Guideline for onsite wastewater management

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 EPA acknowledges Victoria's First Nations peoples as the Traditional Owners of the land and water on which we live and work. We pay our respect to their Elders past and present.

Acknowledgements

The Environment Protection Authority (EPA) acknowledges Aboriginal people as the First peoples and Traditional Custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders past and present.

As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years.

We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Aboriginal people and Traditional custodians. We recognise their intrinsic connection to and aspirations for Country.

Feedback from a wide range of stakeholders including local government (council), water corporations and industry representatives was considered in the development of this guideline.

EPA led the development of the guideline as part of a statewide working group of regulator and industry representatives from:

- EPA Victoria
- Department of Energy, Environment and Climate Action (DEECA)
- Department of Health
- Colac Otway Shire Council
- Coliban Water
- Barwon Water
- Gippsland Water
- Greater Geelong City Council
- Greater Shepparton City Council
- Greater Western Water
- Latrobe City Council
- Manningham City Council
- Mansfield Shire Council
- Mornington Peninsula Shire Council
- North East Water
- Strathbogie Shire Council
- Southern Grampians Shire Council
- Victorian Building Authority
- Yarra Valley Water
- Yarra Ranges Shire Council.

RM Consulting Group (RMCG) was engaged by EPA to assist with the review.

Disclaimer

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Reference to the Australian Standard (AS/NZS1547:2012 - On-site domestic wastewater management) in this publication is for guidance only and is not intended to be a substitute for the Australian Standard which can be purchased at https://store.standards.org.au/product/as-nzs-1547-2012

EPA Victoria has made every reasonable effort to provide current and accurate information, but it does not make any guarantees regarding the accuracy, currency, or completeness of that information.

Contents

1 Introduction

1.1 Purpose

This guideline is a reference document designed to support Victoria's environment protection regulatory framework. It outlines a risk-based approach to managing onsite wastewater management systems (OWMS) and provides links to other guidelines and information about onsite wastewater management.

This guideline is complementary to EPA's Guideline for onsite wastewater effluent dispersal and recycling systems (EDRS Guideline). This guideline and the EDRS guideline replace EPA Publication 891.4: Code of Practice: onsite wastewater management.

OWMS comprises an onsite wastewater treatment plant with a design or actual flow rate of sewage not exceeding 5,000 litres on any day (OWMS ≤5,000 L/day) and includes all beds, sewers, drains, pipes, fittings, appliances and land used in connection with the treatment plant. These systems are regulated in Victoria by local government (councils).

OWMS are used on residential, community and business premises to treat sewage or other human-derived wastewater and then recycle or dispose of the treated wastewater.

Activities related to OWMS – such as installation, maintenance and operation – can give rise to risks of harm from wastewater. OWMS must perform effectively and be well managed to minimise risks to human health and the environment. A failing OWMS can lead to discharge of poorly treated wastewater into the environment which can cause pollution of waterways, including surface and groundwater. It can impact source water used for the supply of drinking water. It may also contribute to the spread of diseases by direct exposure or indirect exposure to human pathogens.

1.2 Scope

This guideline explains the regulatory framework for OWMS under the *Environment Protection Act 2017* (EP Act) and Environment Protection Regulations 2021 (EP Regulations). This includes the general environmental duty (GED), A20 permit requirements and obligations for the operation and maintenance of OWMS. This guideline provides advice on how to meet these obligations (primarily set out in Section 2) using a risk-based approach informed by EPA expertise and industry knowledge.

This guideline also explains how to minimise the risks to human health and the environment for:

- OWMS in unsewered and sewered areas, including greywater systems
- OWMS for single or multi-dwelling premises – including residential, commercial, industrial or community facilities (these include, but are not limited to schools, campgrounds, cafes, wineries, conference centres and public facilities).

1.2.1 Exclusions

This guideline does not include information for:

- systems treating, discharging or depositing sewage (including sullage), exceeding a design or actual flow rate of 5,000 litres per day or on any day – these are regulated by EPA
- portable toilets
- animal keeping premises
- industrial wastewater that does not contain toilet wastewater or greywater of human origin.

This guideline is not a technical manual for the design of OWMS.

1.3 Who is this guideline for

This guideline supports:

- local government (council)
- water corporations
- onsite wastewater professionals, such as land capability assessors, OWMS installers/manufacturers plumbing practitioners, OWMS service technicians
- Department of Transport and Planning and the Victorian Building Authority
- building surveyors.

