

## 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** 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 ( $BOD_5$ ) 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 ( $BOD_5$ ), total suspended solids (TSS), total nitrogen (TN), ammonia nitrogen ( $NH_4-N$ ), 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  $BOD_5$  of  $\leq 20 \text{ g/m}^3$  and TSS of  $\leq 30 \text{ g/m}^3$  with no one result for  $BOD_5$  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  $BOD_5$  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.

Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
$BOD_5$ (mg/L)	3	2.3	A+	<5	<10	<20	<30	$\geq 30$
TSS (mg/L)	6	1.5	A	<5	<10	<20	<30	$\geq 30$
Total nitrogen (mg/L)	40.4	2.7	D	<5	<15	<25	<30	$\geq 30$
$NH_4$ - Nitrogen (mg/L)	12	3.8	C	<1	<5	<10	<20	$\geq 20$
Total phosphorus (mg/L)	3.3	0.6	B	<1	<2	<5	<7	$\geq 7$
Faecal Coliforms (cfu/100mL)	33,000	46,400	C	<1	<200	<10,000	<100,000	$\geq 100,000$
Energy (kWh/d) (indicative)**	0.2		A	0	<1	<2	<5	$\geq 5$

**\*\* 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 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.

This Performance Certificate is therefore 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, and is valid for 5 years from 23 March 2014.

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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2 October 2016