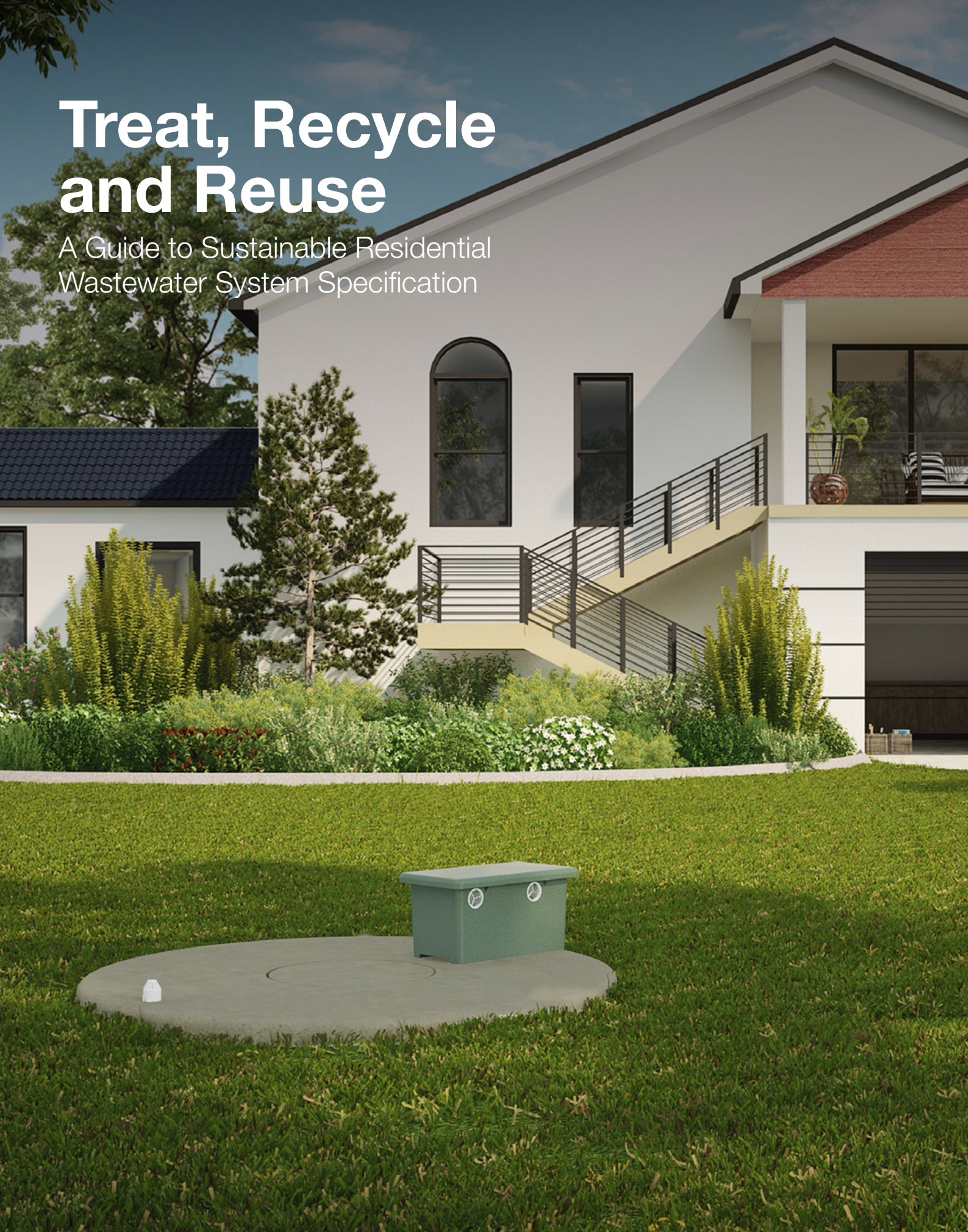


Treat, Recycle and Reuse

A Guide to Sustainable Residential Wastewater System Specification



INTRODUCTION

Where a property has no access to a main sewer line, as in rural or remote areas, there is a need for an alternative system to deal with household wastewater. While septic tanks have traditionally been the most common option for residential applications and still have a place in the market, concerns about their environmental impact has the industry looking towards more effective treatment options. Offering higher quality effluent, advanced aerated systems have gained traction as they enable water to be safely reused for irrigation purposes.

