bioCYCLE™

WASTEWATER TREATMENT SYSTEMS

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The BioCycle™ owner's manual - a complete guide to the operation of your wastewater treatment system

JOWA GROUP

Leaders in Wastewater Treatment and Disposal

Freecall: 1300 363 399

November 2005

bioCYCLE™
WASTEWATER TREATMENT SYSTEMS

Contents

Before phoning for maintenance or service enquiries, or for help with emergencies, please read this booklet carefully.

SA Head Office
8 Lander Ave
Sheidow Park
SA 5158
Ph 08 8381 9100

Victorian Office
20 Alexandra St
Melton
Victoria 3337
Ph 03 9747 0487

Queensland Office
35 Currumbin Creek Rd
Currumbin
Queensland 4223
Ph 07 5598 4344

www.biocyclejowagroup.com.au

Welcome to the family of BioCycle owners

Dear Customer,

One of the problems faced by planning authorities throughout the world is the safe, reliable and economical disposal of the wastewater generated in urban, suburban and regional areas.

Individuals and communities cannot continue to ignore the growing problems of river, lake, ocean and groundwater pollution.

By purchasing a BioCycle Aerobic Wastewater Treatment System you have made an important contribution to environmental sustainability.

This handbook has been prepared to assist you in understanding how your BioCycle works, and how simple ongoing attention will ensure it continues to contribute efficiently to environmental health and safety.

I thank you for your support and look forward to your co-operation in creating a cleaner environment.

John Watkins
Chief Executive
JOWA Group Pty Ltd

Installation and Switching On

Your BioCycle system is ready for use when:

- It has been installed in the correct location and filled with water (with each compartment, except the Pumpout Chamber, being added to progressively until almost full)
- Your household drainage system has been connected correctly to the system inlet
- Electricity has been connected and the alarm panel has been installed
- The system has been fully commissioned - i.e. with the water pump, air blower and irrigation system installed and connected (call your nearest BioCycle/JOWA Group office if you are unsure about this)
- The irrigation area has been prepared and planted. Some form of landscaping is essential, because you cannot irrigate on barren dirt. Your local Council may also have stipulated requirements for this.

General Information

Once the system is running, the entire operation is automatic. Please do NOT make any adjustments to the air supply or pumping equipment. Should you require further information on the operation of the system, please contact your nearest BioCycle/JOWA Group office.

Electricity Consumption

Our electrical consultants advise that the annual usage of electricity for the total system is similar to that of an average household refrigerator.

Septic Tank / Primary Chamber Pumpout

Depending on individual household usage, it will be necessary to periodically pump out the contents of the septic tank (2-tank models) or primary chamber. This is the homeowner's responsibility and is not included in our normal maintenance service. If JOWA Group is servicing your system, our technician will advise you if pumping out is required. This service may be carried out by any person or organisation approved by the relevant local Council or Government authority.

What is a BioCycle?

A BioCycle aerobic wastewater treatment system is a packaged sewage and water treatment plant for locations where mainline sewerage is not available.

The system uses accelerated natural biological processes to purify all wastewater passing through it, which is then pumped out through garden irrigation.

A home system is usually contained in a single tank, about 2.5 metres deep and wide. Internally, the tank is divided into chambers of varying sizes.

Wastewater and effluent from the home enters the BioCycle tank by gravity flow through a single inlet point, and in turn moves through the system's chambers by displacement - i.e. as untreated water flows into one chamber, treated water flows through an outlet into the next chamber, where the water level is slightly lower.

System Functions

BioCycle has a range of standard residential models for all sizes of households. We also design and manufacture larger systems for multiple dwellings, commercial or industrial projects.

A typical residential system has four or five chambers:

1. Primary Chamber

The effluent from the source enters the system via the Primary Chamber where digestion of solids occurs through anaerobic bacterial action. The Primary Chamber is, in effect, a septic tank - some two-tank systems utilise a separate septic tank.

