Government of **Western Australia**
Department of **Health**

DRAFT Code of Practice for On-site Wastewater Disposal in Western Australia 2023

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Contents

Glossary and Terms

Absorption	The uptake of effluent into the soil
Absorption trench or bed or area	A land application system which uses the principles of absorption for dispersing effluent.
Aerobic treatment	Treatment that uses bacteria in the presence of oxygen to break down waste.
Amended soils system	A type of on-site wastewater treatment and disposal system that involves modifying the natural soil on a property to improve its ability to treat and filter wastewater, such as a mound.
Aerobic Sand Filter	A system that treats effluent by filtration and subsequent oxidation by aerobic and nitrifying organisms.
Application area (AA)	A designated area intended for the application of treated wastewater for further treatment, absorption or evaporation.
Application system (AS)	The system used to apply effluent from a wastewater treatment system into or onto the application area.
Authorised Officer	Has the meaning provided by the Public Health Act 2016
AWTS	Aerated Wastewater Treatment System, a system that uses aerobic treatment to biologically treat wastewater.
Blackwater	Wastewater containing waste from the human body.
Buffer distance or buffer zone	The distance required between a wastewater treatment system or application area and environmentally sensitive features
BOD_5 (biochemical oxygen demand)	The measurement of dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter over a 5-day period
Certificate of compliance	Has the meaning given to that term in the Water Services Licensing (Plumbers Licensing and Plumbing Standards) Regulations 2000
CHO	Chief Health Officer of the Department of Health
Compost	Solids arising from the wastewater treatment process
Composting Toilet (waterless)	A device that receives and treats human excreta, organic matter as outlined by the manufacturer for aerobic stabilisation processes to produce a product

	that is suitable for disposal.
Constructed wetlands	Artificial wetlands created to act as a filter for effluent that has had secondary treatment applied
Daily Flow	The volume of wastewater flowing into the on-site wastewater system during a 24-hour period. Also see hydraulic loading
Design Irrigation Rate (DIR)	The loading rate that applies to the distribution of effluent to the design area of an irrigation land application system, expressed in L/m2/day or mm/day. [1]
Design Loading Rate (DLR)	The loading rate that applies to the distribution of effluent to the design area of an absorption trench or bed or mound land application system, expressed in L/m2/day or mm/day, and equivalent to the LTAR of the land application system reduced by a factor of safety [1].
Designer	The person responsible for designing the installation of an on-site wastewater system including its sizing and location within the lot.
Desludging	Removal of accumulated sludge and/or scum from a septic tank, other treatment system, pumps sump or holding sump/well. [1]
Dwelling	A single house including ancillary structures that is ordinarily used for human habitation
Disinfection	Wastewater treatment method which kills or inactivates microbial pathogens to an acceptable level, satisfactory for the intended use.
Effluent	The liquid discharged from a wastewater system
Emerson Aggregate Test	The test classifies the behaviour of soil aggregates, when immersed, on their coherence in water.
Equivalent persons (EP)	One equivalent person for the purpose of this Code is rated as 150 litres of flow per day and 70 grams BOD5 per day (sewage)
Escherichia coli (E. coli)	A member of the faecal coliform group of bacteria and indicator of faecal contamination.
Greywater	The domestic wastewater from baths, showers, basins, and laundries, specifically excluding water closet and urinal wastes.
Groundwater	The body of water in the soil, all the pores of which are saturated with water. If the body of water is present at

	all times, it represents permanent or true groundwater
Holding tank	A tank or vessel used for the temporary containment of wastewater prior to approved disposal
Hydraulic conductivity	Saturated hydraulic conductivity (Ksat) in m/day is the measure of soil permeability used in on-site wastewater management
Hydraulic loading	Liquid flow required to be handled by the wastewater system. Also see daily flow.
Installation Certificate	Certificate provided by the installer of an on-site wastewater system certifying that the system has been installed in accordance with the (new regulations), any applicable adopted code, the approval to install, and the system manufacturers requirements.
Irrigation	The distribution of effluent into the topsoil by a shallow subsurface or covered surface drip irrigation system, a shallow subsurface LPED irrigation system or an above ground spray irrigation system. [1]
Licensed Service Agent	A person licensed by the CHO under Part 8 of the Act for the purpose of servicing and maintaining secondary treatment units.
Long-term acceptance rate (LTAR)	The steady state rate that a land application system can absorb primary or secondary treated effluent for further treatment within the subsoil. It allows for loss to the soil by infiltration though the base and side walls of the system, and other losses to the atmosphere by evaporation and transpiration. [1]
Low Pressure Effluent Distribution irrigation (LPED)	A pressure line perforated with drilled squirt holes and nestled in a distribution pipe.
Non-residential premises	refers to any premises that generates wastewater but is not a dwelling. This includes but is not limited to commercial and industrial development (e.g. caravan parks, factories, hospitals, shopping centres, warehouses and workshops), educational establishments (e.g. schools), nursing homes, and short-term or temporary accommodation (e.g. mining camps).
On-site wastewater disposal	Disposal of wastewater on an application area within an individual lot boundary using an on-site wastewater system.

OWS	Means on-site wastewater system as defined by the Wastewater Regulations
Recognised person	An individual or a collective officially acknowledged by the Department of Health as installers of on-site wastewater systems.
Registration	Registration under Part 8 of the Public Health Act 2016
Primary Treatment	The separation of suspended material from wastewater by settlement and/or floatation in septic tanks, primary settling chambers etc, prior to effluent discharge to a secondary treatment process or to a land application system. [1]
Public Drinking Water Source Area (PDWSA)	Public drinking water catchment and recharge areas that are water reserves, catchment areas, or underground water pollution control areas constituted under the Metropolitan Water Supply, Sewerage, and Drainage Act 1909 or the Country Areas Water Supply Act 1947.
Relevant authority	The authority nominated by the wastewater regulations for a specified purpose.
Reticulated sewerage	A network of sewers managed by a water service provider that conveys sewage from any development or subdivision for treatment and disposal off-site
Secondary Treatment	Aerobic biological processing and settling or filtering of effluent received from a primary treatment process. [1] Effluent quality following secondary treatment is expected to be equal to or better than 20 mg/L 5-day biochemical oxygen demand (BOD5) and 30 mg/L suspended solids (SS)[3].
Septic Tank	A single or multiple chambered tank through which wastewater is allowed to flow slowly to permit suspended matter to settle and be retained, so that organic matter contained therein can be partially decomposed (digested) by anaerobic bacterial action in the liquid. [1] The term covers the tanks that are used to treat all wastewater, greywater and blackwater.
Setback	The distance that an on-site wastewater system or land application system must be situated from any building, structure, boundary, watercourse, body of water or other components of the wastewater system.
Sewage	Any waste composed wholly or in part of liquid and includes “Wastewater” and “Liquid Waste”.
Site and soil evaluation	The evaluation of site and soil characteristics and the

(SSE)	assessment of public health, environmental, legal, and economic factors associated with on-site wastewater disposal in a development area, subdivision or individual lot.
Site and soil evaluator	Suitably qualified persons who undertake land capability or site and soil evaluations. This may include appropriately trained soil scientists, geotechnical engineers, civil and environmental engineers..
Soil absorption system	Subsurface land application systems that rely on the capacity of the soil to accept and transmit the applied hydraulic load (includes absorption trenches and drain fields)
Soil absorption zone	The depth of soil that is required to filter, isolate and absorb wastewater microorganisms, nutrients and particles.
Sludge	The semi liquid solids from wastewater
Unsewered	Refers to any development or subdivision that is not connected to reticulated sewerage, and which requires on-site wastewater disposal.
Wastewater Loading Certificate	A certificate issued by the designer stating the daily hydraulic loading for on on-site wastewater system.
Watercourse	A watercourse is: a) Any river, creek, stream, brook, estuary or inlet, into which water flows (including if flow is intermittent or occasional) b) Any collection of water (including a reservoir) into, through or out of which anything coming within paragraph a) flows c) Any place where water flows that is prescribed by local by-laws to be a watercourse And includes the bed and banks of anything referred to in paragraph a), b), or c).
Wastewater	Any kind of faecal matter, urine or sewage composed wholly or in part from human sources, and includes any sewage from premises used for domestic purposes, for the housing of animals, or for commercial food production, but does not include Liquid Waste
Waterbody	Any significant accumulation of surface water including natural and man-made reservoirs, wetlands, lakes or dams.

Chapter 1- Wastewater Regulatory Environment

1.1 General

This Code of Practice for On-site Wastewater Management (the Code) sets the minimum requirements for on-site wastewater systems in unsewered areas of Western Australia and provides guidance on the application of 'AS/NZS 1547:2012 On-site domestic wastewater management'.

The Code has been developed to provide information on standards and guidelines that must be used in the design, installation and management of on-site wastewater systems (OWS). If there is an inconsistency between an Australian Standard and this Code, this Code takes precedence. Where this Code does not cover a topic, the relevant Australian Standard must be followed.

1.1.1 Purpose

The Code sets out the technical requirements, standards and guidelines for the design, installation, and use of on-site wastewater systems. The Code also details requirements for site and soil evaluation, system suitability, and system management to control associated risks to public health and the environment.

1.1.2 Objectives

The objectives are to:

- Minimise the public health risks associated with on-site wastewater disposal by preventing members of the public from coming into contact with effluent.
- Protect surface waters from contamination with wastewater from on-site wastewater systems and application areas.
- Protect ground waters from contamination with wastewater from on-site wastewater systems and application areas.

1.1.3 Scope

This code applies to the on-site management of wastewater, as defined by the regulations. It covers the approval installation and maintenance requirements for domestic, commercial, and industrial on-site wastewater systems installed in Western Australia. It should be noted there may be additional environmental based works approval/ registration/ licensing under the *Environmental Protection Act 1986.*

This Code does not cover:

- Wastewater Recycling – refer to the "Guidelines for the Use of Recycled Water in Western Australia".
- Management or disposal of 'liquid wastes' including 'trade waste' as defined by the regulations.
- Product design approval for the manufacture of on-site wastewater systems. Manufacturers should consult the "Code of Practice for Product Approval of On-site Wastewater Systems in Western Australia".
- Subdivision of land - the site investigation requirements in this Code only apply to individual lots. Where it is proposed to subdivide land, investigations to determine the suitability of land for on-site wastewater disposal should rely on the relevant sections of AS/NZS 1547:2012 and the Government Sewerage Policy.
- A water service provider licensed under the *Water Services Act 2012*.

1.1.4 Changes to existing systems

This Code applies to all alterations, additions, and repairs of existing systems made after the commencement date of this Code.

Where a lot has been developed prior to the implementation of the [new regulations], and/or where an on-site wastewater system on such a lot requires replacement, all practicable means must be undertaken to size and install a new/replacement system in compliance with this code. This may require the installation of a secondary treatment system and/or engineer's certification for reduced setbacks and land application areas.

1.1.5 Legislation

Public Health Act 2016 and (new regulations)

This Code is an adopted document under the [new regulations] and operates under the authority of the *Public Health Act 2016*. The [new regulations] require that:

- The conveyance, treatment, disposal or reuse of wastewater must be conducted in a safe and effective manner.
- Where a reticulated sewerage scheme is not available a local government may direct a premises to install and connect to an appropriate on-site wastewater system.
- An on-site wastewater system must be registered before a premises is occupied. [1]

1.1.6 Australian/ New Zealand Standards

The Code must be read in conjunction with AS/NZS 1547:2012 which takes a risk management approach to on-site domestic wastewater management for systems normally designed for domestic wastewater flows up to 2,000L per day. If there is a variation between an Australian Standard and this Code, this Code takes precedence. Where this Code does not cover a topic, the relevant Australian Standard should be followed. On-site wastewater systems and the associated application area must be designed installed and managed in accordance with the following Australian Standards:

Standard	Title
AS/NZS 1546.1:2008	On-site domestic wastewater treatment units Part 1: Septic tanks
AS/NZS 1546.2:2008	On-site domestic wastewater treatment units Part 2: Waterless composting toilets
AS 1546.3:2017	On-site domestic wastewater treatment units Part 3: Secondary treatment systems
AS 1546.4:2016	On-site domestic wastewater treatment units Part 4: Domestic greywater treatment systems
AS/NZS 1547:2012	On-site domestic wastewater management
AS/NZS 3000:2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3500.1:2018	Plumbing and drainage Part 1: Water services

[1] Proposed requirements of the regulations are subject to change during the drafting process.

AS/NZS 3500.2:2018	Plumbing and drainage Part 2: Sanitary plumbing and drainage
AS/NZS ISO 31000:2018	Risk management – Principles and guidelines
AS 1319.1994	Safety signs for the occupational environment
AS5200	Technical specification for plumbing and drainage products
AS/NZS 4766:2006	Polyethylene storage tanks for water and chemicals

1.2 Roles and Responsibilities

The key stakeholders identified in the application process for approval to install or construct an on-site wastewater system are listed below. Other persons who may have a role in managing and implementing processes that lead to the effective and sustainable performance of on-site systems are identified in AS/NZS 1547:2012.

1.2.1 Authorised Officers

Authorised Officers are responsible for reviewing all stages of the on-site wastewater system approval process, ensuring compliance with this code as well as relevant guidelines and standards. They have the authority to issue approvals for installation and construction as per the regulations and register on-site wastewater systems under the Act.

1.2.2 Site and soil evaluator

Site and soil evaluator must ensure they:

- Evaluate the site constraints and soil capacity for accepting treated wastewater.
- Include a statement within the report that the evaluation procedure has been undertaken in accordance with AS/NZS 1547:2012 and any other requirements of the Local Government and/or Department of Health.
- Include within the report recommendations of suitable on-site wastewater systems and land application methods appropriate for the site.

1.2.3 On-site system designers

On-site system designers are responsible for the sizing, design and siting of an on-site wastewater system based on the site and soil assessment, Department of Health product approval product engineering specifications and the requirements of AS/NZS 1547:2012.

Designers are required to be suitably qualified or experienced and must ensure they:

- Complete a design report appropriate to the scale and extent of the on-site system.
- Ensure the design is in accordance with manufacturers specifications and the requirements of AS/NZS 1547:2012, any adopted Code, and the regulations.
- Include CHO product approval for the proposed system with the application to Install/ construct.
- Submit to the owner and the Local Government copies of the:
    - Design report and Wastewater loading certificate
    - The site and soil evaluation report used for the purpose of system design

For on-site wastewater systems that have a hydraulic load design exceeding 2000L per day of wastewater, it is necessary to obtain and submit an engineer's certification. This certification

serves as a validation from a qualified engineer, ensuring that the system's design and capacity are appropriate for handling the higher hydraulic load.

1.2.4 On-site system installer

The on-site system installer is the individual responsible for installing the system on site. It is recommended designers and system owner engage a Department of Health recognised installer for the purpose of installing on-site wastewater systems.