The sustainable treatment and reuse of wastewater is critical for Australia's future. As recently as 2019, the nation experienced its driest year on record, with significant deficiencies in rainfall in regions throughout the country continuing into the following years.¹ The need to save, recycle and reuse water is an ongoing concern for many households and local communities.

Against this backdrop, the specification of an onsite wastewater system takes on even greater importance as it allows households to save and safely reuse significant amounts of water every year, alleviating pressure on public water supplies. There are many companies offering residential wastewater treatment systems, but not all solutions are created equal. Site conditions, owner requirements, and council regulations all come into play when specifying an effective solution for any onsite application.

Specifiers must also consider the impact of the new AS/NZ1546.3:2017 On-site Domestic Wastewater Treatment Units - Secondary Treatment Systems. Recent changes to the standard require aerated wastewater systems to meet increasingly stringent capacity and performance requirements. Consequently, existing systems must undergo testing and certification under the new standard before they can be approved for use in any State or Territory.

This whitepaper looks at the specification of residential wastewater systems with a focus on advanced aerated wastewater systems, and how they compare to traditional septic tanks. We also look at the impact of the new AS/NZ1546.3:2017 and other relevant factors when choosing an aerated wastewater system for your next project.

"Aerated wastewater systems, especially advanced systems with enhanced filtration and disinfection, result in a higher quality effluent that is often clean enough for reuse on lawns and gardens".



WHAT IS A WASTEWATER SYSTEM?

A residential wastewater system allows for the onsite treatment of wastewater (that is produced from the water used in a home) and safely dispose of it. The two main types of onsite wastewater water systems are **septic tanks** and **aerated wastewater systems**.

Septic tanks have traditionally been the popular choice for onsite wastewater treatment. A septic tank is an underground chamber through which domestic wastewater flows for basic treatment. Septic tanks are generally made of concrete, fibreglass or plastic and rely on the settling of solids and anaerobic processes as the main treatments for wastewater.

Aerated wastewater systems are considered the most effective for residential onsite wastewater treatment. Comprised of a system of mechanical pumps and compartments, such systems utilise the aeration process, in which wastewater undergoes several treatments as described below:²

The Aeration Process

1. Solids settle to the bottom of the first compartment and scum floats to the top, resulting in partial clarification of the wastewater.
2. The partially clarified wastewater flows to the second compartment in which a pump is used to aerate the wastewater. Proper aeration promotes microbial growth in the wastewater, and assists bacteria to further break down the incoming organic pollutants.
3. The third compartment allows for the further settling of solids.
4. In the fourth compartment, wastewater is subject to a disinfection process, often through chlorination.
5. In the final stage, the treated effluent (treated to a secondary standard) is pumped away for surface or subsurface irrigation or otherwise safely disposed of.

Advanced aerated systems are available that utilise membrane filters that produce higher quality effluent and use UV disinfection processes rather than chlorination. Advanced systems have two clear advantages. First, membrane filtration can filter out most particles, nutrients and diseases, producing a very clear, higher quality effluent. Second, UV disinfection enables wastewater to be treated to a higher standard, while ensuring it is free from chlorine, thus making it more suitable for irrigation purposes.





AERATED WASTEWATER SYSTEMS VS. SEPTIC TANKS

Key Differences

Quality of Effluent

Aerated wastewater systems, especially advanced systems with enhanced filtration and disinfection, result in a higher quality effluent that is clean enough for reuse on lawns and gardens. Septic tank effluent needs additional treatment after it has left the tank as it has only gone through one stage of treatment. This additional treatment usually consists of a “soakaway”, a drainage system in which soil assists in removing bacteria from the effluent and allows the water to be drained back into the environment in a controlled manner.

Maintenance

As they rely on natural processes, septic tanks are more prone to blockages than aerated wastewater systems. In the latter, a mechanical pump assists with the flow of wastewater so blockages are relatively less common. The chambers in aerated wastewater systems also require less desludging (the removal of sludge and scum from the system) than septic tanks. Mechanical components and a more complex series of tanks and pumps will nevertheless attract servicing and maintenance costs. Leading products feature back-up mechanisms, alert systems, and overflow management, ensuring complete safety and peace of mind.

