



BioCycle Ltd  
15 Mexted Place  
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## Technical Design Specifications - BioCycle 8200 Aerated Treatment Plant

The BioCycle 8200 *Ecolution* Aerated Wastewater Treatment System is designed for the Secondary treatment of all domestic wastewater from residential or light commercial properties to a level where it can be safely dispersed on site without significant negative effect on the receiving environment.

The concrete precast BioCycle plant is a cost-effective solution for areas where soil composition or ground porosity is at varying ends of the spectrum. On undulating sites where land at lower levels is occupied by buildings or other facilities, the BioCycle system allows treated effluent to be distributed on a level above the tanks location.

The BioCycle system complies with all regulated specifications for Secondary AWTs units in New Zealand, providing effective and reliable wastewater treatment over a long period of time. The design parameters have been derived from proven technology used around the world for many decades in the field of on-site wastewater treatment. By applying excellent tank design and construction principles, high system performance is achieved and thorough testing of the system in real-world applications has proven the BioCycle 8200 series to be a market leader in final effluent discharge quality.

The BioCycle 8200 *Ecolution* tank can treat up to 1600Litres per day. The large Primary septic chamber allows raw sewage a minimum 24 hours of primary treatment to be achieved, enabling a minimum 20% reduction of BOD's through sedimentation before Secondary processing is commenced.

### Tank Construction

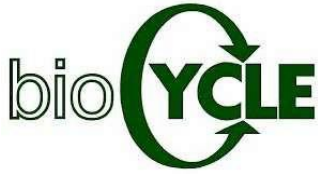
In New Zealand, the BioCycle 8200 series standard concrete tank is constructed of fibre reinforced concrete to a strength of 40Mpa. Tank walls are monolithic. The concrete lid is constructed separately and sealed onto the tank walls after fit-out.

Dart Concrete Ltd manufacture the tank in accordance with the structural requirements of AS/NZS 1546.1.2008.

Manhole lids are formed in HDPE and internal components are PVC pressure pipe.

All electrical box housings and electrical control units are made of HDPE, fastened to the tank lid.

Each system is fitted out prior to leaving the factory. Prerequisite drainage, irrigation and electrical connections are completed on the destination building site.



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## **Inside the BioCycle 8200 *Ecolution* tank**

### **Septic Chamber:**

Raw effluent enters the primary tank (2900L) from the dwelling. The primary tank also receives activated sludge returned from the clarification chamber, providing a stimulant for further breakdown of the influent load. The capacity of the primary tank allows 24 hours of residence for effluent, ensuring enough BOD reduction and anaerobic breakdown has occurred.

### **Anoxic Chamber:**

Filtered effluent enters the anoxic chamber from the primary holding via a 4' Polylok PL-122 filter. This chamber acts as an additional septic, anaerobic zone which also receives recycled activated sludge from the clarification chamber to assist with further removal of nitrates.

### **Aeration Chamber:**

Following Primary treatment, Secondary aeration treatment is provided in a 2800L chamber which contains submerged media. This purpose-built bacterial growth media is attached to the walls of the tank allowing even distribution of air through the chamber and media.

Diffused air at a minimum rate of at least 80Litres/min is required for adequate oxygenation. Air is blown via a pipe into the Aeration Chamber and released at the bottom by way of purpose made fine air bubble diffuser assemblies.

The aeration system is designed to maintain a minimum dissolved oxygen concentration of 2mg/L in the aerobic chamber.

### **Clarification Chamber:**

With a capacity of 1200L, effluent is further polished within the clarification chamber. This chamber is provided to remove settling solids passing through from the aerobic chamber.

Provision is made for constant automatic return of settled solids to the primary chamber by means of a subsurface sludge mechanism operated by venturi suction off the air supply manifold; this is done so that enough nitrified waste is recycled back to the oxygen deficient anoxic stage for denitrification to occur.

### **Pump Out Chamber:**

Treated effluent enters the final Pump chamber, where it will be automatically pumped out to the irrigation field via a fine 130-micron disc filter. This assists with further removal of fine suspended particles and ensures a long-lasting irrigation field.



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## Operating Plant Specifications

### Aeration

Thomas AP-80H Air Pump located inside the HDPE enclosure on top of the tank

- 51-watt power rating is single phase
- Exhaust capacity is 80 litres per minute per pump
- Noise level at 1.0m from the tank is approximately 35dB(A)

### Irrigation Pump

A Bianco B42AC (or Davey D42A/B, or similar) submersible pump with a maximum Head of at least 29m is fitted.

Power consumption is subjective and varies with total flow during any day and the type of irrigation system installed.

An estimated cost of power consumption used by the Biocycle blower and irrigation pump is around \$160.00 per year, based on around 1.8kWhr/day at 0.25c/kWhr.

### Monitoring System

All BioCycle units are installed with two alarms as warning devices. An alarm plate (audible/visual) is supplied to be installed in a convenient position inside the house. The alarm plate is commercial grade, similar to a light switch, with two coloured LED lights. A switch plate provides for the alarm to sound and to be switched to 'mute' when heard.

The alarm panel is incorporated into an electrical circuit breaker, located at the Biocycle system or fuse box, as a safeguard against electrical faults.