Table 1-1 lists the key users with a summary of their role in respect of OWMS and identifies the most relevant sections of the guideline.

Table 1-1: OWMS guideline users

Guideline user	Role	Relevant guideline sections
Local government (council)	Administers and approves the A20 permit for OWMS under the EP Act and EP Regulations. Regulates the operation and maintenance of OWMS under the EP Regulations and regulates risks and impacts of OWMS under delegated powers from EPA (including the GED through a remedial notice). Develops and implements onsite wastewater management plans (OWMP). Responsible for preparing, administering, and enforcing planning schemes, including making decisions about planning permits.	All
Water corporations	Determining referral authority, as specified in a planning scheme for permit applications in special water supply catchment areas that includes an OWMS. Determining referral authority, as specified in a planning scheme for permit applications to subdivide land. Support councils in developing and implementing OWMPs and provide responses to the OWMPs when the plan identifies reticulated sewerage solutions.	All
Land capability assessors	Undertake land capability assessments for OWMS.	Section 3.4 Land capability assessment Chapter 4 Design of OWMS

Guideline user	Role	Relevant guideline sections
OWMS installers/ manufacturers plumbing practitioners	Install OWMS in accordance with the approved design and arrange appropriate certification on completion. Associated pipework must be installed by a licenced or registered plumber. Only licenced plumbers can issue compliance certificates for plumbing work.	Approval process in Figure 2-2 Chapter 4 Design of OWMS Chapter 5 Installation
OWMS service technicians	Complete prescribed servicing and provide service report.	Section 6.4 Service contracts
Department of Transport and Planning	Oversees Victoria's planning, building and transport systems. Responsible for the *Planning and Environment Act 1987* and Victoria Planning Provisions. Responsible for determining planning permit applications where the Minister for Planning is the responsible authority as specified in a planning scheme. Provides oversight of the *Building Act 1993* and its subordinate regulations.	Chapter 2 Regulatory framework
Victorian Building Authority	Building and plumbing regulator. Administers the *Building Act 1993*, Building Regulations 2018, Plumbing Regulations 2018, and the National Construction Code (NCC) Volumes 1 to 3 Enforces practitioner compliance with the *Building Act 1993* and its subordinate regulations.	Chapter 2 Regulatory framework Chapter 5 Installation
Building surveyors	Ensure sites with OWMS have appropriate permits/certification before issuing an occupancy permit or a certificate of final inspection.	Approval process in Figure 2-2 Chapter 5 Installation

1.4 Guideline structure

This guideline provides an overview of the process for planning, designing, installing, operating, and maintaining OWMS. Figure 1-1 outlines the structure of the guideline and key information provided in each section, including alignment with the process steps involved.

More detail on the approval process is also provided in Figure 2-2. Links to additional information and references are included throughout the guideline.

Guideline section		Process Steps
2. Regulatory framework	• Overview • Environment Protection Act 2017 • Environment Protection Regulations 2021 • Planning legislation • Approval process	**Step 1 -** Decision to install
3. Planning	• Onsite wastewater management plans • Reticulated sewerage • Onsite and cluster scale options • Land capability assessment	**Step 2 -** Planning and design of OWMS
4. Design of OWMS	• Containment onsite • Wastewater generation • Wastewater treatment • Effluent dispersal and recycling • Setback distances • Responding to constraints	**Step 3 -** Permit application
		Permit issued
5. installation	• Installation requirements • Documentation • Council inspection and certificate for use • Building surveyor requirements	**Step 4 -** Installation **Step 5 -** Commissioning
		Certificate of use issued
6. Operation / maintenance	• Managing household flow and loads • Onsite wastewater treatment plant lifespan • Monitoring of OWMS • Service contracts • Desludging treatment plants	**Step 6 -** Operation and maintenance

Figure 1-1: Guideline structure and corresponding approval process for OWMS.

2 Regulatory framework

Regulatory framework	• Overview • Environment Protection Act • Environment Protection Regulations • Planning legislation • Approval process

2.1 Overview

This chapter provides information to help you understand the requirements to construct, install or alter an OWMS under the EP Act and the EP Regulations. It will also support you in understanding the laws that apply to a person in management or control of an OWMS.

This chapter focuses on the EP Act and EP Regulations. It also outlines how the planning legislation supports the regulation of OWMS.

This guideline should be used alongside other relevant guidelines when making decisions about OWMS to minimise risks of harm to human health and the environment. The regulatory framework and relevant guidelines from EPA, DEECA and other organisations are summarised in Figure 2-1.