Efficiency

Aerated wastewater systems utilise a pump and other mechanical processes to assist with adding oxygen into water to assist with the decomposition of organic compounds. On the other hand, septic tanks rely on the natural separation of solids from liquid, which limits treatment efficiency. By design, aerated wastewater systems are also better equipped to handle heavier loads and “shock” loads (periods in which water flow exceeds normal ranges, such as during a social gathering).

Environmental Impact

Contaminated water leakage from sewage management systems is a major environmental risk as it pollutes soil and groundwater. Septic tanks are not the most environmentally-friendly solution for wastewater, which is why the industry is moving to aerated wastewater systems. Aerated wastewater systems are more efficient at removing solids than a septic tank; the additional treatment and disinfection results in effluent with less harmful nutrients and bugs, and therefore less risk of environmental harm. This additional protection is beneficial in areas where there is a high groundwater table or if the soil does not drain efficiently.

SPECIFYING ADVANCED AERATED WASTEWATER SYSTEMS

What You Need to Know

Regulatory Framework

Onsite wastewater management systems are regulated at a local government level under environmental protection legislation. A local council must approve the installation of wastewater treatment systems. Approval for installation is usually dependent on the wastewater system being accredited.

Each State and Territory has an accreditation or certification process for sewage management facilities, including aerated wastewater systems. Applications for accreditation are typically reviewed by environmental or health authorities for domestic purposes, with a key requirement being that the manufacturer must have obtained product certification of the wastewater system. For aerated wastewater systems used onsite for residential applications, this means satisfying the testing and reporting requirements of AS/NZ1546.3:2017.

There are also a range of council guidelines, codes of practice and local regulations that will impact the design, installation and operation of the wastewater system.

Recent Changes to AS/NZ1546.3

AS/NZ1546.3 sets out performance requirements, design requirements, means of compliance, and specifications for testing aerated wastewater treatment systems. Specifiers should be aware of recent changes to the new standard. There are new performance and design requirements, such as the stipulation that all newly installed units must be able to process 1,200 litres each day. Industry members note that these requirements are more easily met by aerated wastewater systems, which use electrical pumps, than by passive wastewater systems (such as septic tanks) that do not use external power.³

Most notably, all secondary treatment systems sold in Australia will be required to be stringently tested and must meet or surpass the new standard before they can be sold on the local market. In practice, this means that from a specified date (depending on the State or Territory), all product certificates issued will be against the new AS/NZ1546.3 standard. Existing certificates will be valid for a certain period, but manufacturers will have to resubmit their system for testing if they want to keep their products on the market.

Product Certification

Given the recent changes to AS/NZ1546.3 in 2017, a key question for specifiers is whether the wastewater system has been tested and certified against the new standard. The introduction of the new standard for secondary treatment systems means extra care is needed when selecting a brand or manufacturer. Some manufacturers may decide not to test against the 2017 standard, which could impact the longevity of the manufacturer being in business. This has practical implications for ongoing support and maintenance if you choose one of their systems for your next project.

Design Considerations

Aerated wastewater systems have different capabilities, capacity constraints and performance levels, so a variety of design considerations have to be assessed early in the process.⁴

Consider the following factors:

- daily wastewater load, which will help determine capacity requirements;
- the number of rooms at the residence;
- location of the system, including distance from the house, drainage, and proximity to other structures;
- proximity to effluent management, which influences pump choice and where to run irrigation mains;
- whether there is sufficient land for sustainable disposal of effluent on the site; and
- site and use considerations such as access to electricity, and/or whether it is a holiday or residential home.

Specifiers should also account for any special owner requirements. If the system does not meet the owner's needs, they will be less likely to maintain it. For example, the owner may need a system that can supply treated effluent for reuse due to water restrictions in the area. In such cases, a septic tank will likely not provide the sufficient level of quality of effluent for that specific need.

Installation and Maintenance

The manufacturer or their agent usually installs the aerated wastewater system. Any system should be installed in compliance with the manufacturer's recommendations. Additionally, installation must meet the requirements of AS/NZS3500.2:2003 Plumbing and Drainage - Part 2 Sanitary Plumbing and Drainage, as well as any local council requirements.

An aerated wastewater system should be inspected quarterly by the licensed service provider. The homeowner should expect to undertake light maintenance, and the system will need to be pumped out every 3-5 years (each manufacturer's system is different). In comparison, a septic tank will need desludging generally every 2-5 years.