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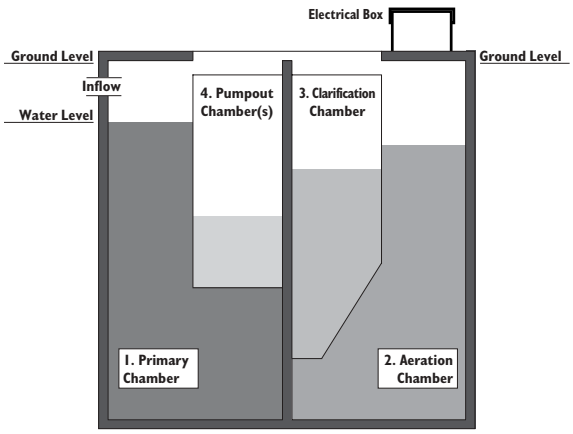
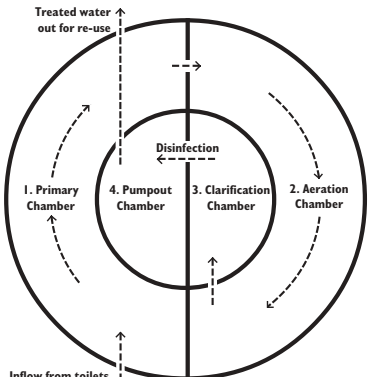


Cross Section of Typical System, showing Displacement Flow (Diagrammatic).



Top View of Typical System, showing Process Flow (Diagrammatic).

System Functions (Cont.)

2. Aeration Chamber

From the Primary Chamber the partially treated effluent moves by displacement to the Aeration Chamber. This chamber is used for secondary treatment of the wastewater.

Air supplied by a small blower (compressor) is distributed through diffusers at the base of the chamber, dramatically increasing the level of dissolved oxygen in the water and stimulating aerobic bacterial growth.

The blower operates continuously at a very low noise level, and is located in a weather-proof housing on top of the tank.

The Aeration Chamber also contains the submerged biological growth media, consisting of different types and configurations of special plastic componentry, greatly enlarging the internal surface area in the chamber and assisting bacterial growth.

3. Clarification Chamber

After aeration the treated wastewater flows into the Clarification Chamber where it is allowed to settle under quiescent conditions.

In this chamber, the BioCycle system utilises a venturi-syphon effect from the blower in an automatic and non-mechanical continuous sludge remover and skimmer.

This returns any excess sludge or floating material back to the Primary Chamber for further treatment by anaerobic digestion.

4. Pumpout Chamber

As the aerated and settled wastewater flows from the Clarification Chamber into the Pumpout Chamber, it passes through the BioCycle Chlorinator, and receives a final disinfection in the process.

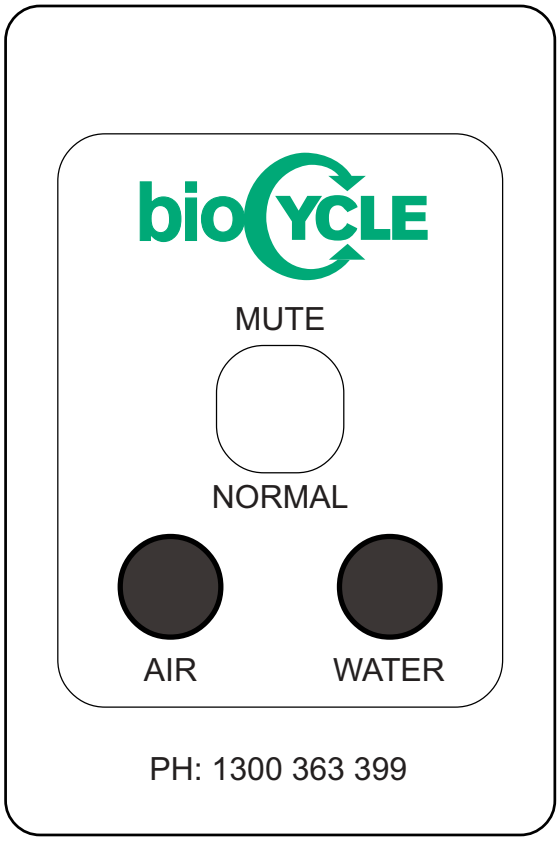
The Pumpout Chamber contains an electric submersible pump which distributes the treated and disinfected water to an irrigation system in the garden or landscaped area of the property.