Environment Protection Act 2017	• See Section 25 of the Act: Creates a general environmental duty for all Victorians including those who own or operate an OWMS • See Section 46 of the Act: Permits required for all permit activities
Environment Protection Regulations 2021	• A permit from the relevant local government is required to construct, install or alter an OWMS (Regulation 33) • See EP Regulations Part 3.3: Permits for prescribed permit activities to be administered by councils (Regulation 25) • See EP Regulations Part 5.7: On-site wastewater management systems
Other supporting legislation	• The Victoria Planning Provisions under the Planning and Environment Act 1987 set out the planning policy framework for wastewater management. • *Buildings Act 1993* and *Building Regulations 2018*: Building permits are issued by registered building surveyors in accordance with the Building Act 1993 and Building Regulations 2018 • Compliance with *Plumbing Regulations 2018* (NCC Vol. 3 - Plumbing Code of Australia (PCA)) required for installation of pipework • *Water Act 1989* and the *Water (Estimation, Supply and Sewerage) Regulations 2014* sets out the provisions for reticulated sewerage. • *Catchment and Land Protection Act 1994* sets out the framework for the integrated management and protection of catchments.
Supporting guidelines	• How to manage your own on-site wastewater system (EPA webpage) • EPA Publication 1974: Regulating on-site wastewater management systems (local government toolkit) • EPA Publication 1976: Guidance for owners and occupiers of land with an OWMS equal to or less than 5,000 litres on any day (including septic tank systems) • EPA Publication: Guideline for onsite wastewater management (this document) • EPA Publication: Guideline for onsite wastewater effluent dispersal and recycling systems • Victorian land capability assessment framework (Municipal Association of Victoria, 2014) - under review • Onsite wastewater management plans: guidelines for developing, reviewing and updating - under development • Planning permit applications in special water supply catchment areas (Department of Energy, Environment and Climate Action, 2024) • Environmental information on emerging contaminants, including PFAS (EPA webpage)

Figure 2-1: Regulatory framework for OWMS in Victoria.

2.2 Environment Protection Act 2017

The EP Act sets out the legislative framework for the protection of human health and the environment from pollution and waste in Victoria. The EP Act focuses on preventing impacts from waste and pollution rather than managing those impacts after they have occurred.

The EP Act sets out your obligations under the general environment duty (GED) (section 25 of the EP Act) and also creates a requirement to obtain a permit for prescribed permit activities (section 46 of the EP Act).

Permits for the construction, installation or alteration of OWMS ≤5,000 L/day are issued by councils. This permit is explained in detail in Section 2.3.1 of this guideline.

How the environment protection laws apply to OWMS is explained in this section of the guideline.

2.2.1 General environmental duty

The GED, under section 25 of the EP Act, is central to Victoria's environmental protection laws. It requires anyone conducting an activity that may give rise to risks of harm to human health or the environment from pollution or waste, to minimise those risks so far as reasonably practicable.

What is 'reasonably practicable' will depend on the particular circumstances considering: the likelihood of the risks eventuating; the degree of harm that would result if the risks eventuated; what you know (or ought reasonably to know) about the harm or risks of harm and ways of minimising them; the availability and suitability of ways to minimise the risks; and the cost of minimising the risks. For further information about how to determine what is reasonably practicable, refer to EPA Publication 1856: Reasonably practicable.

The GED applies to anyone who owns or uses an OWMS. It also applies to OWMS professionals who are engaged to design, install or maintain an OWMS.

The GED establishes a prevention-based approach to the risks and impacts associated with OWMS. Minimising the risks of harm to human health and the environment from OWMS will depend on factors that influence the level of risk, such as the type of OWMS, site constraints, treatment method and the end use of the treated wastewater.

The GED requires anyone engaging in the construction, installation, alteration, operation and maintenance of OWMS to minimise the risks of harm to human health or the environment from pollution or waste. It can also apply to how faults and system failures are dealt with and how waste is managed.

For example, poorly installed or maintained OWMS can lead to discharge of wastewater into the environment which may impact water quality in waterways, channels, reservoirs, and special water supply catchments and increase risks to the environment and human health. Examples of controls to minimise those risks include:

- eliminating or minimising the risk (such as connection to reticulated sewerage, if available)
- engineering controls (such as design and installation of an appropriate OWMS)
- operation and maintenance controls (such as engaging a suitably qualified person to maintain or service an OWMS)
- a combination of the above.

