

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

PERFORMANCE CERTIFICATE BIOROCK-S On-site Domestic Wastewater Treatment System, OSET NTP Trial 8, 2012/2013

System Tested

The **BIOROCK-S system** participated in Trial 8 of the On-site Effluent Treatment National Testing Programme (OSET NTP). This commenced on 29 October 2012 and ran over nine months (43 weeks) during which the treated effluent discharge was monitored generally every six days. The **BIOROCK-S system** is a gravity flow, fixed film bioreactor treatment unit using BIOROCK media. Rated design capacity is 1,500 litres/day. Total liquid volume is 7,250 litres (primary treatment 5000 litres; secondary treatment 2,000 litres; clarification: NA.; pump chamber 250 litres). Emergency storage is 1,830 litres. No tertiary treatment (such as UV disinfection) is incorporated. It is a two tank system with primary treatment in the first tank and secondary treatment in the second.

Test Flow Rate

The **BIOROCK-S 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 November 2012 to June 2013 followed by a 1 month (4 week) high load effects test in July 2013 involving 5 days at 2,000 litres per day then 1,000 litres/day over the following 3 weeks.

Testing and Evaluation Procedures

A total of 37 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. During the trial period a non-return valve in the OSET discharge pipework clogged and two results in weeks 30 and 31 were compromised. In addition there was one excessive unexplained TSS outlier in week 26. SWANSMAG reviewed the results and decided that all 3 should be excluded from the AS/NZS evaluation by substituting two earlier results from weeks 7 and 8 for the compromised results of weeks 30 and 31 and deleting the TSS outlier of week 26.

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 faecal coliforms (FC) at generally six day intervals during weeks 23 through 35 were to be benchmarked and rated on their median values. In addition, the energy used by the treatment system was assessed on the mean of consumption levels over the 16 sample days. Due to the clogged non-return valve the 16 samples evaluated were selected by substituting the three impacted results in weeks 30-32 for 3 earlier results from weeks 20-22.

AS/NZS 1547:2012 Secondary Effluent Quality Requirements

These requirements are that 90% of all test samples must achieve a BOD₅ of $\leq 20 \text{ g/m}^3$ and TSS of $\leq 30 \text{ g/m}^3$ with no one result for BOD₅ being $>30 \text{ g/m}^3$ and no one result for TSS being $>45 \text{ g/m}^3$. The **BIOROCK-S system achieved** a performance level of **100%** for BOD₅ and **100%** for TSS based on the full set of 37 test results in weeks 9 to 35, with no results exceeding the maximums. Even with inclusion of the excluded results the AS/NZS standards were met. The **BIOROCK-S system** thus **meets** the secondary effluent quality requirements of AS/NZS 1547:2012.

Benchmark Ratings

The **BIOROCK-S system achieved** the following effluent quality ratings for the sixteen unimpacted benchmarking results in weeks 20 to 35. The evaluation undertaken without substitution achieved identical ratings except for energy.

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Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
<i>BOD₅</i> (mg/L)	3	2.3	A+	<5	<10	<20	<30	≥30
<i>TSS</i> (mg/L)	6	1.5	A	<5	<10	<20	<30	≥30
<i>Total nitrogen</i> (mg/L)	40.4	2.7	D	<5	<15	<25	<30	≥30
<i>NH₄- Nitrogen</i> (mg/L)	12	3.8	C	<1	<5	<10	<20	≥20
<i>Total phosphorus</i> (mg/L)	3.3	0.6	B	<1	<2	<5	<7	≥7
<i>Faecal Coliforms</i> (cfu/100mL)	33,000	46,400	C	<1	<200	<10,000	<100,000	≥100,000
Energy (kWh/d) (indicative)**	0.2		A	0	<1	<2	<5	≥5

**** Note:** Overall energy rating reflects conditions at the test facility – power consumption for effluent pumping under field conditions will be specific to the distribution system as installed.

In September 2016 OSET-NTP received an authorised statement from Biorock (NZ) Ltd that the plant tested was BIOROCK 'S' Series (BIOROCK-10) manufactured in Luxembourg by BIOROCK S.a.r.l. and that subsequent to testing the manufacturer changed the plants name in December 2014 to 'S' Series BIOROCK-L and then again changed the plants name in June 2016 to ECOROCK-2000. They certify that the plants tank volume, media volume and tank dimensions have remained consistent throughout these name changes.

OSET-NTP therefore acknowledged that this Performance Certificate, which has a 5 year validity period to 23 March 2019, is specific to the **BIOROCK-S System, BIOROCK 'S' Series (BIOROCK-10), Biorock 'S' Series BIOROCK-L** and **ECOROCK-2000** plants **all** as specified above when operated at a flow rate of 1,000 litres/day.

On 1 April 2019 Biorock (NZ) Ltd applied for a 3 year extension to the above certificate and provided a signed and legally witnessed statement confirming that there has been no change made whatsoever to the plant as tested in 2013. Hence OSET-NTP have extended the validity period of the Performance Certificate by 3 years to 23 March 2022.

For the full OSET NTP report on the performance of the **BIOROCK-S system** contact **BIOROCK(NZ) Ltd** of Auckland, Ph: (09) 922 0613.

Authorised By:

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