The pump is activated by a float switch. When the water level in the chamber rises to a certain level, the pump switches on, and when it drops below a certain level, the pump switches off.

The water level in the Pumpout Chamber is kept deliberately low to provide a substantial reserve capacity in case of pump malfunction or irrigation blockage (some models have a separate reserve chamber to comply with regulations in different areas of Australia).

The Pumpout Chamber also contains a high water alarm, activated if the water level rises further than it should.

The Alarm Panel



The BioCycle Alarm Panel is normally located inside the house. If the system malfunctions, the alarm will sound and either the “Air” or “Water” light will illuminate.

If this occurs, consult the “Fault Finding” section on Pages 11-12 of this booklet. If you cannot solve the problem, contact your nearest BioCycle/JOWA Group office or your authorised service contractor.

Note: The “Mute” switch will stop the alarm sounding. Always remember to return the switch to “Normal” after the problem has been rectified.

Responsibilities and Legal Requirements

Regulating bodies (State and Local Governments) throughout Australia impose certain requirements on sewage treatment system owners. The following basic list is provided as a guide only - please check with your local regulating body for further information.

- The system is to be constructed in the approximate position indicated in the plan.
- The system may not be used until the site has been inspected and the Council considers that effluent and sullage can be completely disposed of on the site without nuisance or likely danger to health.
- Unless permitted by local authorities, irrigation water should not be used for food crops, vegetables, etc. Many authorities allow fruit or nut trees growing on the property to be irrigated with effluent from the system, but only on drip feed or flood irrigation.
- There shall be no irrigated water run-off from the allotment to the adjoining properties, public places or reserves.
- The owner shall enter into a service contract with the manufacturer, distributor or their agents considered to be competent by the relevant authority for servicing of the unit at quarterly intervals.
- The service contractor shall make adjustments to each unit, its ventilation and irrigation system, when directed to do so by the relevant authorities.
- The yard or garden areas of the allotment must be turfed and/or landscaped to the satisfaction of the relevant authorities before the system is used for irrigation purposes.

Detailed conditions of installation are stated on the Approval given to you by the Council or regulating authority. Please read these carefully and ask for advice should it be necessary.

The owner of the system is entirely responsible for its operation and maintenance. The existence of a service contract does not transfer the responsibility from the owner to the supplier or its agent.

Quarterly Maintenance

To ensure that sewage treatment plants perform to the high standards set by the regulating bodies, a regular program of quarterly maintenance visits is mandatory. Failure to have the stipulated servicing carried out could result in a breach of public health legislation and subsequent legal proceedings by the relevant authority.

The first 12 months' servicing on your BioCycle system is included in the purchase price. After this, local authorities insist that you have a current Maintenance Contract on your system at all times.

You will receive a Service Contract Renewal from JOWA Group or our accredited Service Contractor after the third service in any 12-month period. Please follow the instructions to ensure your Contract does not lapse.

Each quarterly maintenance service includes a full inspection/check of the system, with special attention to the following points:

- Cleaning of the system componentry, if necessary
- Water quality tests
- Adjustments to air system, if necessary
- Monitoring and maintaining the balance of the purifiers
- Replenishing supply of disinfecting agent
- Servicing and maintenance check of the blower, irrigation pump and electrical system
- Detailed Reports supplied to system owner and local Council/ Authority.

General Care

Access

For maintenance purposes, please ensure that clear access is available to ALL manholes on the tank/s and to the Electrical Box. This is a requirement of the regulating bodies. Soil, plants, bark etc must be removed prior to a maintenance service.

Blower Damage (a very costly problem!)

Do not create a water catchment area around the Electrical Box as this could cause fusion of the blower during periods of heavy rain. Avoid the problem by creating channels to take the rainwater away from the vicinity of the Electrical Box.

Insurance companies will NOT reimburse you for Blower damage caused by your negligence.

Change of Ownership

To enable correct servicing records and procedures to be maintained, could you please:

- Advise us if you sell your property
- Leave this booklet for the new owner.