The on-site system installer must ensure they:

- Install the system in accordance with the plans approved by the approving agency and any imposed conditions.
- Upon completion of the installation, issue an Installers Certificate that certifies the system has been installed in accordance with its approval.
- Include a set of *as installed plans* with the certification.

1.2.5 Enforcement agencies

To manage on-site wastewater systems effectively enforcement agencies must:

- Assess applications for installation of an on-site wastewater system.
- Ensure a proposed on-site system has a valid product approval issued by the CHO and that the application is aligned with any conditions of the product approval.
- Review the site and soil evaluation report.
- To ensure compliance, the on-site wastewater system should align with AS/NZS 1547:2012 standards. Alternatively, if the system's hydraulic load involves treating and disposing of more than 2000L per day, it is necessary to obtain certification from a qualified engineer. This certification validates that the design of the system, including its capacity, is suitable for effectively managing the higher hydraulic load.
- Review the design report including flow rates and land application calculations and designer declaration. It is not the responsibility of the approving agency to do the calculations or design the land application system for the property owner.
- Establish specific site and system conditions of approval that are applicable to the installation of the on-site wastewater system. These conditions should be tailored to the unique characteristics of the site and the specific requirements of the system being installed.
- Assess application for registration.
- Ensure an Installers Certificate has been provided by the installer certifying the installation has been undertaken in accordance with the design report, manufacturers requirements and conditions of approval.
- Set site and system specific conditions of registration pertaining to the operation, use and maintenance of the on-site wastewater system.
- Issue registration.
- Monitor and record routine maintenance activities.

1.2.6 Licensed service persons

Certain on-site wastewater systems designed to achieve specific effluent quality may require ongoing maintenance. Maintenance requirements are specified in product approval. Where a product approval requires servicing and maintenance, this must be undertaken by a person licensed for that purpose under *Part 8 of the Public Health Act 2016*. Service persons must ensure they:

- Have completed an appropriate approved training course or are approved by the system manufacturer.
- Are licensed under *Part 8 of the Public Health Act 2016* for the purpose of undertaking maintenance work on on-site wastewater systems.
- Service the apparatus in accordance with the manufacturer's requirements.
- Complete a service report in the approved form, appropriate to the on-site system. The report must state if the apparatus is functioning correctly or if remedial action is required.
- The report must also detail what maintenance was conducted and include details of the conditions of the land application area(s).
- Provide the owner with a copy of a service report.
- Retain a copy of all service reports for a minimum of four years.
- Notify the local government in the approved form, upon servicing or undertaking maintenance of an on-site wastewater system.
- Provide the local government with a copy of the service report if any mandatory reporting conditions exist with the system.

1.2.7 Property owners

Property owners must ensure that:

- An on-site wastewater system on their property is operated and maintained in accordance with the manufacturer's instructions and the conditions of approval and registration.
- An on-site wastewater system on their property is registered with the appropriate enforcement agency prior to use.
- Facilitate regular maintenance of the on-site wastewater system by a licensed service person in accordance with manufacturers requirements.
- Ensure the system is not modified, dismantled or altered without the approval of an enforcement agency.

Chapter 2- Approval Process

2.1 Approving Agencies for Installation of an On-site Wastewater System

2.1.1 Local Government

Local government is the appropriate enforcement agency for approving the installation of any on-site wastewater system that has Chief Health Officer (CHO) product design approval.

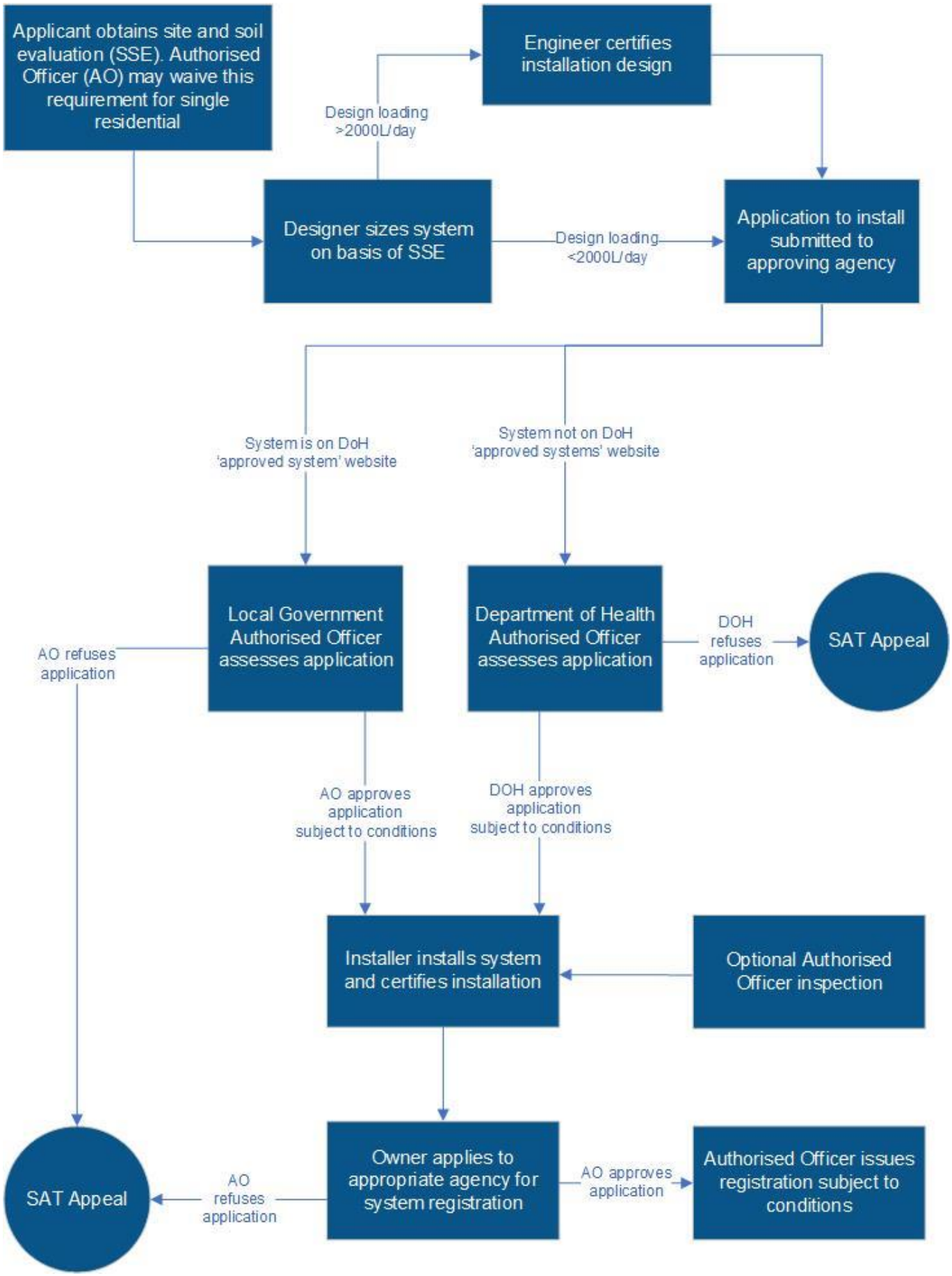
The (new regulations) have removed limits on hydraulic loading design capacities for local government approvals of on-site wastewater systems. Any application to install an on-site wastewater system with a proposed hydraulic loading capacity exceeding 2000L per day will require engineering certification of the installation design. It is recommended the approving agency obtains and reviews the engineer's professional indemnity insurance during the approval process.

2.1.2 Department of Health

The Department of Health is the appropriate enforcement agency for approving the installation of any on-site wastewater system:

- That is proposed to be installed in an area that is not within a local government municipality; or
- That is not on the Department of Health approved system website.

2.1.3 Approval process flow chart



2.2.1.1 Lodging an application to install with Local Government

When lodging an application to install an on-site wastewater system with local government, the application should include:

- **A completed application in the approved form**
- **A copy of the CHO Product Approval for the system**
- **A site and soil evaluation (SSE) report**

The SSE report must address performance criteria detailed in **Section 3.2** of this Code. *The Regulations allow an approving agency to waive the requirement for an SSE for an On-site wastewater system serving single residential dwellings. See **Section 3.1.1** SSE Exemption Criteria.

- **Site plan**
  The site plan must be to a scale (recommended 1:100). The plan must show the setbacks and location of:

  a) The on-site wastewater system proposed to be installed or constructed on the site.

  b) Any related land application area.

  c) Any existing or proposed buildings, structures, driveways, large trees or facilities.

  d) Any related drainage lines or pipework (whether natural or constructed).

  e) Any water courses, waterbodies or groundwater bores located on land within 100m of the on-site wastewater system

  f) the lot boundaries

  g) The site contours

- **An effluent disposal field layout plan**

The effluent disposal field layout plan must have been prepared by the system designer and may be combined with the site plan. The effluent disposal field layout plan must include the following details:

a) A hydraulic balance of effluent application components (for example will the pump pressure be sufficient to activate the number of sprinklers required for an aerated waste treatment system).

b) All components of the system, including, but not limited to; the treatment tank, irrigation lines, the exact number of sprinklers proposed, absorption trenches, splitter valves, rotor valves and moisture sensors.

c) The location and size of the land application area.

d) Detail of contours and any proposed levelling of the site.

- **A design report prepared by the system designer detailing:**

a) The proposed systems componentry.
b) The system capacity.
c) The required desludging frequency.
d) A summary of design criteria, design flow, and loading / infiltration rates.

e) The type of and size of the land application system including the calculations for sizing the area.

- **Certification:**

Either

a) If an on-site wastewater system design is for 2000L per day or less and is listed on the Departments website, or;
b) If an on-site wastewater system design is for more than 2000L per day requires engineering certification.

Certifying engineers shall have Australian engineering qualifications or otherwise have qualifications accredited or recognised by Engineers Australia. It is recommended certifying engineers hold a current chartered credential with Engineers Australia in their area of practice and / or are registered. The engineering certification needs to include the following:

I. Certification that the design of the on-site wastewater system is sufficient for the treatment of daily wastewater loading to the intended water quality criteria.
II. Certification that the land application area is sufficiently sized and appropriately located to receive and effectively dispose of the proposed daily wastewater loading.
III. Reference the design report and effluent disposal field layout plan for the purpose of certification.

- **Signed maintenance agreement**

If the system is of a type that requires regular maintenance by a licensed service person, the application must include a maintenance agreement signed by the property owner and a licensed service person. The service contract should be for a minimum of two (2) years.

2.2.1.2 Application to Install – Department of Health

The Department of Health requirements all on site wastewater products to be certified against relevant Australian Standard or approval criteria which are not covered by the relevant Australian Standard outlined in the Code of Practice for Product Approval of On-site Wastewater Systems.

Any application to install an on-site wastewater product outside the scope of the relevant Australian Standard or approval criteria requires engineering certification. The requirements for product engineering certification is outlined on the Department website. Certification for installation of wastewater treatment systems (health.wa.gov.au)

2.2.3 Approval to Install Expiry

Unless extended by the issuing enforcement agency, an approval to install or construct an on-site wastewater system is valid for two years.

2.2.4 Installers Certificate

A person who installs an on-site wastewater system must complete and sign an Installers Certificate in the approved form.

2.2.5 Application for Registration of On-site Wastewater System

The use of an on-site wastewater system is declared under [the Regulations] to be a public health risk activity that is registerable. Prior to using an on-site wastewater system (including

use by leasing out a property), the owner must ensure the on-site wastewater system is registered under Section 68 of the *Public Health Act 2016.*

An application for registration is required to include a copy of the Installers Certificate. It is recommended that the approving agency requires a copy of the completed installers checklist for the appropriate system type as detailed in this Code.

2.2.6 On-site Wastewater System Notice

A durable notice is to be permanently located in a prominent position (such as a power box) on the property showing, at a minimum:

- Type of system installed
- Maximum loading capacity
- Special conditions applicable to the system
- Date of system installation
- Maintenance/desludging frequency
- Prohibited discharges
- Relevant authority/manufacturer details for further information.

2.2.7 Installers Checklist

An installer's checklist for systems and land applications has been provided in Appendix A, titled 'Installation Checklist,' to assist installers and approving agencies in guiding the installation process. Although these checklists are not mandatory, it is advisable to follow them to ensure that the installation is conducted appropriately.

Chapter 3 – Site and Soil Evaluation and performance criteria

3.1 SSE Scope and Content

This section of the Code sets out the Site and Soil Evaluation (SSE) procedures for individual lots. A separate site and soil evaluation shall be carried out for each individual lot, unless the approving agency waives this requirement for a single residential premises.

The purpose of the SSE for an individual lot is to obtain sufficient information to identify appropriate land application areas and inform the design of the on-site wastewater system.
An SSE should:

- clearly identify any site and soil limitations associated with the lot.
- clearly identify suitable land application areas.
- identify the design loading rate, or design irrigation rate of the soil within the land application area.
- provide water balance calculation if appropriate.
- with due consideration of the above, identify the types of on-site wastewater disposal systems that are suitable for the nominated disposal area.

3.1.1 SSE Exemption Criteria:

For single residential developments, the approving agency may exempt the requirement for an AS/NZS 1547:2012 compliant SSE. Exemptions should only be granted where a site-specific AS/NZS1547:2012 SSE is not practicable and where the authorised officer has access to alternative sources of information, or sufficient local knowledge and experience, to be confident of the soil category and site constraints.

An authorised officer from the approving agency may exempt the requirement for an on-site field investigation but still require a partial SSE desktop analysis to identify any site constraints.

Where an Authorised Officer has issued an exemption to an SSE requirement of this Code, the Authorised Officers should ensure that the system designer has taken a highly conservative design approach.

3.1.2 Site and Soil Limitations

The SSE should identify all site and soil limitations that should be taken into consideration when designing the on-site wastewater system. Relevant types of site and soil limitations are detailed in clauses 5.5.4.2.1 and 5.5.4.2.2 of AS/NZS 1547:2012. Site and soil limitations will influence the determination of loading infiltration / irrigation rates, and appropriate setback distances.

3.1.3 Selection of DLR/DIR Values

DLR values for various application areas should be used from **Table 3.1** below. Maximum design loading rates for primary treatment systems, as outlined in AS/NZS 1547:2012, may be used if there is evidence that there are no site and soil limitations, and these rates can be effectively maintained without harm to the environment or increased risk of system failure.