The two LED lights indicate:

1. High-Water level designed to sound if water level in the Pump chamber reaches a critical level. This indicates that the submersible pump is malfunctioning, or the irrigation filter is blocked.
2. Air pressure fault designed to sound if the blower ceases to operate or there is an air blockage.

The home occupants are responsible for regular cleaning of their irrigation filter and ensuring the irrigation drip lines and flush valves are not obstructed or broken.

### Scheduled Maintenance

Your BioCycle system **MUST be serviced** by an approved BioCycle Ltd Service Agent **every six months** to ensure ongoing performance and to avoid flooding.



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## Final Effluent Quality

A properly maintained system produces treated water of a very high quality.

Testing of the BioCycle 8200 at the OSET NTP facility in Rotorua has reported the following:

### **AS/NZS 1547:2012 Secondary Effluent Quality Requirements**

These requirements are that 90% of all test samples must achieve a BOD<sub>5</sub> of  $\leq 20 \text{ g/m}^3$  and TSS of  $\leq 30 \text{ g/m}^3$  with no one result for BOD<sub>5</sub> being  $>30 \text{ g/m}^3$  and no one result for TSS being  $>45 \text{ g/m}^3$ .

The **BioCycle 8200 system** achieved a performance level of **100%** for BOD<sub>5</sub> and **100%** for TSS based on the full set of 37 test results in weeks 9 to 35, with no results exceeding the maximums. The **BioCycle 8200 system** thus **meets** the secondary effluent quality requirements of **AS/NZS 1547:2012** at the test flow rate of 1,000 L/day.

### **Benchmark Ratings**

The **BioCycle 8200 system** achieved the following effluent quality ratings for the sixteen benchmarking results in weeks 20 to 35.

Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
BOD (mg/L)	4.5	1.4	A+	<5	<10	<20	<30	$\geq 30$
TSS (mg/L)	7.7	3.6	A	<5	<10	<20	<30	$\geq 30$
Total Nitrogen (mg/L)	22.1	2.4	B	<5	<15	<25	<30	$\geq 30$
NH <sub>4</sub> - Nitrogen (mg/L)	0.2	0.1	A+	<1	<5	<10	<20	$\geq 20$
Total phosphorus (mg/L)	4.4	0.3	B	<1	<2	<5	<7	$\geq 7$
Faecal Coliforms (cfu/100mL)	54,000	23,660	C	<10	<200	<10,000	<100,000	$\geq 100,000$
Energy (kWh/d) (mean)	6.3	1.9	D	0	<1	<2	<5	$\geq 5$

Ongoing testing on the BioCycle 8200 allows for continuous improvement to exceed the above final effluent quality expectations.

## BioCycle Guarantee / Warranty

Each BioCycle system is covered by a limited warranty of 10 years on the concrete tank, and two years (24 months from date of installation) on all electrical components within the system.

Within the warranty periods stated above, BioCycle Ltd guarantees to repair or replace any part of the system requiring remedy due to defective manufacture, provided BioCycle is given notice of the problem within 24 hours of the customer being aware of the problem.

**NOTE:** All warranties are void if routine maintenance is not carried out at 6-monthly intervals, or harmful chemicals have entered the system causing damage to any components.



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## **Essential operation rules and care of your wastewater system.**

All wastewater (toilets, bathrooms, laundry) produced on a rural property is discharged via pipes to an on-site wastewater treatment and land dispersal system. The wastewater treatment system is a fragile biological (bacterial) process and therefore requires care by all residents and visitors.

You can help maintain an effective wastewater treatment system on your site by ensuring **no toxic chemicals** are put down sinks or toilets or gully traps, and by using only environmentally friendly cleaning products. Toxic chemicals and drugs (e.g. antibiotics) kill bacteria in the treatment system. Bacterial organisms are essential for the treatment of wastewater and if healthy populations are not maintained, the system will fail resulting in poorly treated wastewater discharging into the soil, offensive odour and increased maintenance costs. You should also manage your water use to protect the system from overloading...Spread your laundry loads throughout the week, rather than doing five loads on a sunny Saturday morning.

### **DO**

- Try to take short showers in preference to baths.
- Use bio-degradable soaps and cleaners.
- Check all your cleaning products to see if they are suitable for septic tanks.
- Use natural soaps (rather than chemicals) for cleaning.
- Scrape all plates and dishes to compost/rubbish, removing as much food/fat as possible.
- Repair/fix all leaking taps as soon as possible.
- Use phosphate free or low phosphorus laundry detergents.
- Fit gauze mesh over gully traps to stop mosquitoes entering the BioCycle system.

### **DO NOT**

- Do Not pour any toxic/strong chemicals (paint, oil, grease, thinners, pesticides down any drains).
- **Do Not flush any products other than standard toilet paper** down the toilet! This means no tampons, pads, condoms, cigarette butts or 'wet-wipes'.
- Do Not discard any drugs down the toilet or sink.
- Do Not use strong cleaners (bleach, Canesten, Napisan, strong citrus or alcohol base).
- Do Not tip chlorine, anti-**septic**, anti-**bacterial**, or disinfectant type products down drain.
- Do Not use chemical drain cleaning products to clear a blockage – call a plumber.
- Do Not do all your laundry in one day – spread your loads through the week.
- Do Not install sink garbage grinders. If a grinder exists, don't discharge high volumes of scraps, especially carbohydrates, bones or fats & oils into it.
- Do Not put coffee grinds down the sink drain.