Difficult-to-Find Homes

Due to the complexities of street numbering in certain areas, our company provides an identification placard. Please affix this to your letterbox or on the fence nearest to your property entrance - this will assist us in locating your home quicker during routine or emergency calls, thus keeping costs down.

Tips for a Healthy System

- DO NOT flush newspaper, disposable or sanitary napkins down the toilet
- DO NOT use “under-sink” style garbage disposal units
- DO NOT allow strong caustic or alkaline substances, oils, acids, bleaches, disinfectants or chemical detergents to reach the system. These substances can harm or kill the beneficial bacteria within the BioCycle unit, causing unpleasant odours and adversely affecting the operation of the system.
- DO NOT exceed the maximum design load or subject the system to hydraulic shock loads (use of baths, washing machines, dishwashers, etc at the same time) as these can cause odours.
- DO NOT use too much detergent - always follow manufacturers’ directions regarding quantities.
- DO NOT switch the power off.
- DO use biodegradable detergents (see Page 14).
- DO spread your wash loads over six or seven days where possible.

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General Care (Cont.)

Holidays/Extended Absences

If you are absent from the property for any length of time, the system should be left switched on. Power use is similar to leaving a light switched on in the home.

Should you wish to switch the system off for any reason, please contact your local BioCycle office for advice.

For security reasons, we suggest that while you are away from the property you leave the alarm switched to MUTE. On your return please switch back to the NORMAL position.

Irrigation System

Irrigation lines, spray heads etc. can clog up over extended periods of use. Manufacturers of such equipment recommend that these items be flushed at least monthly. To avoid any inconvenience and to keep costs down, please comply with manufacturers' recommendations. You must have a minimum of six spray heads in your irrigation system.

Plumbing Problems

Blockages in the drainage pipes from the house to the system are plumbing problems. If your household fittings are not draining away, please check the inlet to the system (or septic tank with two-tank systems) for blockages. Usually the lines can be cleared at the inlet point by inserting a rod down the pipe. Should this not be possible please call your local plumber or drainer.

The loss of a water seal in fittings, allowing gases to escape, should be initially referred to your local plumber for corrective measures. An incorrectly constructed E Duct vent could be the cause of this problem. E Duct Vents should be constructed to ensure the proper dispersal of gaseous by-products prevalent in all forms of sewerage treatment. The vent should be positioned at least 60mm above the highest point in the house so that prevailing winds will carry away such gases.

In The House

Reduce foaming by adding a tablespoon of crushed bath soap (leftovers) to your washing powder. After wiping down tiles and the like, rinse the cloth in a bucket, then discard the contents in the yard, not in the system.

Don't Panic!

If the alarm sounds, PLEASE refer to the Fault Finding section on the following pages before calling us – this may help keep your costs down!

Fault Finding - A Quick Reference

In the unlikely event of a malfunction, please refer to the Guide below. Many minor problems can be rectified by the owner taking simple corrective action.

If, after taking the recommended actions, the system is still malfunctioning, contact your nearest JOWA Group office or your authorised service contractor.

Don't panic – the system has been designed with sufficient reserve capacity to allow normal household use until a technician arrives.

FAULT - THE ALARM SOUNDS AND THE 'AIR' LIGHT ILLUMINATES

Possible Causes	Action
(1) Tripping of a circuit breaker	Turn alarm to mute. Listen at the system to hear if the blower is running. If not, follow instructions for resetting the Circuit Breaker on Page 13.
(2) Power failure	Check power supply and/or other home appliances/ fittings. If necessary, contact your electricity supplier or a local electrician.
(3) Blower failure	If power supply is OK but blower is still not running, a service call is necessary.

FAULT - THE ALARM SOUNDS AND THE 'WATER' LIGHT ILLUMINATES

Possible Causes	Action
(1) Tripping of a circuit breaker	Check as above.
(2) Power failure	Check as above.
(3) Blocked irrigation filter	Clean out filter.
(4) Blockage in the irrigation line	Flush irrigation lines.
(5) Kink in the irrigation line	Unkink line - if necessary cut out damaged section and rejoin.
(6) Pump failure	If all above have been checked but pump still does not operate, a service call is necessary.