Table 3.1 - Design loading and design irrigation rates

Soil Texture	Soil Category	Soil Structure	Indictive permeability (Ksat) (m/d)	Design Irrigation Rates and Design Loading Rates (DIR/DLR) (mm/day)					
				Absorption trench/beds systems for primary effluent (refer to Table L1 in AS/NZS 1547:2012)	Evapotranspiration absorption (ETA) beds and trenches (refer to Table L1 in AS/NZS 1547:2012) (Conservative rate)	Secondary treated effluent applied to Trench Bed	Mounds (basal area, refer to Table N1 in AS/NZS 1527:2012)	Surface & Sub-surface irrigation (refer to Table M1 in AS/NZS 1547:2012)	LPED (refer to table M1 in AS/NZS 1547:2012)
Gravels & Sands	1	Structureless	>3.0	20-35 (See note 1 Table L1)	ETA/ETS beds are not normally used on soil category 1 to 3	50.0 (See note 1 Table L1)	32.0	5.0 (see Note 2 in Table M1)	(See note 3 in Table M1)
Sandy Loams	2A	Weakly Structured	>3.0						
	2B	Massive	>.3.0	15.0-25.0		50.0	24.0		4.0
Loams	3A	High/ Moderate Structured	1.5-3.0	15.0-25.0		50.0	24.0	4.0 (see Note 1 in Table M1)	3.5
	3B	Weakly Structured or massive	0.5-1.5	10.0 – 15.0		30.0	16.0		
Clay Loams	4A	High/ Moderate Structured	0.5-1.5	10.0-15.0	12.0	30.0	16.0	3.5 (see Note 1 in Table M1)	3.0
	4B	Weakly Structured	0.12-0.5	6.0-10.0	8.0	20.0	8.0		
	4C	Massive	0.06-0.12	4.0-5.0	5.0	10.0	5.0 (see Note 1 in Table M1)		
Light Clays	5A	Strongly Structured	0.12-05	5.0-8.0	8.0	12.0	8.0	3.0 (see Note 1 in Table M1)	2.5 (See note 4 in table M1)
	5B	Moderately Structured	0.006-0.12	See Note 2 & 3	5.0	10.0	5.0 (see Note to Table N1 of AS1547:2012)		
	5C	Weakly Structured or massive	<0.06		see Note 2 & 3	8.0			
Medium to Heavy Clays	6A	Strongly Structured	0.06-0.5					2.0 (see Note 1 in Table M1 of AS1547:2012)	(See note 3 in table M1 of AS1547:2012)
	6B	Moderately Structured	<0.06						
	6C	Weakly Structured or massive	<0.06						

Notes to Table 3.1- Design loading and design irrigation rates

1. Adapted from Australian Standard AS/NZS 1547: 2012 – On-site domestic wastewater management
2. A water balance may indicate that a reduced application rate is required for a specific site.
3. Lower application rates may be required for reduced soil permeability in sodic and dispersive soils, soils with a perched or seasonally high-water table or soils with a limiting layer.

3.2 Site and Soil Evaluation Performance Criteria

The site and soil evaluation reports should address the following performance criteria with either the associated acceptable solutions or an alternative acceptable solution.

Performance Criteria		Acceptable Solution	
P1	Identifies system types and suitable site locations to protect the quality of water bodies. Adequate separation is to be provided between effluent application areas and water bodies.	**A1.1**	Application area installation is in accordance with the setbacks detailed in **Table 3.3**
P2	The system is designed and located to protect the quality of groundwater. Adequate separation is to be provided between application areas and ground water.	**A2.1**	Application area installation is in accordance with the setbacks detailed in **Table 3.3**
		A2.2	Where soils exhibit a high permeability (greater than 3.5 m/day) the applicant is to demonstrate through further investigation that pollution of groundwater will not occur
P3	The system is designed and located to ensure adequate separation between the application areas and property boundaries, pools, buildings and other effluent application areas.	**A3.1**	A minimum horizontal setback distance from the perimeter of any application area is provided in accordance with **Table 3.3** Setback Distances
P4	Wastewater treatment systems and application areas are not to be adversely affected during flood periods, or by seasonally perched water tables. The application area is to be designed and located to ensure adequate on-site soil absorption and no surface pooling.	**A4.1**	All wastewater treatment systems and application areas are located above the 1 in 10-year flood level.
		A4.2	The laterals and spray heads are to be located to ensure even distribution of effluent across the application area. Note: Refer to 'Shallow soil'& 'Very shallow soils over creviced bedrock' in AS/NZS 1547:2012 - Table K2 Selecting the land application

			system to fit the site and soil.
		A4.3	Minimum setbacks in accordance with **Table 3.3**
P5	Whole site considerations are incorporated in the selection, design, siting, construction, operation and maintenance of wastewater management systems.	**A5.1**	SSE is to nominate the soil category in accordance with AS/NZS1547:2012 and determine the appropriate DLR/DIR.
		A5.2	Sub-surface irrigation systems are to be utilised on steeper slopes where site stability is not compromised and surfacing of effluent will not occur. Trenches and beds are to be terraced along contours.
		A5.3	Sites are to be contoured to direct surface water flow away from application areas.
		A5.4	The impact of climate and weather conditions are considered for periods of wet weather where the soils in the application area will become saturated.
		A5.5	Where effluent is applied via spray irrigation, the application area is to be isolated so as not to be used for passive or active recreation purposes (fenced off, delineated garden etc.). Such areas are also to be stock proof, during and immediately after application.
		A5.6	The application area is not used for growing vegetables or food plants for human consumption.
P6	On-site system performance in dispersive soils.	**A6.1**	Emerson Aggregate Test is performed where heavy soils are identified, or dispersive soils are suspected.
		A6.2	Where dispersive soils are identified system design is adequately modified, and/or appropriate soil modification is

			applied. Soil modification commonly involves application of gypsum to the base of the application area at 1kg/m^2.
		A6.3	Ensure application area is covered with soil to protect from raindrop impact.
P7	Appropriate provision is made for wet weather storage of treated effluent during wet weather periods when it is inappropriate to spray irrigate.	**A7.1**	Assessment of the need for wet weather storage is based upon water balance calculations and adequate storage.

Where acceptable solutions are not adopted the applicant must submit an alternate solution prepared by a suitably qualified and experienced person for assessment by the approving agency. Any variation must demonstrate an equal or superior outcome to performance standards in this section.

Table 3.2 - Suitable Land Application Systems

Land Application System	Soil Category	Soil Depth & Slope Gradient	Climate Factors	Dispersive Soils
Conventional Absorption Trench	Not recommended for soil category 5 &6 soils as large trench system are required per unit volume of effluent. **To Consider:** Soil category 1 & 2 can cause ground water pollution, reduce risk by effluent dosing via pumped distribution system.	Not recommended for slopes >15% **To Consider**: Construction on steep slopes, causes more soil disturbance and erosion to site.	Operates in high or low rainfall areas. **To Consider:** Surface and groundwater controls may be required in wet areas.	In high clay areas, soil may lose permeability and cause system failure and pollution of surface waters. **To Consider**: Larger trench lengths may be required to reduce risk.
ETA/ ETS/ LPED Beds	Soil category 4 to 6 are suitable for ETA/ ETS systems, pending on climate suitability and water balancing. **To Consider:** Special design consideration are required in soil categories 1 to 3 due to groundwater pollution risks	Not recommended for slopes >10% **To Consider**: Construction on steep slopes, causes more soil disturbance and erosion to site	The system can operate if annual evaporation exceeds annual rainfall. **To Consider:** Increased high rainfall months coincide with low evapotranspiration levels increasing the risk for system failure. In some areas wet season storage capacity may be required.	In high clay areas, soil may lose permeability and cause system failure and pollution of surface waters. **To Consider**: Larger beds may be required to reduce risk.
Mounds	Mounds can be designed to overcome soil limitations of category 4 to 6 and may also be used on soil category 1 to 3 where groundwater contamination is a risk.	Not recommended for slopes >15% due to the large amount of imported sand that is required on steep slopes and increased the risk of mound toe seepage on steep slopes. **To Consider:** Mounds can be specifically designed to overcome shallow water tables.	Operates in high or low rainfall areas. **To Consider:** Surface and groundwater controls may be required in wet areas.	The underlaying natural soil may be limited by low effluent infiltration rate. **To Consider**: Seepage may occur along the toe of the mound.

Subsurface Irrigation Systems	Soil category 4 to 6 require large amounts of dripper lines and a well-prepared soil surface area. **To consider:** Nutrients may reach ground water in soil category 1 & 2	Recommended maximum slope of 30% without specific application design. **To Consider:** Soil category 1 & 2 can cause ground water pollution, reduce risk by increasing setback to groundwater	Operates in high or low rainfall areas but operates more efficiently in lower rainfall areas.	In high clay areas, soil may lose soil permeability and cause surface pooling of polluted water. **To Consider:** Recommended to have topsoil with low clay content and treat soil if required.
Surface Irrigation Systems	Soil category 4 to 6 require large amounts of dripper/ spray lines and a well-prepared soil surface area. **To consider:** Nutrients may reach ground water in in soil category 1 & 2	Steeper slopes can cause water run off during wet seasons, therefore not recommended on slopes above 10%.	Suited to climates with infrequent high rainfall events and evapotranspiration exceeds annual rainfall. **To Consider:** Not recommended in areas with windy conditions due to spray drift.	In high clay areas, soil may lose soil permeability and cause surface pooling of polluted water. **To Consider:** Recommended to have topsoil with low clay content and treat soil if required.

Notes to Table3.2 – Suitable Land Application Systems: Slope percentage refers to a percentile of the slope ratio (vertical: horizontal)

Adopted from AS/NZS 1547

5% slope = 1:20 = 2.8°
10% slope = 1:10 = 5.7°
15% slope = 1:6.7 = 8.5°
20% slope = 1:5 = 11.3°

Table 3.3 - Setback distances from application area to surface water/groundwater

Surface Waters Site feature	Setback from application area
• Perennial watercourse that discharges into the Swan and Canning River or their tributaries. • Ramsar wetland listed under the Environment Protection and *Biodiversity Conservation Act 1999* • Significant water body or significant wetland as determined by the approving agency	100 meters
• Intermittent watercourse, water body (including farm dams) • any private bore.	30 meters
• 100 metres of the high-water mark of a reservoir, or • 100 metres of any bore used for public drinking water as defined in the *Planning Policy 2.9 Planning for Water Guidelines*	100 meters
• Sites located within a Public Drinking Water Source Area,	In accordance with *Planning Policy 2.9 Planning for Water Guidelines*
Groundwater **Site feature**	**Vertical setback – Application area to highest known groundwater**
• Sites within a Public Drinking Water Source Area	• 2 meters
• On-site wastewater system should be at least the following distances above the highest groundwater level.	• loams and clay soils - 0.6 metres • gravels – 1 metre • sands - 1.5 metres Taking into account long term variability, possible groundwater rises following development and perched water tables.

Table 3.4 - Minimum setback distances from apparatus to site feature

Tanks and Treatment Systems Septic Tanks / Secondary treatment system (STS)	Minimum Setback

Septic tank / STS, holding tank, pre-treatment tank, distribution sump and pump sump	• From buildings and property boundaries
	  ○ Sufficient to ensure the structural integrity of a building is not compromised
	  ○ Accessible for the purposes of maintenance
	  ○ 2 meters unless otherwise certified by an engineer.
	• 30 meters from any watercourse.
	• 30 metres of a private bore used for household/ drinking water purposes.
	• 1 meter from any septic tank, wastewater treatment unit, collection well, pre-treatment tank, distribution sump or pump sump.

Land application System **Application Area**	**Minimum Setback**
Absorption Trench, Absorption Bed, mounds and ETA	• 2 meters from a septic tank, wastewater treatment unit, pre-treatment unit, pump, diversion trench and site allotment boundary. • 6 meters upslope from a building/swimming pool/stormwater drain or soak. • 3 meters flat or upslope from a building/swimming pool/stormwater drain or soak wells. • 1meter from a trafficable area unless otherwise certified by an engineer.
Subsurface irrigation from secondary treatment system	**On application area less than <10% slope:** • 0.5 meters from site allotment boundary • 2 meters from a septic tank, wastewater treatment unit, pre-treatment unit, pump, diversion trench. • 2 meters from any building, including those erected on adjoining allotments. • 2 meters from a stormwater drain or soak wells • 3 meters from swimming pools. **On application area more than >10% slope:** • 3 meters from a septic tank, wastewater treatment unit, pre-treatment unit, pump, diversion trench. • 5 meters from any building, including those erected on adjoining allotments. • 5 meters from a stormwater drain or soak wells • 6 meters from swimming pools.

Surface irrigation/ spray from secondary treatment system	**On application area less than <10% slope:** • 3 meters from site allotment boundary • 3 meters from a septic tank, wastewater treatment unit, pre-treatment unit, pump, diversion trench. • 3 meters from any building, including those erected on adjoining allotments. • 3 meters from a stormwater drain or soak wells • 3 meters from swimming pools. **On application area more than >10% slope:** • 6 meters from a septic tank, wastewater treatment unit, pre-treatment unit, pump, diversion trench. • 6 meters from any building, including those erected on adjoining allotments. • 6 meters from a stormwater drain or soak wells • 6 meters from swimming pools.
Vertical setbacks **Land application system**	**Minimum setback**
Absorption trenches, absorption beds, ETAs	• 1.2 meters from underlying bedrock or other confining layer
Subsurface irrigation from secondary treatment system / mounds	• 0.5 metres from underlying bedrock or other confining layer.

Notes Table:

1. Slope percentage refers to a percentile of the slope ratio (vertical: horizontal)
   10% slope = 1:10 = 5.7°
2. Reduced setbacks are appropriate for existing developments replacing existing systems that were originally approved under the *Health (Treatment Effluent and Disposal of Liquid Waste) Regulations 1974.*
3. where slope exceeds one in five (1:5), the land application area should be engineered to prevent run-off from the land application area. Surface contours should be provided on the site plan.

Chapter 4 - Treatment Systems

In Western Australia, manufacturers of on-site wastewater treatment systems must obtain product approval from the Department of Health to produce and/or sell on-site wastewater systems. The Departments product approval process ensures all systems available for installation comply with the relevant Australian Standard. On-site wastewater systems that have product approval are listed on the departments website Approved wastewater systems (health.wa.gov.au). Any on-site treatment system listed on the Departments website can be approved for installation in an unsewered area if the design flow rate of the treatment is appropriate for the site.

4.1 Septic tanks- Primary Treatment Unit

A list of approved primary treatment systems is available on the Department of Health Approved website - Primary Treatment Systems (health.wa.gov.au)

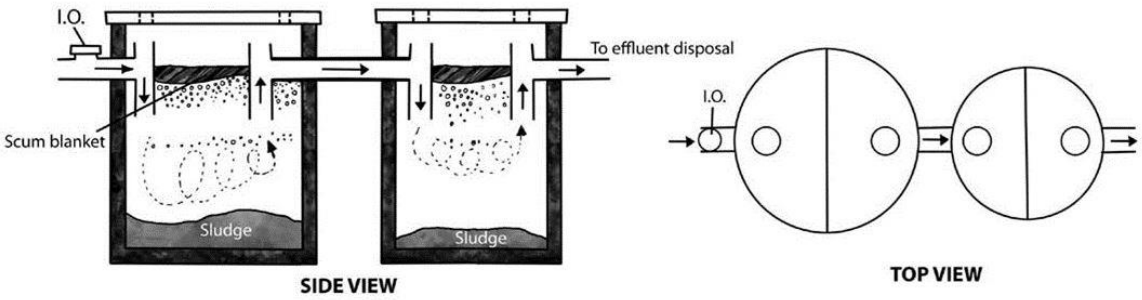
A septic tank must be able to retain at least the maximum 24-hour design flow to optimise settling and moderate peak flows. A correctly sized septic tank can remove approximately 25% to 35% of the Biochemical Oxygen Demand (BOD) and more than 60% of the suspended solids, from untreated wastewater. Solids are stored in the base of the primary tank and liquids are discharged for further treatment and/or disposal. Floating material (scum) typically accumulates on the surface providing an airtight seal creating anaerobic conditions.