2.2.2 Council's role in regulating OWMS under the EP Act

Councils regulate OWMS ≤5,000 L/day under the EP Act and EP Regulations. EPA delegates certain powers to councils under the EP Act. This includes powers to investigate contraventions of the EP Act and EP Regulations related to OWMS (including the GED) and to issue improvement notices and prohibition notices for contraventions.

A council authorised officer can issue an improvement notice or prohibition notice (sections 271 and 272 of the EP Act) if they reasonably believe the GED has been breached in relation to an OWMS. For example, if a landowner has an older legacy system discharging untreated wastewater offsite that the council authorised officer reasonably believes may cause land and water contamination issues that can impact human health and the environment, the officer may require actions to be taken to minimise the risk from the system through an improvement notice.

More information for council officers can be found in EPA publication 1974: Regulating onsite wastewater management systems: local government toolkit.

2.2.3 Order for Obligations of managers of land or infrastructure (On-site wastewater management)

The Obligations of managers of land or infrastructure (Urban stormwater management and On-site wastewater management) (OMLI) is a legislative instrument under the EP Act. Compliance with the OMLI is mandatory and, if it is contravened, EPA may issue a remedial notice. If the duty holder fails to comply with a remedial notice EPA can take proceedings to enforce the notice in court. For more information on OMLIs see Part 7.3 of the EP Act.

The OMLI requires:

1. councils to develop and publish an onsite wastewater management plan (OWMP) that identify, assess and address the risks of harm to human health and the environment from these systems.
2. water corporations to respond to councils' OWMP about their preferred sewage management solutions.

These obligations supplement and operate alongside the GED and other obligations in the EP Act.

The OMLI play a role in environmental protection by addressing responsibilities outside of the direct focus of the GED.

See EPA's website for more information about the OMLI. See also Section 3.1 about developing and OWMP.

2.3 Environment Protection Regulations 2021

The EP Regulations outline specific requirements and powers related to OWMS including:

- requirements related to obtaining a permit from council to construct, install or alter an OWMS (Part 3.3 of the EP Regulations)
- obligations for a person in management or control of an OWMS (Part 5.7 of the Regulations).
- powers of council to order an owner of a premises with OWMS to undertake specified maintenance activities (where the requirements of the EP Regulations related to the issuing of this order have been met).

2.3.1 OWMS permit

A permit is required to construct, install or alter an OWMS, which is defined in the EP Regulations as an onsite wastewater treatment plant with a design or actual flow rate of sewage not exceeding 5,000 litres on any day and includes all beds, sewers, drains, pipes, fittings, appliances and land used in connection with the treatment plant.

This is prescribed permission activity A20 under the EP Regulations and is administered by councils rather than EPA. The permit is required for proposed new systems and alterations to existing systems, which includes alterations that increase the system's flow or load – for example, a house extension or change from residential premises to commercial premises. General maintenance of the system is not considered an alteration.

An application for an A20 permit must be made in the manner and form prescribed by the Regulations (see regulation 26). Regulation 28(h) of the EP Regulations stipulates the matters a council must consider when deciding whether to issue an A20 permit. These are:

- whether the site for the proposed construction, installation or alteration of the OWMS is environmentally sensitive or is otherwise unsuitable
- whether the proposed construction, installation or alteration of the OWMS is unsuitable for the site or proposed use
- whether the proposed use of the OWMS is inconsistent with the design specifications of the system
- whether the area available for the treatment or disposal of the effluent resulting from the OWMS is not suitable or sufficient
- the findings of any land capability assessment (LCA) required under regulation 26(2)(e).

Under section 81(4) of the EP Act, council must refuse to issue a permit if:

- it determines the permit applicant is not a fit and proper person to hold the permit
- it considers that the activity specified in the permit application poses an unacceptable risk of harm to human health or the environment, or
- any prescribed circumstances exist – the EP Regulations prescribe that a permit application must be refused if it involves a new wastewater discharge or deposit to surface waters in a special water supply catchment area (regulation 19), or if the application has not provided the specified information (regulation 29(4)).

For detailed descriptions of all permit-related provisions in the EP Regulations, refer to EPA publication 1974.

Wastewater management systems that can treat more than 5,000 litres on any day are classified as prescribed permission activity A03 (Sewage treatment), which requires a development licence and operating licence from EPA (unless an exemption applies). This applies to both proposed new systems and existing systems.