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FAULT - IRRIGATION DOES NOT WORK

Possible Causes	Action
(1) Tripping of a circuit breaker/Power failure	Check as per previous page.
(2) Blocked irrigation filter	Unblock filter
(3) Blockage in the irrigation line	Flush out irrigation line
(4) Kink in the irrigation line	Unkink line - if necessary cut out damaged section and rejoin.
(5) Pump failure	If all above have been checked but irrigation still does not function, a service call is necessary.

FAULT - EXCESSIVE FOAMING

Possible Causes	Action
(1) Too much detergent being used in laundry	Use recommended quantities of detergents
(2) Too many washes	Adjust loads – only do one or two washes per day

FAULT - PERSISTENT ODOURS

Possible Causes	Action
(1) The first tank in the system has not matured yet	Contact your local BioCycle office for advice
(2) Too much water is being discharged through your household fittings at the same time	Modify your water use patterns to avoid heavy loads on the system – e.g. avoid using the bath and washing machine at the same time
(3) Excessive chemicals and/or disinfectants are being used in your residence	Please avoid and the system will recover
(4) E-duct vent or S-bends are not suitably constructed	Refer to your plumber or contact your local BioCycle office for advice
(5) Exposed areas in tanks, seal degradation	Apply a light mix of sand/cement or similar mix
(6) The system is required to do more than it is designed for	Refrain from overloading
(7) The venting system on the house is too low and/ or is over a window	Extend the vent pipe higher

Resetting The Circuit Breaker

The electrical circuitry in your BioCycle allows for some variations in power supply, but problems can still occur. Blackouts, supply fluctuations, power surges or voltage drops – all more common in rural areas - may trip the circuit breaker, shutting down the system and triggering the alarm.

If the overload circuit breaker in your switchboard has tripped to the "Off" (down) position, this does not necessarily indicate a fault in the system – it is the electrical system working correctly to protect the equipment within the system.

If, after a power cut or voltage fluctuation, the system alarm does not clear itself within 30 minutes, it may be necessary for you to reset the tripped circuit breaker.

To do this, open your switchboard and look for the circuit marked "Aerobic" (or whatever your electrician may have called it). There will be two circuit breakers. If one of them is in the down position, it is off. To reset, lift the circuit breaker toggle to the up position.

Upon doing this, the blower should immediately re-start and the system should function normally. The alarm may take 30 minutes to clear. Don't forget to reset the alarm to NORMAL.

If the Circuit Breaker switch will not stay up, contact your nearest JOWA Group office for advice. You may need to call an electrician.

Detergents and Cleaning Products

Many popular detergents and cleaners can upset the delicate biological balance which is essential for your BioCycle system's efficient operation. They can damage the bacterial processes within the system, resulting in odours and other potential problems.

As a toilet and surface cleaner, hot water has been proved to be the most effective as a disinfectant. Where possible, use should be made of it, as it is ideal for the system.

Among the products which we do not recommend using with the BioCycle system are:

- **Anti-Bacterial Solutions**

  Milton Tablets, Napisan, Nursil, Cold Power, Milton - Nursery Land, Nappy Plus, Pine O Clean, Nappy Soft, Nappy Fresh, Toilet Duck

- **Bleaches**

  Domestos, Lemon Budget, White King, Grade, Marvolinn Bleach, Zixo Premium, Lemon Bleach

- **Toilet Cleaners**

  Harpic, Ajax, Blue Loo, Aussa

The BioCycle Range

On the following page you will find a leaflet for the BioCycle range of cleaning products. These products are the result of more than two years of trials and testing, and meet all the requirements for healthy operation of aerobic treatment systems and septic tanks.

At present the BioCycle products are only available from our South Australian head office. We plan to eventually have the full range available from retail outlets in all States, however setting up the necessary distribution channels will take some time. We will advise you when the products are available in your area.

South Australian customers can simply phone their order through on 1300 363 399 and we will arrange for one of our Service Technicians to deliver your order when he is next in your area – this will usually be within a few days of placing your order. If you require immediate delivery, courier service can be arranged for a small fee or you can collect from our Sheidow Park office.

DO YOU HAVE A SEPTIC TANK OR WASTEWATER TREATMENT SYSTEM?