4.1.1 Septic Tank Design

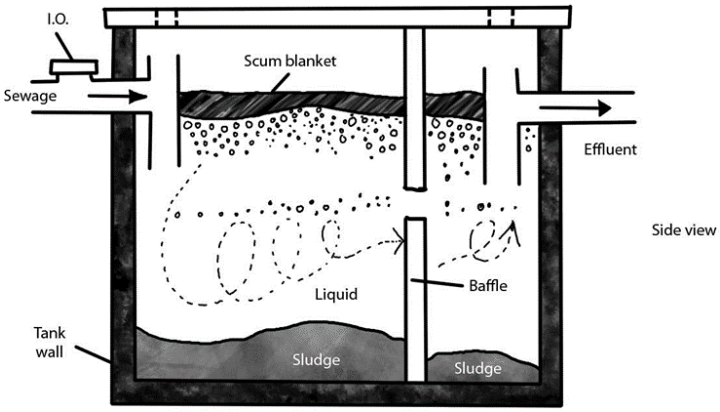
Septic tanks for use in Western Australia must comply with the requirements of AS/NZS 1546.1:2008 On-site domestic wastewater treatment units Part 1: Septic tanks or otherwise approved by the CHO.

Septic tanks are commonly cylindrical with vertical or horizontal axis or rectangular in shape and are made from durable concrete, fibre glass or plastic. They come in various designs that may include a partitioned (or baffled) divider to reduce the carry-over of solids between compartments.

Typical Residential Primary and Secondary Septic Tanks Arrangement:



Baffled Tank



4.1.2 Septic Tank Installation:

Septic tanks are installed with the top of the tank below ground surface or just above ground surface. If the system is installed below ground, it is important to note that a watertight riser must be fitted to allow for access and inspections. On sloping sites and sites with high surface water flows, stormwater diversion devices may be needed to prevent ponding and pooling around the top of the installed tank.

A surface drainage berm to divert surface water runoff from pooling around the tank can be built using mounded soil before vegetating. If groundwater levels are high and/or drainage cannot be installed, ground anchors may be needed to prevent hydrostatic uplift of septic tanks. The size and installation of ground anchors must comply with AS/NZS 1546.1:2008 On-site domestic wastewater treatment units – Septic tanks, section 3.2.2 Anchorage. Typical methods of anchorage include hydrostatic flanges, anchor collars and/or loops fitted at the time of installation.

Checklist 4.1- Septic Tank Installation Checklist

4.1.3 Holding tanks

Holding tanks should be designed to undergo emptying at intervals ranging from 1 week to 3 months. The tanks must be appropriately sized for the type of premises, adhering to the specifications outlined in this Code. These tanks are specifically constructed for non-buried vertical installation, serving as a temporary solution and not permissible for residential premises.

To dispose of the tank's contents, they are pumped into a sewage-sludge truck and subsequently transported and discharged into an approved facility. However, it is important to note that this method of sewage management may not be sustainable due to the economic and environmental costs associated with the pump-out, transport, and the requisite licenses for effluent discharge and approved waste facility.

Service Agreement: When approving the installation of a holding tank, the Local Authority should obtain a copy of a service agreement between the owner/operator of the premises and the licensed contractor pumping out the tanks and ensure this agreement (or an equivalent) always remains valid.

4.1.4 Sludge Accumulation:

Sludge accumulation occurs in all wastewater tanks. In residential premises, septic tanks receiving all wastewater will accumulate sludge at approximately 80 litres, per person, per year. AS/NZS 1547:2012 On-site domestic wastewater management, provides guidance about how often to remove sludge (roughly once every three to five years for a domestic system). When sludge is removed from a septic tank, about 10% of the original contents should be kept in the tank to help an appropriate bacterial population regenerate for ongoing treatment. Once pumped out, the tank should be refilled with water to its normal operating level to protect against undue pressure from high groundwater and surrounding soil. If the groundwater level is known to be high, solids should be pumped from the tank at the same time as refilling it with clean water. Once pumped out, all inspection openings should be replaced, and the tank lid sealed with a flexible sealant.

4.2 Secondary Treatment Systems (STS)

Secondary Treatment Systems (STS), use the processes of aeration followed by clarification to achieve biological treatment of wastewater. Microorganisms in an STS breakdown suspended and dissolved organic matter. Aerobic processes encourage specific bacteria to convert organic nitrogen and ammonia to nitrate (nitrification). Oxygen is supplied to the aeration chamber by a pump (blower) and air diffusers, or by mechanical mixing of the effluent over porous material (passive). Over time, dead cell mass and residuals will collect in the chamber and eventually need to be removed. For this reason, regular servicing is required in accordance with the manufacture's specifications.

4.2.1 Secondary Treatment System Design

STS are comprised of multiple clarification chambers that facilitate the settling of sludge and minimise the presence of suspended solids. The accumulated sludge can either be recirculated back into the aeration chamber or removed during routine servicing. For a comprehensive list of approved secondary treatment systems and aerated wastewater treatment systems, please refer to the Department of Health website. – Approved secondary treatment systems and aerated wastewater treatment systems (health.wa.gov.au).

To ensure the proper design, fittings, materials, testing, and performance of secondary treatment systems, it is important to adhere to AS/NZS 1546:3:2017. This standard, titled "On-

site wastewater treatment unit Part 3: Secondary Treatment Systems," provides detailed guidelines and requirements for the effective functioning and compliance of secondary treatment systems. By following these standards, the quality and performance of the secondary treatment systems can be assured.

4.2.2 Secondary Treatment System Installation

The installation of STS must comply with the instructions provided by the manufacturer and meet the requirements set by the approving agency. Following the manufacturer's instructions diligently is crucial as they have detailed knowledge of their system's design and installation processes, which are essential for ensuring optimal functionality and operation of the system at appropriate levels. **Checklist 4.2 - Secondary Treatment System Installation Checklist**

4.2.3 Sludge Accumulation and Removal

In STS, sludge accumulation occurs at the bottom of the tanks over time, leading to a decrease in system effectiveness. It is the responsibility of the premises owner, where an STS is installed, to ensure that appropriate service agreements are in place for the regular maintenance of the system as per the manufacturer's recommendations and approving agency conditions. The maintenance for STS must be carried out by licensed individuals authorised under *Part 8 of the Public Health Act 2016.*

4.2.4 Alarm & Control Panel

All STS (and any other system that includes a pump tank) must be provided with an alarm system to indicate an electrical or mechanical malfunction. Refer to Appendix B- Filter Systems & Supplementary Technology for details on pumps and alarms.

4.2.5 Intermittent Use Considerations

Another matter designers need to consider is the intermittent use of a system. Holiday homes, community halls and sporting facilities may be subject to intermittent use and irregular hydraulic and organic loads. Most STS may not be suitable for developments with intermittent use, because many STS cannot be switched off when not in use, otherwise the aerobic microbiological ecosystem in the tank will die if the water becomes anaerobic for more than 48 hours.

4.3 Composting toilets

Composting toilets mainly rely on the action of microorganisms in an aerobic environment to break down waste. Systems are usually dry (waterless), although some wet composting systems and incinerator systems are available. All waterless / alternative toilets manufactured for sale in Western Australia must have product design approval issued by the Department of Health. A list of approved waterless / alternative toilets is available on the Department of Health Approved waterless toilets (health.wa.gov.au)

Significant quantities of suspended solids, BOD, nitrogen, and pathogenic organisms can be eliminated from wastewater flows by segregating human effluent from the wastewater stream using composting or incinerator toilets. Waterless composting toilets must comply with the requirements of AS 1546.2 Part 2: Waterless composting toilets. Excess liquid from a composting toilet shall be removed and disposed of in accordance with the Department of Health product approval conditions and the installation approval conditions issued by the approving agency.

Where composting toilets are used, an additional on-site wastewater system must also be installed for any other wastewater streams associated with a premises. Composting toilets are often used in conjunction with a greywater treatment system.

Checklist 4.3- Dry Composting Toilet Installation Checklist

4.3.1 Climatic Conditions

Climatic conditions can significantly affect the performance of composting toilets, this is particularly significant in colder climates specifically the southwestern parts of Western Australia, where a larger system may be required to allow for the slower decomposition of the compost. It is important the designer considers the effects of climate on composting toilets and considers alternative designs (such as incinerator toilets) where appropriate.

4.3.2 Composting Toilet Designs

Most composting toilets are designed to sit under the premises, so these systems are not suited to slab on ground developments or raised homes where the toilet is in the middle of the dwelling, as regular access to the composting unit is needed to remove the organic material. Most traditional composting units require a ventilation system to manage odours and help the composting process. The ventilation system generally consists of a small electric fan in the vent pipe, requiring a power source to operate.

Wet composting systems are more adaptable to various types of premises as the entire wastewater plumbing is generally collected into one tank that can be located away from the dwelling. These systems treat the whole wastewater load from the dwelling and do not require separate greywater management.

There are also incinerator toilets available. An incineration toilet burns biological waste at high temperatures, which can be powered by either gas or electricity, leaving only an insignificant quantity of waste. An incinerator toilet requires a flue terminal to be installed and specific maintenance requirements need to be considered in accordance with manufactures details.

4.4 Greywater Treatment Systems

All domestic greywater systems are considered wastewater treatment systems. Accordingly, any domestic greywater treatment systems for sale in Western Australia must have product design approval issued by the Department of Health. A list of approved greywater treatment and disposal systems are available on the Department of Health website - Approved greywater systems (health.wa.gov.au)

A greywater system treats domestic wastewater drained from sinks, tubs, showers, baths, dishwashers, clothes washers and other non-toilet sources. The Australian Standards 1546.4:2016 On-site domestic wastewater treatment units – Part 4: Domestic greywater treatment systems, sets out the requirements for the design, commissioning, performance, installation and conformity testing of greywater systems.

Due to the difficulty of treating fats, oils, grease and high loads of organic matter in kitchen wastewater, most greywater treatment systems exclude kitchen water from the waste stream. Kitchen wastewater must be diverted to an approved septic tank unless the greywater treatment system is specifically designed for treating kitchen wastewater.

Checklist 4.4- Greywater Treatment System Installation Checklist

Chapter 5 Land Application Systems

Land application Systems broadly fall into five categories covered by this Code. These are:

1. Absorption trenches
2. Absorption beds
3. Evapotranspiration-absorption systems
4. Mound systems
5. Irrigation systems

The level of wastewater treatment determines the viable disposal methods for the effluent. Below ground (sub-soil) disposal methods are preferred, as they minimise the likelihood of exposure to wastewater. Primary treated wastewater must be disposed below ground via soil absorption systems, while secondary treated effluent can be disposed by subsurface and covered drip irrigation. Wastewater disposal via spray irrigation must be of secondary quality and be disinfected in accordance with water quality criteria stipulated in AS/NZS 1547:2012. It should be noted that surface spray and surface drip may be considered beneficial reuse and have additional considerations as per recycled water regulations.

Effluent quality and corresponding land application systems shall be in accordance with **Table 5** below.

Table 5 - Acceptable Land Application Systems Based on Effluent Treatment Method

Treatment Method	Water Quality Criteria	Acceptable Land Application System
Primary Treated Effluent from Septic Tank	N.A.	Soil Absorption Trench / Bed Evapo-Transpiration Bed Mound LPED Irrigation
Secondary Treated Effluent with no disinfection	<20 mg/L BOD, <30 mg/L suspended solids	Soil Absorption Trench / Bed Evapo-transpiration Bed Mound LPED Irrigation Covered surface drip* Subsurface drip
Secondary Treated Effluent with Disinfection	<20 mg/L BOD, <30 mg/L suspended solids <10 E. Coli/100mL 0.5-2mg/L total chlorine	Soil Absorption Trench / Bed Evapo-transpiration Bed Mound LPED Irrigation Covered surface drip* Subsurface drip Surface Spray*

* Surface spray and surface drip may be considered beneficial reuse and are covered by the recycled water regulations.

5.1 Absorption & Evapotranspiration Trenches

To ensure compliance in Western Australia, all trenches and beds intended for wastewater disposal must obtain product approval and be listed on the Department of Health website. A standard absorption trench consists of a fundamental distribution module enclosed by soil. The typical dimensions of an absorption trench range from 200mm to 600mm in width, with an effective depth between 200mm and 600mm.

Within the trench, a drainage receptacle is positioned and filled with clean fill and/or blue metal aggregate. The effluent from the septic tank flows into the drainage receptacle and is distributed along the length of the trench. Subsequently, the effluent is predominantly disposed of through deep infiltration.

Most drainage receptacles historically referred to as 'leach drains' in Western Australia are used as components of absorption trenches. These include:

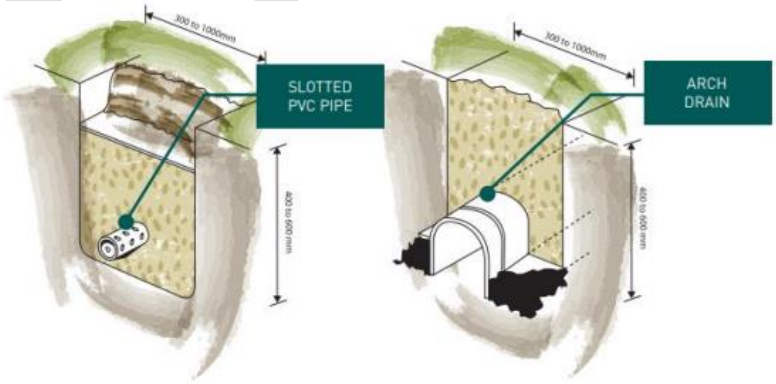
- standard concrete drains;
- polypropylene plastic drains, which include a self-supporting arch trench or modular design;
- Flatbed modular drains are a lower profile system to the conventional leach drains and contain an inbuilt distribution pipe that can either be pump or gravity driven.

When installing trenches for wastewater disposal, it is crucial to follow certain guidelines to ensure proper functionality. Trenches should be positioned along contours, with their bases levelled. Uneven levels can result in uneven distribution of wastewater, causing excessive loading in certain areas of the trench and potentially leading to premature failure.

It is advisable to avoid constructing trenches in medium to heavy clay soils, and preferably to avoid light clay soils as well. Furthermore, the design of trenches must comply with AS/NZS1547:2012 standards to ensure optimal performance.