Running Costs

Homeowners should be made aware of the costs of running an aerated wastewater system. Running costs include routine servicing, desludging, repairs and energy use. Aerated wastewater systems require a continuous supply of electricity. Total energy consumption will depend on the type and quality of the selected system.

Below is a general guide (all prices are estimated and may vary):

- Servicing: \$300 per year
- Desludging: \$900 (every 5-10 years)
- Energy costs: \$300 per year

Pump or aerator replacement and installation costs vary depending on type and size. Pump failure may require a pump out from a liquid waste removalist which may cost approximately \$250.



AQUA ADVANCED

A Sustainable Solution for Recycling Wastewater

The Aqua Advanced Wastewater and Irrigation System is designed to treat all of the wastewater from your laundry, kitchen and bathroom so that it can be safely reused on your lawn and garden. Required for properties that do not have access to main sewer lines, Aqua Advanced uses similar processes and technologies to that of the sewage treatment plants used in large townships and cities.

Designed and manufactured in Australia, Aqua Advanced is available in both polymer and concrete. The system is a one tank, compact design with a small footprint, discreet lid and control box, complete with an alert system. Built with above or below ground irrigation capabilities, Aqua Advanced is the complete solution to recycling household wastewater.

Safe and reliable

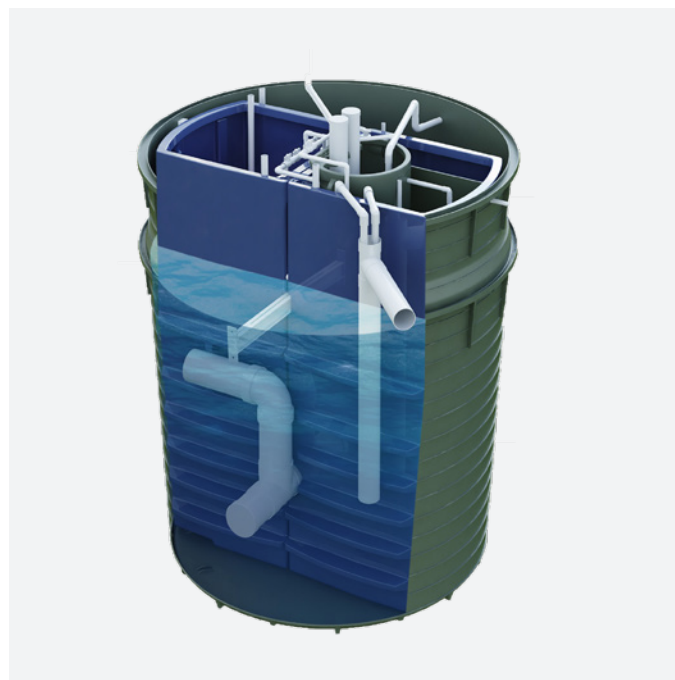
- Aqua Advanced comes with a 20-year tank warranty.
- All household water can be connected with the appropriate working capacity system.
- Unobtrusive, odour free, environmentally friendly, and safe.

Tested to industry standards

- Aqua Advanced has tested to the requirements of the AS/NZ1546.3 standard and has tested to the Advanced Secondary Standard.
- Aqua Advanced has passed a stringent testing program which was undertaken over a period of 34 weeks. Australia has one of the most demanding testing programs worldwide, which ensures the standard of effluent discharged to the environment is world leading.

Sustainable and environmental

- Designed and manufactured by Everhard Industries, Aqua Advanced is 100% Australian made and owned.
- Treating and recycling wastewater minimises the amount of pollution entering waterways, keeping the environment safe
- Using the water on your garden and lawn reduces your water bill and is also advantageous during drought or through periods of water restrictions





“All wastewater treatment systems sold in Australia will be required to be stringently tested and must meet or surpass the requirements of the new AS/NZ1546.3 standard.”

ABOUT EVERHARD INDUSTRIES

Everhard Industries is an Australian family-owned manufacturer of Drainage, Wastewater and Environmental solutions for residential and commercial applications. In addition to our extensive drainage and wastewater range, we are also the market leaders in laundry units and sinks for the home. Back in 1926, Everhard pioneered the original concrete laundry tub in Queensland.

Using environmentally conscious materials and sustainable manufacturing techniques, our products are designed for Australian homes and Australian conditions, working to conserve the environment for the future.

For more information on Everhard's range of innovative solutions, go to <https://www.everhard.com.au>

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All information provided correct as of May 2021