Do you know that many common detergents and cleaning products are *lethal* to the natural biological processes which make your system work?

HERE ARE THE ANSWERS!

The BioCycle range of detergents and cleaning products has been specifically formulated for trouble-free use with septic tanks and aerobic wastewater treatment systems. The special biodegradable formulae will not harm the beneficial bacteria which are esential for your system's efficient operation.

SEPTIC TANK & Aerobic Treatment System FRIENDLY

FOR A CURRENT PRICE LIST AND/OR TO PLACE AN ORDER, CONTACT BIOCYCLE ON:

08 8381 9100

bioCYCLE™ Spray & Wipe

bioCYCLE™ Dishwasher Powder

bioCYCLE™ Laundry Powder

bioCYCLE™ Dishwashing Detergent

bioCYCLE™ Toilet Cleaner

bioCYCLE™ Floor & Surface Cleaner

bioCYCLE™ Bathroom Cleaner

Distributed by JOWA Group Pty Ltd, manufacturers of BioCycle wastewater treatment systems. 8 Lander Ave, Sheidow Park SA 5158

Cleaning - A Few More Helpful Hints

These days the clothes we wear are not really very dirty, due to personal hygiene and cleaner habits. We have our daily showers and daily change of clothes. Because of the clothes not being so dirty any more, the detergents we use tend to foam more, sometimes excessively. To prevent this from happening, try putting a tablespoon of crushed bath soap (leftovers) in with your washing powder. It will cut down the foaming.

Try to avoid products with ammonia and bleaches being put through the system. If you want to use this type of product - on bathroom tiles, for example - wipe most of it off with a cloth, but do not rinse this cloth out in the laundry sink. Rinse it in a bucket and discard it in the yard away from the system.

For the bathroom, we recommend using a biodegradable cleanser applied with a soft brush and rinsed off with hot water for the tiles, toilet bowl, bathtop and sink.

To get nappies, socks or other whites cleaner, try using an airtight container and your normal washing powder/liquid. Soak the dirty socks in the container, giving it a shake every time you pass the bucket without opening the lid. This should do the trick.

Each week, many new products come onto the market, as well as changes to the composition of existing products. It is not possible for us to keep track of all these products and/or changes. The ultimate responsibility for the use of products in the system lies with the owner/user of the system.

Remember: The BioCycle, like all sewage treatment/disposal systems, uses biological processes. If a cleaning product kills bacteria in the house, it will also kill the bacteria in the treatment system.

Garden Irrigation

The treated wastewater from your system is rich in nutrients and therefore a bonus to your garden. Please do not waste this water.

You should be aware that most authorities require: "There shall be no irrigated water run-off from your allotment to adjoining properties, public places or reserves."

Generally speaking, you are not permitted to water the Council's footpath and care should be taken not to allow any run-off onto your neighbour's land.

Chlorine – Will It Harm My Garden?

Within the system the only chemical used is Chlorine. This acts as a final disinfecting process.

Research has been carried out on the use of Chlorinated swimming pool water (which usually contains a greater amount of Chlorine than the BioCycle system's irrigation water) by the Department of Agriculture Biological and Chemical Research Institute.

They found that Chlorine concentrations up to 15 ppm - 7 times greater than the amounts found in a BioCycle system - had no long term affects on grasses or native species of plants and there was no Chlorine accumulation in plants or soil.

Many town water supplies are Chlorinated with residual concentrations of up to 6 ppm. BioCycle irrigation water generally ranges from 0.5 ppm to 2 ppm.

Our company has tested the effects of the system's treated water on three individual installations where it had been sprayed directly onto native plants over a period of two years. The results are thriving and healthy plants with a measured faster growth rate than areas of the gardens not irrigated by the system's water.

Care should be taken when spraying onto very young plants.

Suitable Plants for the Surface Irrigation Area

This list is only intended to provide a selection of trees, shrubs and other plants which may be considered suitable for the surface irrigation disposal area. However, as we live in a land of wide climate and soil variations, it is essential that further investigation be made with your local plant nurseries before finalising plant choices to suit your particular locality and site conditions.