To promote even distribution of effluent and to ensure it reaches the far end of each trench, the lengths of the trenches should be designed accordingly. In passive systems, individual trenches should be limited to a maximum length of 20 meters. Adhering to these guidelines will help maintain the effectiveness of the wastewater disposal system.

Checklist 5.1 – Trenches/ Beds Installation Checklist



5.2 Absorption Beds

As an alternative to absorption trenches, conventional beds can be employed. While these beds operate on the same principle as trenches, they have a shallower depth. Conventional beds are particularly suitable when the site gradients are minimal. In comparison to conventional trenches, they are considerably wider, typically ranging from 1000mm to 4000mm. This wider width allows for significantly shorter drain lengths within the bed.

5.2.1 Evapotranspiration-Absorption Systems

ETA beds, short for Evapotranspiration Absorption beds, typically consist of unlined beds that utilise a network of slotted pipes for effluent distribution. These beds operate by drawing wastewater upward through capillary action into the upper section of the ETA bed. This supplies nutrients and water to the root zone of the vegetation layer above, facilitating evapotranspiration[2].

To ensure optimal performance, it is essential to maintain a well-maintained vegetation cover that promotes robust growth for maximum water uptake through transpiration. Additionally, the surrounding landscape and vegetation should be maintained to minimise shading and maximise exposure to wind, facilitating the evapotranspiration process. ETA beds are commonly employed for wastewater disposal from septic tanks, although they can also manage secondary treated effluent.

ETA beds can be either gravity-fed or pressure-dosed, utilising pumps or low-pressure dosing devices. In cases where there are shallow limiting layers or a high-water table (such as bedrock, clay, or the water table) raised pressure-dosed absorption beds can be considered as an alternative. In such situations, an appropriate linear loading rate must be selected.

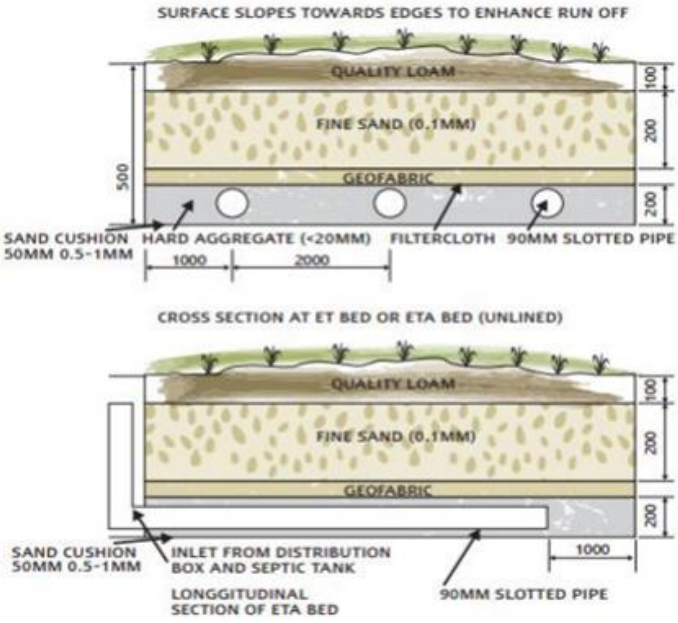
The sizing of ETA systems is determined through a water balance calculation. This calculation takes into account precipitation and effluent loading rates, as well as factors such as evaporation, transpiration, infiltration, and runoff rates. The goal is to determine the necessary storage volume in the gravel bed, ensuring that the bed does not overflow during periods of higher rainfall and effluent input when evapotranspiration losses are comparatively lower.

5.2.2 Low Pressure Effluent Distribution (LPED)

Low pressure effluent distribution (LPED) is an irrigation system that operates by utilising low pressure distribution lines equipped with drilled squirt holes. These distribution lines are installed approximately 100mm below the soil surface. One notable advantage of LPED irrigation systems is that they do not necessitate the use of secondary quality effluent, distinguishing them from other forms of irrigation.

Checklist 5.2 - ETA Beds Installation Checklist

[2] Image used with the permission of Gannawarra Shire Council



5.3 Mound Systems

The sand mound (often called a Wisconsin mound) is used to treat and dispose of wastewater in areas that are unsuitable for conventional trenches and beds due to soil shallowness, high water table, low permeability, or prior disturbance.

5.3.1 Mound System Design

Mounds are directly constructed on ploughed natural ground. The effluent is dose loaded into a distribution cell at the top of the mound and percolates downward through the sand fill media onto the underlaying soil. The distribution cell is made from coarse aggregate with a level base at the design elevation. The mound sides are shaped to the specified slope of the site. The sand fill area usually consists of sand with a grain size of 0.25-1.0mm carefully placed on the ploughed area. The mound is capped with geotextile fabric material and silt loam laced over the top. A further 150mm layer of quality topsoil is placed on top, and the surface covered with grass to stabilise the mound and prevent erosion.

The mound system should be installed in areas that are either flat or gently sloping (<15% / <8.5° from horizontal), and where:

- Natural water tables are high (within 300mm to 600mm from ground level).
- Soil layers are shallow (300mm – 600mm) over rock or hardpan
- Soils are imperfectly, poorly, or very poorly drained.

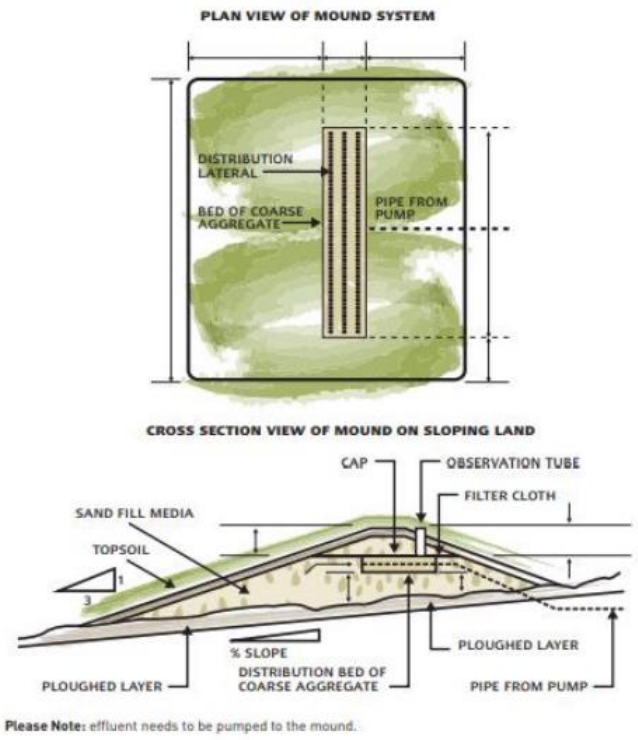
The distribution beds of the mound system should incorporate a valve set within a turf box in the mound top, including a shut off valve, an air admittance valve and feed points as part of the design. Distribution bed pipework should be hydraulically designed to ensure adequate and even distribution across the distribution cell. It is important that an appropriately sized pump is used for effective distribution. It is recommended distribution cells longer than 8 meters should have multiple feed points to allow even distribution.

5.3.2 Site Selection and Layout

Establish the contour of the lot and mound area and ensure that the distribution cell runs parallel to the contour. Any upslope drainage can be appropriately diverted around the sand

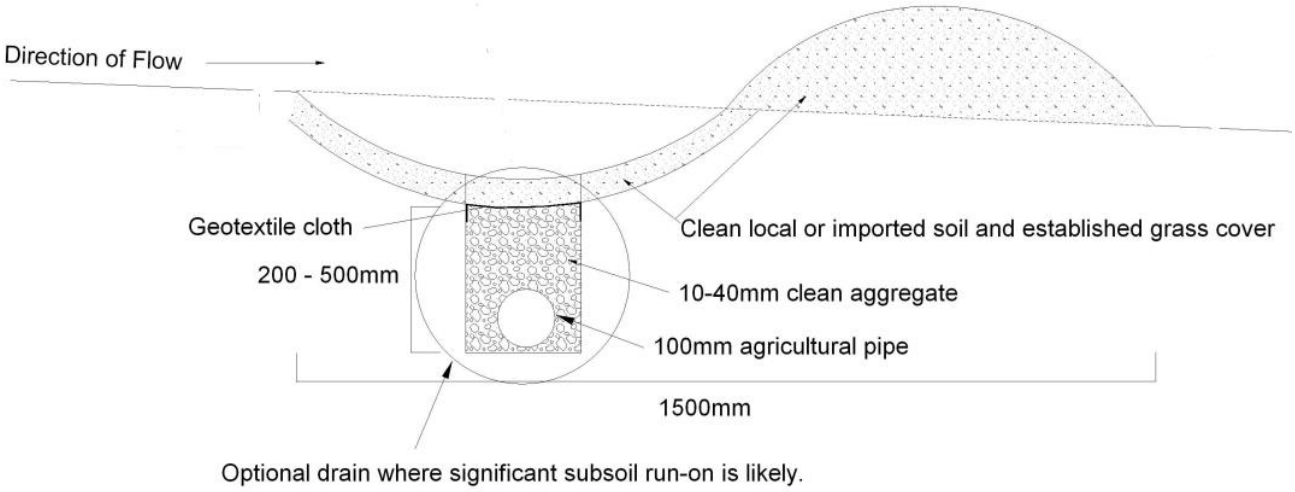
mound to stop it from becoming saturated with stormwater ingress. Mounds shall be constructed and sized in accordance with AS/NZS 1547:2012. The surfaces of mounds are to be grassed or planted with shrubs.

Checklist 5.3 Mound System Installation Checklist



[3]

Upslope Diversion Drain Example:



[3] Image used with the permission of Gannawarra Shire Council.

5.4 Irrigation Systems

Irrigation systems are only suitable for secondary treated effluent See Table 5 Chapter 5 Land Application Systems.

Irrigation systems approved for use in Western Australia are:

1. Subsurface drip irrigation – drip irrigation installed 150mm below the soil surface.
2. Covered drip irrigation (or sub-strata) – drip irrigation where the lines are placed on top of the ground surface and covered with a minimum of 150mm of mulch, bark or woodchips.
3. Surface spray irrigation involves the application of treated and disinfected wastewater to the ground surface through sprinklers positioned above ground level. This practice is only allowed when the wastewater has undergone appropriate treatment and disinfection. In certain cases, this form of irrigation may be considered beneficial reuse, and its implementation should adhere to the regulations outlined in the recycled wastewater guidelines.

Irrigation systems must be constructed and installed in accordance with AS/NZS 1547:2012. All pipes and fittings are required to comply with AS/NZS 4130:2018 and AS/NZS 4129:2020 or with AS/NZS 1477:2017. All components used in an on-site wastewater system require product design approval by the Department of Health. The use of standard garden hoses and fittings is not permitted. All wastewater irrigation lines used for the distribution of effluent must be clearly identifiable and coloured purple in accordance with AS2700:2011.

5.4.1 Surface Irrigation

In Western Australia, surface irrigation of effluent that has undergone secondary treatment with disinfection is allowed. However, it is important to note that surface irrigation poses an increased public health risk due to the higher likelihood of human contact with the effluent. This risk is especially significant if there are concerns about the reliability of the treatment and/or disinfection system.

Surface irrigation typically utilizes fixed or pop-up sprinklers, while the use of movable heads is not permitted. The design of an irrigation system should align with the guidelines outlined in 'AS/NZS 1547:2012 On-site domestic wastewater management' for hydraulic balancing. It is crucial that spray systems do not generate aerosols and have a throw and plume height suitable for the specific site. Consequently, they may not be suitable for areas with high wind conditions due to the potential for spray drift.

Surface irrigation and surface drip irrigation of gardens is considered a beneficial reuse of wastewater rather than disposal. Approval for surface irrigation for beneficial reuse is necessary and should comply with the regulations governing recycled water

Checklist 5.4.1 -Surface Irrigation System

.5.4.2 Subsurface and Subsoil Irrigation

Subsurface irrigation minimises the risk of human contact with effluent and greatly reduces public health hazards. Placing the effluent in the root zone of plants allows for optimal uptake of both the hydraulic and nutrient components, resulting in improved environmental advantages. Notably, there have been significant advancements in subsurface drip technology specifically designed for effluent irrigation in residential settings. Subsurface irrigation entails the use of a polyethylene pipe that is pressurised and equipped with either turbulent flow or, preferably, pressure compensating drip emitters. The inclusion of pressure compensation/regulation ensures uniform distribution of effluent and low application rates, regardless of varying gradients and elevations.

To achieve consistent and even distribution across the irrigation area, lateral drip lines should be positioned according to the specifications provided by the designer. This ensures a uniform and reliable distribution of the effluent.

Checklist 5.4.2 -Subsurface Irrigation System

5.4.3 Landscaping Requirements for Irrigation Systems

Irrigation areas shall comply with the following requirements:

- Except for maintenance purposes, pedestrian access is to be excluded from the surface irrigation areas.
- Have at least two warning signposts, at the boundaries of the irrigation area. The signs must be clearly visible to property users, with wording such as “Treated Wastewater – Avoid Contact – DO NOT DRINK”. Warning sign text must be clearly legible with a minimum font size of 20mm in height. Signage must be in accordance with AS/NZS 1547:2012 and AS 1319:1994
- The irrigation / distribution lines, sprinklers and fixtures used must be purple in colour or have a purple line to indicate recycled wastewater.
- Shall not be used for the growing of vegetables or food plants where the effluent may contact the plant.
- Substrata drip lines must be located at ground level with a minimum 150mm deep cover of mulch shall be maintained over the drip irrigation area at all times.
- The minimum standard for pipe work must be polyethylene complying with AS 2698.2:2000 Installation of pipe work must comply with AS/NZS 3500.1:2021, be suitable for use with wastewater.
- Potable pipes are not permitted for use in the irrigation system.
- Care must be taken in the selection of the type and placement of the spray heads to ensure the plume is contained totally within the land application area. This may require the installation of 90° and/or 180° sprays around the permitter.

Chapter 6 – Sizing On-site Wastewater Systems

6.1 System Design Outcomes

All on-site wastewater treatment systems must be designed to receive, treat and dispose a volume of wastewater appropriate for the premises. Design outcomes should ensure:

- public and environmental health is protected by minimising the risks associated with the treatment of wastewater and its final discharge into the environment.
- treatment capacity is sufficient to meet hydraulic and organic loadings (BOD) from the premises.
- a long-term reliable treatment process is provided that will achieve the specified effluent quality criteria when operated and maintained in accordance with the manufacturer's/designer's instructions.

6.1.1 Design Considerations

When sizing on-site wastewater systems, designers will need to determine the required capacity of treatment tanks and the size of the land application area to ensure the system can adequately treat and effectively dispose all wastewater from the premises. The following factors need to be considered in system design:

- Design flow allowance
- Sludge accumulation
- Extent of effluent treatment (primary / secondary / disinfection)
- Design loading / irrigation rate of soils
- Application methodology

6.1.2 Determining Design Flow

The design flow refers to the volume of wastewater an on-site wastewater system is expected to receive. This is an important consideration of system design and will impact the size of treatment tanks and land application systems.