Use EPA's Permission Pathway Form (F1021) if you are unsure about which pathway is most suitable for your wastewater management system.

Appendix 1 provides a flow chart to assist in determining the type of permit or licence required for the management of wastewater based on the design or actual flow rates of wastewater treated.

Refer to Part 3.3 of the EP Regulations for more information about permits.

2.3.2 Assessment of onsite wastewater treatment plants

The EP Regulations (regulation 26(2)(c)) require an onsite wastewater treatment plant to meet the appropriate standard, unless an exemption has been granted by the EPA under section 459 of the EP Act.

Appropriate standard is defined in regulation 4 of the EP Regulations. Broadly speaking it refers to the relevant Australian and New Zealand standard. The onsite wastewater treatment plant must be assessed by a body accredited under the Joint Accreditation System of Australia and New Zealand or any other accreditation body approved by EPA. The assessment body must certify the onsite wastewater treatment plant as conforming with the relevant Australian and New Zealand standard.

If a brand or model of onsite wastewater treatment plant does not have a current certificate of conformity against the relevant Australian Standard it cannot be installed in Victoria. When a certificate of conformity expires, treatment plants that have already been installed can continue to be used in accordance with the EP Regulations.

In exceptional circumstances relating to innovative onsite wastewater treatment plants, an exemption (under section 459 of the EP Act) from these requirements may be granted by EPA for a specified period. For more information refer to EPA determinations and exemptions.

EPA collates information provided by suppliers of onsite wastewater treatment plants and maintains a list of certificate holders against each treatment plant type. This information is provided on its onsite wastewater treatment systems with valid certificates webpage. It is important to note that the information presented on the website has been provided by the suppliers. EPA does not guarantee the details contained in them are correct.

2.3.2.1 Australian Standards relevant to onsite wastewater treatment plant

The relevant Australian and New Zealand standards for installation of an onsite wastewater treatment plant are:

- AS/NZS 1546.1:2008, On-site domestic wastewater treatment units, Part 1: Septic tanks (AS/NZS 1546.1:2008)
- AS/NZS 1546.2:2008, On-site domestic wastewater treatment units, Part 2: Waterless composting toilets (AS/NZS 1546.2:2008)
- AS 1546.3:2017, On-site domestic wastewater treatment units, Part 3: Secondary treatment systems (AS 1546.3:2017)
- AS 1546.4:2016, On-site domestic wastewater treatment units, Part 4: Domestic greywater treatment systems (AS 1546.4:2016).

Other Australian Standards that may be relevant and used for reference on the design and management of OWMS are:

- AS/NZS 1547:2012, On-site domestic wastewater management (AS/NZS 1547:2012)
- AS/NZS 1319:1994, REC:2018 Safety signs for the occupational environment (AS/NZS 1319:1994 REC:2018)
- AS/NZS 3500.1:2021 Set (Parts 0-4) 2021: Plumbing and drainage (AS/NZS 3500.1:2021)
- AS/NZS 4130:2018 Polyethylene (PE) pipes for pressure applications (AS/NZS 4130:2018).

Australian Standards can be purchased from the Standards Australia store.

Refer to Chapter 5 of this guideline for more information on installation requirements for OWMS, including information about the requirements under the *Plumbing Code of Australia*.

2.3.3 Operation and maintenance obligations

Part 5.7 of the EP Regulations provides ongoing obligations for a person in management or control of an OWMS. These include:

- an obligation to operate and maintain OWMS in a way that minimises risks to human health and the environment.(including ensuring it does not overflow)
- a duty to keep maintenance records (and make maintenance records available to councils or EPA for inspection when requested)
- a duty to notify the council as soon as practicable if the system poses a risk of harm to human health or the environment or is otherwise not in good working order.

The EP Regulations apply to all OWMS, including systems installed before installation permits were introduced. People may still operate these old legacy systems, but they must take all reasonable steps to ensure the OWMS is maintained in good working order.

For more information refer to EPA Publication 1976: Guidance for owners and occupiers of land with an OWMS ≤5,000L on any day.

The EP Regulations also establish offences and allow councils to issue orders requiring system maintenance and enforce breaches of duties. For more information, refer to EPA Publication 1974.

2.4 Planning legislation

The land use planning system plays an important role in preventing harm to human health and the environment. There are specific requirements under the land use planning system and these work alongside the EP regulatory framework to prevent harm from wastewater.

The *Planning and Environment Act 1987* (P&E Act) establishes a framework for planning the use, development and protection of land in Victoria.