BOTANIC NAME	COMMON NAME	APPROX. HT.
Trees		
Agonis flexuosa	Willow myrtle	5-6m
Acacia Baileyana	Cootamundra Wattle	3-5m
Banksia spp		
Casuarina strica	Drooping She Oak	3-5m
Casuarina cunninghamiana	River She Oak	6-10m
Callistemon viminalis	Red Bottlebrush	3-6m
Callistemon salignus	White Bottlebrush	3-6m
Eucalyptus robusta	Swamp Mahogany	6-9m
Eucalyptus saligna	Sydney Blue Gum	15-30m
Eucalyptus grandis	Flooded Gum	5-6m
Eucalyptus camaldulensis	River Red Gum	15-20m
Eucalyptus cosmophylla	Cup Gum	5-6m
Hymenosporum flavum	Native Frangipani	3-5m
Leptospermum flavum	Coast Tea Tree	5-6m
Melaleuca Quinquenervia	Broad paperback	5-7m
Melaleuca nesophila	Western Tea Myrtle	2-4m
Pittosporum spp		
Syqygium panuculatum	Bush Cherry	8-10m
Tristania laurina	Kanuka	3-5m
Shrubs		
Abelia x grandiflora	Abelia	2-3m
Acacia floribunda	Gossamer Wattle	2-4m
Acacia longifolia	Sallow Wattle	2-4m
Acacia iteaphylla	Flinders Range Wattle	2-3m
Cotoneaster spp.		
Cortanderia selloana	Pampas Grass	2-3m
Cyperus alternifolius	Umbrella Grass	0.5-1m
Cyperus papyrus	Papyrus	0.5-1m
Cassia spp.		
Chamelaucium uncinatum	Geraldton wax	
Dryandra formosa		1-3m
Eremophila spp.		
Grevillia spp.		1-3m
Hebe spp.	Veronica	0.5-1m

BOTANIC NAME	COMMON NAME
Climbers	
Bougainvillea spp.	
Clematis spp.	
Hardenbergia violacea	Purple Coral Pea
Hibbertia scandens	Snake Vine
Jasminum grandiflorum	
Jasminum polyanthum	
Jasminum officinate	Common Jasmine
Kennedia rubicunda	Dusky Coral Pea
Lonicera japonica	Japanese Honeysuckle
Passiflora spp.	Passion Flower
Vitis coignetiae	Glory Vine
Perennials	
Aster novi-belgii	Perennial Aster
Canna	
Chrysanthemum frutescens	Marguerite Daisy
Chrysanthemum maximum	Shasta Daisy
Gazania ringens	Black eyed Susan
Impatiens spp.	
Salvia ulignosa	Bog Salvia
Viola spp.	

Warranty

JOWA Group Pty Ltd warrants that if the tank(s) supplied require repair or replacement due to defective manufacturing during a period of five (5) years from the date of supply, it will carry out such repairs or replacements at no charge to the Customer or subsequent owner of the System.

JOWA Group Pty Ltd also warrants that if the pumps, blowers, fittings, pipework and/or plumbing components supplied require repair or replacement due to defective manufacturing during a period of two (2) years from the date of supply, it will carry out such repairs or replacements at no charge to the Customer or subsequent owner of the System.

These warranties are conditional upon the full price having been paid for supply and delivery of the System and/or any associated goods or services, and upon the Customer or owner notifying JOWA Group Pty Ltd immediately if becoming aware of any defects.

These warranties shall not apply to any failure of the System caused by:

- The Customer or owner's non-compliance with any conditions of the contract, operating instructions or recommendations by JOWA Group Pty Ltd
- Actual interference with the System or any of its components by any person other than an authorised service technician
- The System being required to bear a work load greater than that for which it is designed, due to incorrect information being supplied by the Customer at the time of purchase, or a subsequent change in the volume of use, or the load being unusually large for the size of the dwelling on the site
- Actual or consequent damage caused by earthquake, fire, flood, storm, lightning, land slip, soil subsidence, electrical supply fault or plumbing fault.

The Customer agrees to pay any charges incurred for labour, repairs and/or replacement parts due to System failure resulting from any of the above causes.