6.1.2.1 Residential Systems Design Flow

It is recommended that on-site wastewater systems for residential premises should be designed for a minimum capacity of five (5) equivalent persons (EP). In some circumstances an approving agency may approve a residential system designed for smaller minimum capacity subject to land capabilities, lot sizing and development proposal.

Designers can use the **Table 6.1.1** to determine appropriate design flow for residential premises based on system type and design flow. Note that AS/NZS1547:2012 allows for reduced residential design flows if a premises is not connected to reticulated scheme water.

Table 6.1.1 - Daily Flow Allowances for Residential Systems:

System type	Design Flow (L/person/day)
All waste septic tank	150L/p/day
Blackwater tanks	60L/p/day
Greywater tanks	90L/p/day

6.1.2.2 Additional Capacity for Spa Baths / Spa Pools

A spa bath refers to a fixture with a capacity of 680 litres or less, designed to include features that inject air bubbles or jets of turbulent water. In the context of on-site wastewater systems, a spa bath can be connected if the additional hydraulic load is considered in the system design, as specified in **Table 6.1.2.**

If a spa has a capacity greater than 680 litres it is considered a spa pool. Spa pools must be connected to their own on-site wastewater system which does not receive wastewater from other domestic sources.

Table 6.1.2 - Hydraulic Design Criteria for Spa Baths

Spa Bath Capacity	Additional Design Flow
< 120 L	No increase
121 – 370 L	250 L/day
371 – 680 L	500L/day
>680L	Separate disposal system required

6.2 Commercial Systems Design Flow

Whenever feasible, the design flows and sludge accumulation rates for commercial on-site wastewater systems should be established by considering the wastewater flow data from existing comparable developments. This data serves as a reliable reference point for determining appropriate design parameters. In cases where specific wastewater flow data is unavailable, **Table 6.2** can be utilised as a resource to determine suitable design flow rates for the system.

Table 6.2 – Commercial System Design Flow Rates

Premises	Sludge accumulation		Daily Flow Rate	
	Number of Persons	**L/Person/ Year**	**Number of persons**	**L/Person/Day**
Motels / hotels / Guest house				
Resident guest	Number of person	48	Number of persons	100
Resident staff	Number of live in staff	80	Number of live in staff	150
Non-resident staff	Number of staff per shift x number of shifts / 24 hours	25	Number of staff per shift x number of shifts / 24 hours	30
Bar Staff	Average daily number over 7 day period	5	Highest daily number over 7 day period	10

Dining room lounge area non-resident use	Average daily number over 7 day period	10	Highest daily number over 7 day period	15
Tearooms / lunch bar	Average daily number customers over 7 day period + staff	30	Highest daily number over 7 day period	10
Halls / Churches / Art gallery	Average daily number over 7 day period	**Up to 4 days use per week: 25** **Over 4 days per week: 40**	Highest daily number over a 7 day period	10
Public toilet	Average daily number over 7 day period	20	Highest daily number over a 7 day period	10
Gyms / pools / sports centres	Average daily number over a 7 day period plus staff	25	Highest daily number over a 7 day period plus staff	50
Schools				
Pupils and staff	Total number of students + staff	25	Total number of students + staff	30
Boarders	Total number boarders	80	Total number boarders	150
Canteen	Total number of staff plus students	10	Total number of staff plus students	5
Childcare	Total number of children + staff	58	Total number of children + staff	50 (in house laundry) 35 (outsourced laundry)
Work places				
Factories	Number of staff / shift x number of shifts / 24 hours	25	Number of staff / shift x number of shifts / day	50
Offices	Number of staff / shift x number of shifts / 24 hours	25	Number of staff / shift x number of shifts / day	30
Canteen	Total number students plus staff	10	Total number students plus staff	5

Shopping centres				
Staff	Number of staff / shift x number of shifts / day	25	Number of staff / shift x number of shifts / day	30
Public	Average daily number over 7 day period	20	Highest daily number over a 7 day period	5
Shop	Per shop	20L/shop/ year	40L/shop/day	
Supermarket	Per supermarket	40L/shop/ year	500L/supermarket/day	
Caravan Park / Camping grounds				
Fully serviced / permanent occupation	3.5 persons / site	80	3.5 persons / site	150
Recreational camp / casual occupation	3.5 persons / site	48	3.5 persons / site	100
Restaurant				
No liquor license	Average daily number of a 7 day period plus staff	35	Highest daily number over a 7 day period plus staff	25
Liquor license		35		30L/diner
Conference / function				
No food and no liquor license	Total seating capacity plus staff	25	Total seating capacity plus staff	30
Food or liquor license	Total seating capacity plus staff	35	Total seating capacity plus staff	35
Food and liquor license	Total easting capacity plus staff	35	Total seating capacity plus staff	40
Construction camp	Total number of persons using facility	80	Totally number of persons using facility	150
Medical consulting rooms	Number of staff using system per shift x number of shifts	40L/staff/ year +80L/ consulting room/year	Number of staff using system per shift x number of shifts/day	30L/staff/year + 100L/ consulting room/day

Boarding / lodging houses				
Accommodation and resident staff	Total number of beds plus resident staff	80	Total number of beds plus resident staff	150
Non-resident staff	Number of staff per shift x number of shifts	25	Number of staff per shift x number of shifts/day	30
Road house / service station				
Staff	Number of staff per shift x number of shifts / day	25	Number of staff per shift x number of shifts / day	30
Public toilets	Average number of persons using over 7 day period	20	Highest daily number over a 7 day period	5
Restaurant	Average number over a 7 day period	10	Highest daily number over a 7 day period	10

6.3 Sludge Accumulation

6.3.1 Residential

AS/NZS 1547:2012 assumes a sludge accumulation 80L/person/year in residential premises.

6.3.2 Commercial

To determine the sludge accumulation rates for commercial businesses, refer to **Table 6.2.** It provides guidelines for establishing the appropriate rates. It is important to note that regardless of the rates obtained from **Table 6.2**, a minimum storage capacity of 1,600 litres is mandatory for both scum and sludge in any commercial septic tank..

6.4 Sizing On-site Wastewater Treatment Systems

6.4.1Tank Capacity Residential Systems <2000L/day (1 – 10 Persons)

Primary Treatment System

For residential premises with up to 6 bedrooms, the sizing of primary treatment tank systems should follow the guidelines outlined in tables J1, J2, and J3 of the AS/NZS 1547:2012 standard (provided as an abstract below). These tables provide specific information and criteria for determining the appropriate size of the treatment tank system.

Table 6.4.1 - All waste residential tank capacity

Number of Bedrooms	Population Equivalent	Tank Capacity (L)
1-3	1-5	3000
4	6-7	3500
5	8	4000
6	9-10	4500

Table 6.4.2 – Greywater residential tank capacity

Number of Bedrooms	Population Equivalent	Tank Capacity (L)
1-3	1-5	1800
4	6-7	2100
5	8	2400
6	9-10	2700

Table 6.4.3 – Blackwater residential tank capacity

Number of Bedrooms	Population Equivalent	Tank Capacity (L)
1-3	1-5	1500
4	6-7	1800
5	8	2100
6	9-10	2500

Secondary Treatment Systems

During the product approval process, the hydraulic loading capacity of secondary treatment systems is evaluated and specified in the conditions of approval. It is required that the hydraulic loading capacity of a secondary treatment unit surpasses the anticipated daily design flow rate from the development, as determined in accordance applicable with the Code.

6.4.2 Commercial Systems / Residential Systems >2000L per day (11+ Persons)

Primary Treatment Systems

For primary treatment systems serving commercial premises, or for primary treatment systems serving residential premises that exceed the design capacity of AS/NZS 1547:2012, the following formula can be used to determine the required hydraulic loading capacity:

Required Capacity = (P1 x S x Y) + (P2 x DF)

Where

P1 = Number of persons using the system
S = Rate of sludge accumulation in litres per persons per year (refer section 6.3)
Y = Desludging frequency in years
P2 = Number of persons using the system
DF = Daily flow in litres per person per day (refer Section 15.3)

Secondary Treatment Systems

The capacity of secondary treatment systems is assessed during the product approval process and specified in the conditions of approval. The hydraulic loading capacity of a secondary treatment unit must exceed the expected daily design flow rate from the development determined in accordance with this Code.

6.4.3 Sizing Land Application Area

Land application areas are to be sized in accordance with AS/NZS1547:2012

6.4.3.1 Sizing Trenches Beds & ETA

Trenches beds and ETAs are sized by considering the volume of wastewater and the infiltration rate of the soil. AS/NZS1547:2012 provides conservative and maximum design loading rates for sizing trenches and beds. Maximum design loading rates can be used where there are no site limitations identified in the site and soil evaluation. See **section 3.1** of this Code for further guidance on design loading rates.

The DLR is used to size the land application system based on the bottom area of the drain. It has been observed that during peak loading some wastewater absorption can occur through the sidewall zone in trenches and beds. Therefore, the permeability of the horizontal soil profile should be considered during system design phase as a means of dealing with peak loading occurrences. However, the effect of sidewall infiltration is not specifically included in the sizing calculation because it is already factored into the DLR's provided in AS/NZS1547:2012 (See CL4.1 of AS/NZS 1547:2012).

Trenches beds and ETAs are to be sized using the following formula:

$$L = \frac{Q}{W \times DLR}$$

Where

L = Required length in m
Q = Design flow in L/day (refer section 6.2)
DLR = design loading rate in mm/day (refer SSE)
W = width of the drainage receptacle (refer CHO approval / product specifications)

16.3.2 Sizing irrigation areas

Irrigation areas are sized on the basis of the daily flow of wastewater, and the design irrigation rate of the soil. The following formula can be used for determining the required size of an irrigation area:

$$A = \frac{Q}{DIR}$$

Where:

A = Required area in m2
Q = Design flow in L/day (refer section 6.2)
DIR = Design infiltration rate (refer SSE)

6.5 Grease Traps

Grease traps should not be considered mandatory for all on-site wastewater systems. This section provides guidance for system designers who may wish to incorporate a grease trap to reduce sludge accumulation on commercial systems.

Grease traps are important in assisting with the removal of grease, oil and fats from wastewater generated from commercial premises. Grease traps are typically used in restaurants, cafes, health care facilities and institutions producing wastewater with a high fat, oil and grease content. Generally, grease traps are not required for individual houses (the septic tank generally provides adequate control of small quantities of grease).

Grease traps are similar in design to a septic tank. Typically, the grease (dissolved in the hot influent water) cools and solidifies and traps oils by flotation. Clearer water is then removed from the central zone. To be effective, the grease trap must retain the fluid for sufficient time to allow grease cooling and flotation, or for at least one hour at the instantaneous peak flow. Increasing grease trap size (and retention time) improves grease and fat removal.

Table 6.5 - Grease Trap Design Considerations

Grease trap design and operation considerations	
Location	Grease traps should be located outside the building and be accessible for maintenance or cleaning.
Influent	Grease traps do not perform well with high solids content in the wastewater; this leads to increased pump-out frequency. Discharges containing high BOD (such as wine, milk, oils and grease) should be avoided.
Filters	Commercially available outlet filters designed for grease interceptor tanks can improve effluent quality.
Additional design options	In commercial kitchens, under-sink grease trimmers, prior to the grease trap, can provide additional oil and fat removal, with further treatment in the subsequent grease trap. Under-sink grease converters with chemical addition for emulsification of grease components in the wastewater are never appropriate in the on-site wastewater systems.
Maintenance	Cleaning frequency is dependent on the facility's kitchen practices and must be based on observed accumulation. The depth of scum and sludge build-up requires regular monitoring. For restaurants, depending on the capacity of the grease traps, pump-out frequency can vary between once a week and once every 2 to 3 months

6.5.1 Grease Trap Sizing

The size of a grease trap is critical in ensuring the wastewater discharged from a restaurant, café, fast food take away or other grease waste producer has the optimum conditions for the efficient removal of suspended solids, oil and grease.

Grease trap sizing should be in accordance with Water Corporation sizing methodology: https://www.watercorporation.com.au/Help-and-advice/Trade-waste/Retail-food-businesses/Grease-arrestor-maintenance/Grease-arrestor-sizing

Chapter 7 - Operation and Maintenance

7.1 General

Correct operation and maintenance of on-site wastewater systems is essential for their long-term viability. Operation and maintenance procedures are needed to help achieve sustainable and effective long-term performance of on-site wastewater systems, so that they comply with public health and environmental health requirements.

On-site wastewater systems are prone to failure if incorrectly operated or poorly maintained. All on-site wastewater systems require a degree of user dedication in terms of operation and maintenance to ensure that the design performance is achieved. All on-site wastewater systems, or components of systems, have a finite life and will at some time require replacement. This should be acknowledged by all stakeholders and explained to homeowners by manufactures and location governments

7.2 Operation and Maintenance Guidelines

All on-site wastewater systems shall have operation and maintenance manuals for all aspects of the system. The designer, manufacturer and/or installer must ensure that operation and maintenance manuals are provided to all owners and operators of an on-site wastewater system at the time of installation or upon occupation of the premises. For further details on the content of operation and maintenance manuals see AS/NZS 1547:2012.

7.3 Responsibilities of Owners/Operators

- Owners must ensure the details and requirements for the system operation, maintenance, and monitoring (including plans, design reports, equipment brochure etc) are retained on the property and are readily accessible to the occupier.
- Owners of STS must ensure that they hold maintenance and service contracts for their on-site wastewater systems (where applicable under the conditions of product approval) and make service records available to the relevant Local Government on request. Owners must ensure that all servicing is undertaken by a licensed service provider.
- On-site wastewater system must be operated and maintained in accordance with the approval conditions set by the local government and the Department of Health.

Property owners must keep their on-site wastewater systems in good working order. A property owner must contact an authorised service person and inform the local government if at any stage:

- The land application area becomes wet / soggy with ponding on the surface of the ground
- Basins, toilets and other plumbing fixtures in the house are slow to drain
- There is a noticeable smell of effluent near the treatment system or land application area
- The grease trap is full or blocked

7.4 Maintenance of Septic Tanks

Maintenance requirement for septic tanks are as follows:

- Regular desludging
- Regular cleaning of grease trap
- Exposure of the vent and/or access cover of the septic tank
- Regular inspection and cleaning of the outlet filter

- Ensuring all access openings are maintained to be gas and watertight.

7.5 Maintenance of Composting Toilets

The maintenance requirements for composting toilets includes removal of composted material. The frequency with which compost requires removal will depend on the size of the unit and the level of use. The composted material must be disposed of in accordance with AS/NZS 1546.2:2008, the manufacturer's instructions, and must have completed a 12-month composting period before disposal. The cover of soil over the composted material must be at least 75mm.

7.6 Maintenance of Secondary Treatment Systems.

The owner of a secondary treatment system must ensure it is serviced by a licensed service person at frequencies specified by the manufacturer.