The Victoria Planning Provisions (VPP) are subordinate instruments made under the P&E Act that contain a comprehensive set of planning provisions for Victoria and set out the template for the construction and layout of planning schemes. A planning scheme is a statutory document that sets out objectives, policies and provisions relating to the use, development, protection and conservation of land in the area to which it applies. Planning schemes are made up of maps and ordinance including the VPP and local provisions. The ordinance are the policies and written clauses, and the maps depict where the zones and overlays apply within the planning scheme area. The VPP set out the situations where planning permits are required or not. The VPP are amended from time to time and this section includes only summaries and examples from the VPP.

If you are a permit applicant, make sure you understand the specific requirements by accessing the legislation directly and contacting the council to discuss the requirements that relate to your specific application prior to lodging a planning permit application. Planning schemes in Victoria can be found at https://www.planning.vic.gov.au/planning-schemes/browse-planning-scheme.

Councils ensure all land use and development within their municipalities occurs in accordance with the relevant planning scheme. Councils administer and enforce planning schemes and can act as both planning authorities and responsible authorities under the P&E Act.

A planning scheme may also nominate other people as the responsible authority for planning permit applications such as the Minister for Planning.

2.4.1 Planning requirements and environment protection

The P&E Act requires responsible authorities, when making a planning decision under that Act, to consider a number of matters. This includes:

- 'the relevant planning scheme' [section 60(1)(a)]
- 'any significant effects which the responsible authority considers the use or development may have on the environment or which the responsible authority considers the environment may have on the use or development' [section 60(1)(e)].

Before deciding on a planning permit application, responsible authorities (if the circumstances appear to so require) may consider:

- any Order made by the Governor in Council under section 156 of the EP Act [P&E Act section 60(1A)(fa)]
- any strategic plan, policy statement, code or guideline that has been adopted by a Minister, government department, public authority or municipal council [P&E Act section 60(1A)(g)].

This includes key guidelines and strategic plans that aim to minimise risk and prevent harm – such as this guideline and OWMPs

The provision of reticulated sewerage is a key strategy to prevent harm and minimise risks to human health and the environment from wastewater. This is reflected in the requirements under the VPP – for example, VPP 19.03-3S (Integrated water management). When reticulated sewerage is not available, onsite wastewater management is required to be provided that takes land capability into account and meets the requirements of the EP Regulations, relevant council and water corporation. This applies regardless of whether a planning permit is required.

Some key examples of relevant VPP that relate to onsite wastewater management are outlined below.

Land capability assessments with planning permit applications

When a planning permit is required and reticulated sewerage is not available, in most cases council will require an application to be submitted with an LCA (Refer to Section 3.4) addressing the risks to human health and the environment from an OWMS at the site. This enables the responsible authority to understand the environmental and human health risks and make an informed decision on the viability of the proposed development to manage the resulting wastewater onsite.

Additional requirements for subdivision

Ensuring subdivisions are carried out appropriately is key to minimising risks and preventing future negative impacts to human health and the environment. For an application to subdivide land for residential development in specified zones in the VPP[1], Clause 56 (Residential development) also applies and sets out sustainable water management objectives and standards including for wastewater management. Planning Practice Note 39: Using the Integrated Water Management Provisions of Clause 56 – Residential Subdivision explains how the requirements of Clause 56 can be met.

For specific lot size requirements for subdivision, refer to the relevant clauses in the VPP (such as

[1] For example, Low Density Residential Zone, Neighbourhood Residential Zone, General Residential Zone, Residential Growth Zone, Mixed Use Zone or Township Zone and any Comprehensive Development Zone or Priority Development Zone.

Clause 32 – Subdivision Permit requirements in Low Density Residential Zone).

An application must be referred to the EPA, relevant water, drainage or sewerage authority where these entities are specified as 'referral authorities' in the planning scheme (pursuant to section 55 of the P&E Act). This gives the specified entities an opportunity to provide advice to the responsible authority about whether to grant a permit and any conditions to be included in the permit. Additionally, notice of an application must be given to the relevant water, drainage or sewerage authority under section 52 of the P&E Act if the responsible authority considers that granting the permit may cause them material detriment.

