30
NH ₄ - Nitrogen (mg/L)	1.8	0.5	A	<1	<5	<10	<20	≥20
Total phosphorus (mg/L)	2.7	0.5	B	<1	<2	<5	<7	≥7
Faecal Coliforms (cfu/100mL)	2,260	7,000	B	<10	<200	<10,000	<100,000	≥100,000
Energy (kWh/d) (mean)	0.1	0.04	A	0	<1	<2	<5	≥5

This Certificate of Performance applies to the treatment capacity of a fully lined AES-38 Wastewater Treatment system constructed as described in the 'System Tested' above when loaded at 1,000 L/day (ie 97% of the advised plant capacity).

This certificate was initially issued on 20 December 2017 with a validation period of 5 years.

With the pausing of OSET testing facility occurring on 1st Jun 2021, OSET-NTP has further extended the Performance Certificate to **31st December 2026** following an application signed and legally witnessed statement by Environment Technology confirming that there has been no change made whatsoever to the plant as tested in Trial 12.

For the full OSET NTP report on the performance of the Environment Technology Ltd AES-38 passive aerobic proprietary bed treatment system contact Dick Lamb/Hazel Pearson, phone 03 970 7979 or Email info@et.nz

Authorised By:

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20 January 2023