A licensed person who services a secondary treatment unit, must do so in accordance with the manufacturer's requirements, and the maintenance and monitoring requirements of AS/NZS 1547:2012.

To minimise any public health risk when operating secondary treatment systems, they must be maintained so that the discharge criteria for secondary treated effluent are met at all times.

The maintenance schedule must, where applicable, include tests and checks of the following:

- Sludge build up
- Turbidity
- Disinfection equipment
- Air supply to aeration tank
- flow distribution and slime growth on filter media and/or growth on biodiscs
- noise levels from electric motors, pumps and aerator
- alarms – air supply, water level, chlorine tablet supply
- effluent filter
- irrigation system
- land application area – plant condition, evidence of surface water / pooling.

Damaged or malfunctioning equipment must be repaired or replaced as soon as practicable without impacting on the continued operation of the unit.

All inspection/manhole openings must be secured in place after each servicing.

Desludging of the septic tank associated with the secondary treatment system is required in accordance with the approved conditions and/or manufacturers operating requirements. This is usually every four years; however, some manufacturers may recommend that their systems are desludged more frequently.

The land application area must be maintained to a standard that prevents it from being a risk to public health or creating a nuisance. Such maintenance is to prevent the occurrence of spray drift, misting, pooling and run-off of effluent.

To ensure that the surface irrigation disposal area operates at its maximum efficiency, the required cover media must be maintained and suitable plants capable of effecting a high evapo-transpiration rate must be maintained at all times.

Appendix A – Installation Checklist

Installers checklist for systems and land applications has been provided, to assist installers and approving agencies with guidance for installation. While these checklists are not mandatory, it is advised to follow them to ensure that the installation has been conducted appropriately.

Checklist 4.1- Septic Tank Installation Checklist

Checklist 4.2 - Secondary Treatment System Installation Checklist

Checklist 4.3- Dry Composting Toilet Installation Checklist

Checklist 4.4- Greywater Treatment System Installation Checklist

Checklist 5.1 – Trenches/ Beds Installation Checklist

Checklist 5.2 - ETA Beds Installation Checklist

Checklist 5.3 Mound System Installation Checklist

Checklist 5.4.1 -Surface Irrigation System

Checklist 5.4.2 -Subsurface Irrigation System

Checklist 4.1- Septic Tank Installation Checklist

Checklist 4.1- Septic Tank Installation Checklist		
Owners Name:		
Address:		
Tank Coordinates:		
Installation Date:		
Tank Type (tick all applicable) ☐ Septic tank ☐ Pump well ☐ Collection/holding tank ☐ Other:		
Tank 1		
Manufacture –	Model	
Department product approval: ☐Yes		
Material ☐ Concrete ☐ Plastic ☐ Other:		
Tank 2 (If applicable)		
Manufacture-	Model	
Material ☐ Concrete ☐ Plastic ☐ Other:		
Tank Volume Capacity (each tank) Tank 1 Litres	Tank 2 Litres	
Tank Dimensions		
	Tank 1	Tank 2 (if applicable)
Exterior dimensions (HxW)	mm	mm
Interior dimensions (HxW)	mm	mm
Exterior Height of Inlet	mm	mm
Exterior height of Outlet	mm	mm
Setting of Tank & Excavation		
Location of Tanks as per plan:	☐ Yes ☐ No ☐ N/A	
Setbacks from building and boundaries comply:	☐ Yes ☐ No ☐ N/A	
Inlet/ Outlet Elevations verified:	☐ Yes ☐ No ☐ N/A	
Groundwater present during excavation:	☐ Yes ☐ No ☐ N/A	
Dewatering performed during excavation:	☐ Yes ☐ No ☐ N/A	
Bottom of Excavation		
Free of rock, debris or tree roots:	☐ Yes ☐ No ☐ N/A	
Bottom of excavation flat and level:	☐ Yes ☐ No ☐ N/A	
Bedding Material		
Type:		

Depth	
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Levelled and compacted:	☐ Yes ☐ No ☐ N/A
Free standing above ground/holding tank	
Hardstand provided:	☐ Yes ☐ No ☐ N/A
Levelled and compacted:	☐ Yes ☐ No ☐ N/A
Anti-floatation implemented	
Tank Collar:	☐ Yes ☐ No ☐ N/A
Anchors: Collective weight (Kg: _____)	☐ Yes ☐ No ☐ N/A
Comments:	
Backfill	
Backfill Material:	
Compacted:	☐ Yes ☐ No ☐ N/A
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Pipe Sealing	
Pipes appropriately sealed as per manufacture specification (including electrical conduit pump well if applicable)	☐ Yes ☐ No ☐ N/A
Tank Venting and Access	
Venting:	☐ Yes ☐ No ☐ N/A
Access risers:	☐ Yes ☐ No ☐ N/A
Outlet Filter: Manufacture (if applicable):	☐ Yes ☐ No ☐ N/A
Tank water tightness testing: :	☐ Yes ☐ No ☐ N/A
Additional Comments:	
Installer: Address: Contact Number:	
Signature	**Date**

Checklist 4.2 - Secondary Treatment System Installation Checklist

Checklist 4.2 – Secondary Treatment Systems Installation Checklist		
Owners Name:		
Address:		
Tank Coordinates:		
Installation Date:		
Tank 1		
Manufacture –	Model	
Department product approval: ☐ Yes		
Material ☐ Concrete ☐ Plastic ☐ Other:		
Tank 2 (If applicable)		
Manufacture-	Model	
Material ☐ Concrete ☐ Plastic ☐ Other:		
Tank Volume Capacity (each tank) Tank 1 Litres Tank 2 Litres		
Tank Volume Capacity (each tank) Tank 1: Litres Tank 2: Litres		
Tank Dimensions		
	Tank (1)	Tank (2) (if applicable)
Exterior dimensions (HxW)	mm	mm
Interior dimensions (HxW)	mm	mm
Capacity of Each compartment		
Anaerobic (septic) Litres	Aeration Litres	
Clarifier (sludge setting) Litres	Pump well (chlorine contact) Litres	
Setting of Tank & Excavation		
Location of Tanks as per plan:	☐ Yes ☐ No ☐ N/A	
Setbacks from building and boundaries comply:	☐ Yes ☐ No ☐ N/A	
Inlet/ Outlet Elevations verified:	☐ Yes ☐ No ☐ N/A	
Groundwater present during excavation:	☐ Yes ☐ No ☐ N/A	
Anchors installed (if necessary):	☐ Yes ☐ No ☐ N/A	

Dewatering performed during excavation:	☐ Yes ☐ No ☐ N/A
Bottom of excavation	
Free of rock, debris or tree roots:	☐ Yes ☐ No ☐ N/A
Is the base of the excavation flat and levelled:	☐ Yes ☐ No ☐ N/A
Bedding Material	
Type:	
Depth:	
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Levelled and compacted:	☐ Yes ☐ No ☐ N/A
Free standing above ground	
Hardstand provided	☐ Yes ☐ No ☐ N/A
Levelled and compacted:	☐ Yes ☐ No ☐ N/A
Backfill	
Backfill Material:	
Compacted:	☐ Yes ☐ No ☐ N/A
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Pipe sealing	
Pipes appropriately sealed as per manufacturer specification (including electrical conduit pump well, if applicable)	☐ Yes ☐ No ☐ N/A
Tank Lids/ Testing	
Venting:	☐ Yes ☐ No
Tank water tightness testing:	☐ Yes ☐ No
Manufacture Testing:	☐ Yes ☐ No
Pumps Operational:	☐ Yes ☐ No
Pump timing:	☐ Yes ☐ No
Alarm tested:	☐ Yes ☐ No
Service Agreement	
Service Provider: Address: Contact Number: Is this person licensed under Part 8 of the Public Health Act 2016:	☐ Yes ☐ No

Additional Comments:	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 4.3- Dry Composting Toilet Installation Checklist

Checklist 4.3 – Dry Composting toilet Installation Checklist				
Owners Name:				
Address:				
Tank Coordinates:				
Installation Date:				
Tank Description:				
Type of Composting Toilet				
Manufacture	Model			
Department product approval:	☐ Yes			
Material:	☐ Concrete	☐ Plastic	☐ Other:	
Composting Tank Dimensions and Capacity				
Total Tank Capacity	m3			
Exterior dimensions (HxW)	mm			
Effective Depth	mm			
Setting of Tank				
Location of Tanks as per plan:	☐ Yes	☐ No	☐ N/A	
Setbacks from building and boundaries comply:	☐ Yes	☐ No	☐ N/A	
Nature of Installation Ground	☐ Above Ground	☐ Below		
Multiple Systems	☐ Yes	☐ No		
Bottom of excavation				
Free of rock, debris or tree roots:	☐ Yes	☐ No	☐ N/A	
Is the base of the excavation level:	☐ Yes	☐ No	☐ N/A	
Bedding Material				
Type:				
Depth(mm)				
Free of debris and large rocks:	☐ Yes	☐ No	☐ N/A	
Levelled and compacted:	☐ Yes	☐ No	☐ N/A	
Backfill				

Backfill Material:	
Compacted:	☐ Yes ☐ No ☐ N/A
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Venting	
Venting installed as per manufactures requirements	☐ Yes ☐ No ☐ N/A
Pipe sealing	
Pipes appropriately sealed as per manufacture specification (including electrical conduit and excessive moisture pipe, if applicable)	☐ Yes ☐ No ☐ N/A
Additional Comments:	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 4.4- Greywater Treatment System Installation Checklist

Checklist 4.4 – Greywater Treatment System Installation Checklist				
Owners Name:				
Address:				
Tank Coordinates:				
Installation Date:				
Tank Description:				
Type of Greywater System				
Manufacture	Model			
Department product approval:	☐ Yes			
Material:	☐ Concrete	☐ Plastic	☐ Other:	
Composting Tank Dimensions and Capacity				
Total Tank Capacity	m3			
Exterior dimensions (HxW)	mm			
Effective Depth	mm			
Setting of Tank				
Location of Tanks as per plan:	☐ Yes	☐ No	☐ N/A	
Setbacks from building and boundaries comply:	☐ Yes	☐ No	☐ N/A	
Nature of Installation Ground	☐ Above Ground	☐ Below		
Multiple Systems	☐ Yes	☐ No		
Bottom of excavation				
Free of rock, debris or tree roots:	☐ Yes	☐ No	☐ N/A	
Is the base of the excavation flat and levelled:	☐ Yes	☐ No	☐ N/A	
Bedding Material				
Type:				
Depth(mm)				
Free of debris and large rocks:	☐ Yes	☐ No	☐ N/A	
Levelled and compacted:	☐ Yes	☐ No	☐ N/A	
Free standing above ground				

Hardstand provided	☐ Yes ☐ No ☐ N/A
Levelled and compacted:	☐ Yes ☐ No ☐ N/A
Backfill	
Backfill Material:	
Compacted:	☐ Yes ☐ No ☐ N/A
Free of debris and large rocks:	☐ Yes ☐ No ☐ N/A
Venting	
Venting installed as per manufactures requirements	☐ Yes ☐ No ☐ N/A
Pipe sealing	
Pipes appropriately sealed as per manufacture specification (including electrical conduit and excessive moisture pipe, if applicable)	☐ Yes ☐ No ☐ N/A
Additional Comments:	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.1 – Trenches/ Beds Installation Checklist

Checklist 5.1 – Trenches/ Beds Systems Installation Checklist		
Owners Name:		
Address:		
Trench/ Beds Coordinates:		
Installation Date:		
Method of application	☐ Gravity ☐ Pump	☐ Siphon/ Flout
Configuration	☐ Trench	☐ Absorption Bed
Department product approval:	☐ Yes	
Pre- Construction Considerations		
Is the soil to wet for construction?	☐ Yes ☐ No	
Site Preparation		
Trench/Bed area in accordance with approved plans and conditions including setback and buffer distances?	☐ Yes ☐ No	
Trenches / beds positioned according to design requirements for contours?	☐ Yes ☐ No	
Method of Excavation:		
Trench/ Bed Dimensions		
Number of Bed/ Trenches?		
Width: mm	Length mm	Depth: mm
Confirmed system elevations?	☐ Yes ☐ No	
Inspection Ports		
Inspection Ports Installed	☐ Yes ☐ No	
Type	Diameter	
Grade from tank to Trench/ Bed		
☐ Above Grade (pump needed)	☐ Below Grade	
Media		
☐ Aggregate ☐ Sand ☐ Other		
Media size	Graded/levelled ☐ Yes ☐ No	
Total Depth of Media mm	Total amount of media used: m^3	

Dispersive soil Treatment required? ☐ Yes ☐ No If yes, product used: Quantity: Kg/m^2	
Installation	
Geotextile fabric cover placed over media ☐ Yes ☐ No	
Valve Type (if applicable)	
Splitter valve / Sequence Valve / Other:	
Installation Access: ☐ Valve Box ☐ In Bedding ☐ In dosing tank	
Pressure Manifold Specification:	
Distribution System access ☐ None ☐ Riser ☐ other (provide details):	
Laterals feed configuration: ☐ End ☐ Top ☐ Centre ☐ Bottom ☐ Other:	
Type:	
Diameter: mm	Length: mm
Final Topsoil Cover	
Depth of Topsoil: mm	
Imported material needed: ☐ Yes ☐ No	
Soil Category (e.g. clay loam- sandy loam):	
Stormwater Diverted: ☐ Yes ☐ No	
Grass vegetation cover established over site: ☐ Yes ☐ No	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.2 - ETA Beds Installation Checklist

Checklist 5.2 – ETA Systems Installation Checklist		
Owners Name:		
Address:		
ETA Bed Coordinates:		
Installation Date:		
Department product approval:	☐ Yes	
Pre- Construction Considerations		
Is the soil to wet for construction?	☐ Yes ☐ No	
Site Preparation		
ETA area in accordance with approved plans and conditions including setback and buffer distances?	☐ Yes ☐ No	
ETA positioned according to design requirements for contours?	☐ Yes ☐ No	
Method of Excavation:		
ETA Bed Dimensions		
Number of Beds?		
Width: mm	Length mm	Depth: mm
Confirmed system elevations?	☐ Yes ☐ No	
Inspection Ports		
Inspection Ports Installed	☐ Yes ☐ No	

Type	Diameter
Grade from apparatus to disposal bed	
☐ Above Grade ☐ Below Grade	
Media	
☐ Aggregate ☐ Sand ☐ Other	
Media size	Cleaned & Graded ☐ Yes ☐ No
Total Depth of Media mm	Total amount of media used: m^3
Distribution System:	
Distribution Device:	
Dispersive soil Treatment required? ☐ Yes ☐ No If yes, product used: Kg/m^2	Quantity:
Installation	
Geotextile fabric cover placed over media ☐ Yes ☐ No	
Distribution System access ☐ None ☐ Riser ☐ other (provide details):	
Laterals feed configuration ☐ End ☐ Top ☐ Centre ☐ Bottom ☐ Other:	
Type:	
Diameter: mm	Length: mm