Special water supply catchment areas

When assessing planning permit applications in designated special water supply catchment areas declared under Division 2 of Part 4 of the *Catchment and Land Protection Act 1994*, responsible authorities consider, as relevant, the guideline Planning permit applications in open, special water supply catchment areas (published by the Department of Energy, Environment and Climate Action). The guideline was developed to assist water corporations and other determining referral and responsible authorities[2] in their assessment of planning permit applications for the use and development of land within these catchment areas. The stated purpose of the guideline is 'to protect the quality of potable water supplies, using a risk-based approach, while facilitating appropriate development within these catchments'.

The guideline also provides information on how assessment of the policies within the guideline should be appropriately considered where a planning permit is required to use or develop the land for a dwelling or other activities requiring onsite wastewater disposal, or to subdivide land in an open, special water supply catchment area.

Planning Practice Note 55: Planning in Open Drinking Water Catchments includes further information about how open drinking water catchments are protected through guidelines, legislation, planning schemes and model permit conditions.

2.5 Approval process

Figure 2-2 outlines the outlines the approval process required for all OWMS installations under the EP Act and the corresponding sections of this guideline that provide relevant information.

[2] The relevant water board or water supply authority is a determining referral authority for applications in designated special water supply catchment areas so use and development is sited and managed to protect the quality of water collected from the catchment.

Approval process for a permit under the EP Act	Guideline section
Step 1 - Decision to install • Investigate permit requirements for OWMS and obtain appropriate permit forms	Section 2 Section 3
Step 2 - Planning and design of OWMS • Engage a professional for support if needed • Undertake LCA (as per council requirements) • Determine wastewater flows and loads • Select appropriate treatment and reuse / dispersal system • Determine setback distances	Section 3 Section 4
Step 3 - Permit application • Permit fee must be paid before assessment begins. Council will assess the application and may ask for more information or approve/reject the application. • Offences apply for contructing, installing, or altering an OWMS without a permit	Section 4
Permit issued	
Step 4 - Installation • Install OWMS according to conditions outlined in permit. The OWMS must be inspected by council during installation. If approved, a Certificate of Use will be issued. • Offences apply for contructing, installing, or altering an OWMS without a permit **Building surveyors: ensure an A20 permit is in place before issuing a building permit**	Section 5
Step 5 - Commissioning • Offences apply for operating a system without council approval **Building surveyors:** ensure OWMS Certificate of Use is in place before issuing Certificate of Occupancy	
Certificate of use issued	
Step 6 - Operation and maintenance • Operate the system appropriately including servicing and maintaining the system as required • Offences apply for failing to operate and maintain OWMS correctly	Section 6

Figure 2-2: Approval process for installation of OWMS under the EP Act and alignment with guideline structure

3 OWMS planning

Planning	
	• Onsite wastewater management plans • Reticulated sewerage • Onsite and cluster scale options • Land capability assessment

This chapter provides information to assist in planning the construction, installation or alteration of an OWMS.

It outlines the various tools and options to inform onsite wastewater planning to assist in the overall design of an OWMS that is suitable for the site in a manner that minimises the risk of harm to human health or the environment.

3.1 Onsite wastewater management plans (OWMP)

An OWMP is a planning and management tool that documents a council's understanding of the risks that OWMS present in its municipality and shapes its activities to manage those risks, now and into the future. The identification and assessment of risks supports the development and implementation of actions to protect human health and the environment.

Preparation of an OWMP is a requirement of the OMLI (Part 3) for council areas that include OWMS. Refer to EPA Publication :Onsite wastewater management plans: Guidelines for developing, reviewing and updating (under development) for advice on how to develop, review and update an OWMP.

3.2 Reticulated sewerage

Reticulated sewerage is an important tool in the management of wastewater. It provides for transfer of wastewater offsite to a treatment facility managed by a water corporation. It significantly reduces the risk of wastewater runoff compared to OWMS, particularly in densely populated areas.

The VPP provide that new dwellings must be connected to reticulated sewerage where available.

Where a water corporation extends reticulated sewer to an area and it is available, owners should connect to it.

When a water corporation believes (after consultation with EPA and the Department of Health) that connection to reticulated sewage is necessary to avoid an adverse impact on public health or the environment, it can (through notice under section 147 of the *Water Act 1989)* require the owner of a serviced property to connect the property to its sewerage works.

Certain types of toilets or greywater treatment plants can continue to be used in properties connected to reticulated sewerage. These are:

- greywater treatment and recycling systems certified to the appropriate standard as required by the EP Regulations
- waterless composting toilets certified to the appropriate standard as required by the EP Regulations
- urine separating toilets.

Toilets or greywater treatment plants installed in properties connected to reticulated sewerage are also subject to the requirements of the Plumbing Regulations 2018. Refer to Section 5.1 of this guideline for more information.