Final Topsoil Cover	
Depth of Topsoil: mm	
Imported material needed: ☐ Yes ☐ No	
Soil Category (e.g. clay loam- sandy loam):	
Stormwater Diverted/ constructed: ☐ Yes ☐ No	
Turf planted: ☐ Yes ☐ No Species:	
ETA bed protection / access restriction:	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.3 Mound System Installation Checklist

Checklist 5.3 Mound System Installation Checklist		
Owners Name:		
Address:		
Mound Coordinates:		
Installation Date:		
Department product approval:	☐ Yes	
Pre- Construction Considerations		
Is the soil to wet for construction?	☐ Yes ☐ No	
Site Preparation		
Mound system area in accordance with approved plans and conditions including setback and buffer distances?	☐ Yes ☐ No	
Mound positioned according to design requirements for contours?	☐ Yes ☐ No	
Method of Excavation:		
Does the mound have good exposure to sun and wind? ☐ Yes ☐ No		
Has the soil been ploughed under mound ?	☐ Yes ☐ No	
Mound Dimensions		
Width: mm	Length mm	Depth: mm
Confirmed system elevations?	☐ Yes ☐ No	
Inspection Ports		
Inspection Ports Installed	☐ Yes ☐ No	
Type	Diameter	
Media		
☐ Aggregate ☐ Sand ☐ Other		

Media size	Cleaned & Graded ☐ Yes ☐ No
Total Depth of Media mm	Total amount of media used: m^3
Installation	
Geotextile Fabric cover placed over media ☐ Yes ☐ No	
Distribution System access ☐ None ☐ Riser ☐ other (provide details):	
Distribution cell configuration: Describe	
Type:	
Diameter: mm	Length: mm
Final Topsoil Cover	
Depth of Topsoil: mm	
Soil Category (e.g., clay loam- sandy loam):	
Stormwater Diverted/ constructed: ☐ Yes ☐ No	
Turf planted: ☐ Yes ☐ No Species:	
Mound system protection / access prevention:	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.4.1 -Surface Irrigation System

Checklist 5.4.1 Surface Irrigation System Installation Checklist	
Owners Name:	
Address:	
Irrigation Area Coordinates:	
Installation Date:	
Department product approval:	☐ Yes
Site Preparation	
Is the effluent irrigation area located according to approved plans and conditions including setback and buffer distances?	☐ Yes ☐ No
Is the size of the irrigation area consistent with the approved system design	☐ Yes ☐ No
Is the land application in a high wind area?	☐ Yes ☐ No
Is the effluent irrigation area located according to buffer distances relating to:	
Dwelling and other buildings	☐ Yes ☐ No
Swimming pool and other sensitive receptors?	☐ Yes ☐ No
Driveways and property boundaries? Yes ☐ No	☐
Sprinkler Head type:	
Are appropriate authorised fittings used as part of the system?	☐ Yes ☐ No
Fixed sprinkler type:	☐ Bayonet ☐ Pop-up ☐ Other (describe):
What is the sprinkler plume height?	mm
What is the sprinkler throw?	M
Are the sprinklers appropriately spaced given their throw and plume height?	☐ Yes ☐ No
Do the sprinklers receive uniform amounts of effluent?	☐ Yes ☐ No
Have manual or automatic indexing valves been installed?	☐ Manual ☐ Automatic
Has a disc filter been installed upstream of any indexing valve?	☐ Yes ☐ No

Have air, pressure-reducing and/or non-return valves been incorporated into the design (if applicable)? ☐Yes ☐ No	
Does the irrigation system have a flushing valve? ☐Yes ☐ No	
Does the flushing line return to the wastewater treatment system (not the primary chamber)? ☐Yes ☐ No	
Has the pump sufficient capacity to service the demands of the effluent irrigation area and overcome friction and head losses in the system? ☐Yes ☐ No	
Is the effluent distribution line from the tank to the effluent irrigation area buried at an appropriate depth (minimum 300mm) and in a manner that provides protection against mechanical damage or deformation? ☐Yes ☐ No	
Are the distribution laterals buried at a depth of between 100- 150mm? ☐Yes ☐ No	
Has the effluent irrigation area been turfed? ☐Yes ☐ No	
Irrigation system protection / access prevention: ☐Yes ☐ No	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.4.2 -Subsurface Irrigation System

Checklist 5.4.2 Subsurface Irrigation System Installation Checklist
Owners Name:
Address:
Irrigation Area Coordinates:
Installation Date:
Department product approval: ☐ Yes
Site Preparation
Is the effluent irrigation area located according to approved plans and conditions including setback and buffer distances? ☐ Yes ☐ No
Is the size of the irrigation area consistent with the approved system design ☐ Yes ☐ No
Headworks
Is the control panel/controller installed according to manufacturer's instructions and the irrigation system design details? ☐ Yes ☐ No
Is a foot valve fitted to the suction inlet in the treated effluent tank? ☐ Yes ☐ No ☐ N/A
Is an appropriate pump installed according to the manufacturer's specifications and/or the irrigation system design requirements? ☐ Yes ☐ No
Is a permanent pressure gauge installed following the pump? ☐ Yes ☐ No
Is a non-return valve installed following the pressure gauge? ☐ Yes ☐ No
Is an appropriate filter installed? ☐ Yes ☐ No
Are any solenoid valves, cabling, sequencing, indexing or Manual valves installed to enable alternate dosing of the irrigation fields according to the design? ☐ Yes ☐ No
Is the controller capable of operating the specified pump, filter and any solenoid valves for the irrigation fields according to the design? ☐ Yes ☐ No
Has the controller been tested to operate satisfactorily for each field? ☐ Yes ☐ No
Do the headworks meet the hydraulic specifications of the design? ☐ Yes ☐ No
Drip line and field layouts
Do the headworks meet the hydraulic specifications of the design? ☐ Yes ☐ No

Are dripline laterals spaced as per design? ☐Yes ☐ No	
Do all laterals comply with appropriate buffer distances? ☐Yes ☐ No	
Is all dosing and flushing pipework according to the manufacturer's recommendations? ☐Yes ☐ No	
Commissioning and testing	
Has the pump, filter and control equipment been commissioned and tested according to the manufacturer or supplier specifications? ☐Yes ☐ No	
Have all mainlined and sub-mains been commissioned and tested according to 'AS/NZS 2566.2:2002 (R2016)/AMDT 2:2018 Buried flexible pipelines Installation? ☐Yes ☐ No	
Have all drip line field layout, connections and fittings been checked before covering? ☐Yes ☐ No	
Have all drip line fields been tested for leakage from joints and fittings before covering? ☐Yes ☐ No	
Have all operating pressures been checked at the pump and the end of each field or subsection at the time of commissioning according to the design ☐Yes ☐ No	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Checklist 5.4.2 -Subsurface Irrigation System

Checklist 5.4.2 Subsurface Irrigation System Installation Checklist
Owners Name:
Address:
Irrigation Area Coordinates:
Installation Date:
Department product approval: ☐ Yes
Site Preparation
Is the effluent irrigation area located according to approved plans and conditions including setback and buffer distances? ☐ Yes ☐ No
Is the size of the irrigation area consistent with the approved system design ☐ Yes ☐ No
Headworks
Is the control panel/controller installed according to manufacturer's instructions and the irrigation system design details? ☐ Yes ☐ No
Is a foot valve fitted to the suction inlet in the treated effluent tank? ☐ Yes ☐ No ☐ N/A
Is an appropriate pump installed according to the manufacturer's specifications and/or the irrigation system design requirements? ☐ Yes ☐ No
Is a permanent pressure gauge installed following the pump? ☐ Yes ☐ No
Is a non-return valve installed following the pressure gauge? ☐ Yes ☐ No
Is an appropriate filter installed? ☐ Yes ☐ No
Are any solenoid valves, cabling, sequencing, indexing or Manual valves installed to enable alternate dosing of the irrigation fields according to the design? ☐ Yes ☐ No
Is the controller capable of operating the specified pump, filter and any solenoid valves for the irrigation fields according to the design? ☐ Yes ☐ No
Has the controller been tested to operate satisfactorily for each field? ☐ Yes ☐ No
Do the headworks meet the hydraulic specifications of the design? ☐ Yes ☐ No
Drip line and field layouts
Do the headworks meet the hydraulic specifications of the design? ☐ Yes ☐ No

Are dripline laterals spaced as per design? ☐Yes ☐ No	
Do all laterals comply with appropriate buffer distances? ☐Yes ☐ No	
Is all dosing and flushing pipework according to the manufacturer's recommendations? ☐Yes ☐ No	
Commissioning and testing	
Has the pump, filter and control equipment been commissioned and tested according to the manufacturer or supplier specifications? ☐Yes ☐ No	
Have all mainlined and sub-mains been commissioned and tested according to 'AS/NZS 2566.2:2002 (R2016)/AMDT 2:2018 Buried flexible pipelines Installation? ☐Yes ☐ No	
Have all drip line field layout, connections and fittings been checked before covering? ☐Yes ☐ No	
Have all drip line fields been tested for leakage from joints and fittings before covering? ☐Yes ☐ No	
Have all operating pressures been checked at the pump and the end of each field or subsection at the time of commissioning according to the design ☐Yes ☐ No	
Installer: **Address:** **Contact Number:**	
Signature	**Date**

Appendix B- Filter Systems & Supplementary Technology

Sand Filters

Sand filter treatment systems are secondary treatment systems. Systems typically consist of primary treatment of effluent by a septic tank, which filtrates through a bed of an approved soil media. The most typical designs of a sand filter include a synthetic membrane lined sand bed with a grid of small diameter pipes placed in a gravel filled bed on top of the sand. The effluent is pumped with a low-pressure dosing system through the pipes in controlled doses to ensure uniform distribution and treatment. The sand used must be certified to ensure it meets the design criteria for particle size and distribution to ensure treatment performance and avoid clogging. The designs must consider both hydraulic and organic loading rates as sand filters are commonly pressure dosed via a pipe distribution system appropriate for the hydraulic design. An alarm system must be installed with suitable visual alarm as outlines in section 4.5.3.

All sand filters must comply with the following sand requirement, unless otherwise specified in the Department product approval.

Dosage rate, L/m^2/day	Effective Size, mm	Uniformity Coefficient	Clay and Silt Content (by Volume)
50 or greater	Between 0.4 and 1.0	Less than 4	Less than 5%
Less than 50	between 0.25 and 0.60		

- Effective size = maximum particle size of the smallest 10% (D10) by mass of the sand
- Uniformity coefficient = the ratio of the maximum particle size of the smallest 60% by mass of the sand to the maximum particle size of the smallest 10% by mass of the sand.

Constructed Wetlands

A constructed treatment wetland, such as a reed bed or macrophyte beds can be incorporated into an on-site sewage management system to provide higher level treatment of effluent. A constructed treatment wetland is a cell or basin with an impermeable liner, filled with gravel and planted with macrophytes (aquatic plants) such as reeds and rushes. The inlet and outlet pipes are located below the gravel surface, to ensure wastewater remains below the surface, therefore minimising the risk of human exposure, mosquito breeding and unpleasant odours. Treatment wetlands operate by receiving untreated wastewater from the premises which flows into a collection tank for primary treatment to remove large solids, grease and oils. The primary treated effluent then passes through an effluent filter to trap any large solids that remain. Effluent then flows into the reed bed where the wastewater passes through the root zone and undergoes treatment via physical, chemical, and biological interactions between the wastewater, plants, micro-organisms, and gravel. The effluent from reed beds can be directed into a range of land application systems.

Pumps and Alarms

On-site wastewater systems that include a pump must also incorporate a high liquid level alarm trigger point with audible and visual (indicator light) alarm components. The alarm system is required to activate upon mechanical malfunction of the apparatus, or when wastewater in the tank reaches the high liquid level. Systems that incorporate a pump must also include 24-hour emergency storage volume above the high liquid level alarm trigger point. Where pumps are

used, they must be clean water tested before commissioning to ensure they achieve the required pump head for the proposed operation.

The alarm panel must be easily accessible and located where audible or visual components can be seen and heard by the owner/occupier of the premises. Audio alarms are to be fitted with a manual muting switch which resets to audible after 24 hours. The alarm panel must be watertight with all connections sealed to stop moisture or sewer gases from entering.

Outlet Filters

A properly maintained outlet filter is an effective mechanism to control the discharge of suspended soils in tank outflow and prevent carryover of solids and scum into drainage receptacles. Where outlet filters are fitted, they should be inspected every three months and cleaned when necessary.

Mosquito proof cowls

All educts and back vents used in connection with sewage apparatus shall be fitted with an approved mosquito proof cowl and be maintained by the owner.

Appendix C- Typical Components Used in Land Application Areas

Indexing Valves

Indexing valves are commonly used in sprinkler irrigation systems. They provide a simple and efficient way to control the distribution of water to different sprinkler zones. With an indexing valve, you can connect multiple sprinkler zones to the outlets of the valve, and the valve will sequentially supply water to each zone one at a time. The indexing valve's rotating mechanism ensures that water is directed to a specific zone while blocking flow to the other zones. This sequential flow allows for efficient watering of different areas without the need for individual zone valves or complex control systems.

Dosing System

Dosing siphons or flout systems are passive devices that deliver a set quantity of treated wastewater in discrete doses. Siphons are located after the collection tank (greywater or septic tank) and are used on sloping sites to allow for even and intermittent dosing of drainage components at different levels.

Distribution Boxes

Distribution boxes (also known as splitter boxes) the main purpose of a splitter box is to divide the wastewater flow into multiple streams, allowing it to be directed to different treatment or disposal units. This can include distributing the flow to different drain lines, leach fields, or other treatment processes.

Plants

To optimise the efficiency of evapotranspiration absorption systems utilising plants such as shrubs and grasses, it is essential to expose them to ample sunlight and wind. The selection of plant species should be based on the expertise of qualified individuals familiar with the local environment. Suitable experts may include horticulturalists who possess knowledge regarding plants with shallow root systems, transpiration capabilities, and adaptability to nutrient-rich conditions.

For optimal placement, shrubs must be planted no closer than one (1) meter from the sidewall of a bed or trench, while small trees (<5m) should have a minimum distance of five (5) meters. Regarding large trees like eucalypts, figs, or mangoes, a distance of at least 20 meters from the land application area is recommended. As a general guideline, the shrub or tree should be positioned horizontally from the trench or bed at a distance similar to its anticipated maximum height when fully grown.

To enhance the land application area, it is advisable to plant suitable grasses or plants with a preference for continuously wet roots. Particularly, plants with large leaves are preferable as they exhibit higher water transpiration rates compared to those with small leaves. The vicinity surrounding the tanks should be appropriately vegetated with non-invasive plant species, taking into consideration that some plants can even penetrate sealed tank and pipe work systems.

This document can be made available in alternative formats on request for a person with disability.