Sections 4.3.2 and 4.3.3 also provide further information on the requirements for greywater treatment and recycling systems and dry composting toilets respectively.

In a dwelling connected to reticulated sewerage these options would be installed in conjunction with a connection to sewer so that excess or residual wastewater can continue to be discharged to the sewerage works.

3.3 Onsite and cluster scale options

Where reticulated sewer is not available, different wastewater treatment methods and combinations of recycling systems are available for management of sewage from households and commercial premises. Some common scenarios are shown in the diagrams below and listed in the text boxes. These could apply to new developments or when upgrading existing systems.

As part of a water corporation's alternative servicing strategy it may seek to install an OWMS or cluster scale options. Appropriate permissions need to be obtained from the responsible authority depending on the type and capacity of the system (council permit for an OWMS or EPA development and operating licence for a sewage treatment plant treating, discharging, or depositing sewage, exceeding a design or actual flow rate of 5,000L/day or any day). As required under Part 5.7 of the EP Regulations, the person in management or control of land on which an OWMS is located must take all reasonable steps to ensure the system is operated and maintained in good working order so it does not pose a risk to human health or the environment. This may include engaging a suitably qualified professional to assist in maintaining an OWMS installed by a water corporation.

In some cluster scenarios where multiple OWMS are located within an allotment or title boundary, the flow rates of these OWMS may be added together to determine the appropriate permissions pathway – for example, depending on whether the treatment plants are connected or where they are located in relation to each other within the site. Proponents are encouraged to speak with council where multiple treatment plants are proposed to ensure the appropriate permission is obtained.

Some scenarios relate to fully contained OWMS ≤5,000 L/day. An OWMS may treat all wastewater streams in one treatment plant or have separate treatment pathways for blackwater and greywater.

Other scenarios may involve offsite treatment or recycling for part or all of the sewage being managed. These scenarios are expected to be beyond the scope of this guideline as they are likely to exceed 5,000 litres per day.

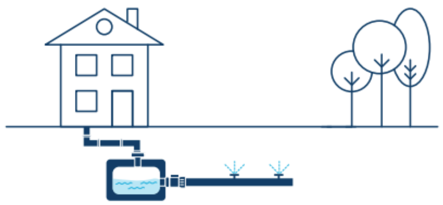

Figure 3-1 Single house with OWMS. Typically ≤5,000 L/day. Requires a council A20 permit when constructing, installing or altering a system.

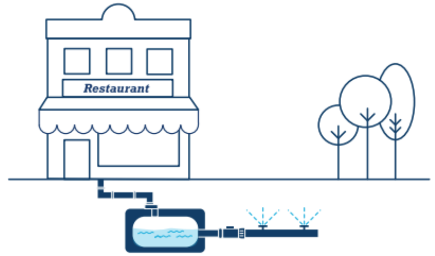

Figure 3-2 Higher occupancy site (e.g. business/apartment block) with OWMS. If scale is ≤5,000 L/day, a council A20 permit is required when constructing, installing or altering a system. If scale is >5,000 L/day on any day, the system requires A03 EPA approval whether existing or proposed.

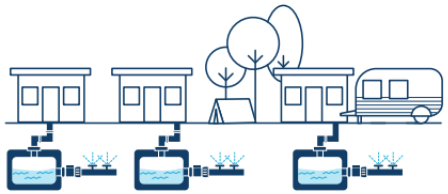

Figure 3-3 Multiple houses or large-scale business with multiple treatment and reuse systems on the one property. Add all treatment plants together. >5,000 L/day (on any day) – A03 EPA approval for existing and proposed systems; ≤5,000 L/day (on all days) – council A20 permit when constructing, installing or altering a system.

Figure 3-4 Cluster system servicing more than one property. If scale is >5,000 L/day on any day the system requires EPA approval for existing and proposed systems.

OWMS scenarios:

- Single household or business with OWMS managing all wastewater and onsite reuse/dispersal (for example, Figure 3-1 or Figure 3-2).
- Onsite treatment and recycling for portion of wastewater (for example, greywater only) with excess reticulated offsite for community-scale treatment and recycling. This guideline relates to the onsite component only. The offsite treatment and recycling would be managed by the local water corporations.

Cluster scenarios:

- Household or business with split/multiple treatment and reuse/dispersal, but all contained onsite. For example, greywater may be managed separately to blackwater. Another example may be as per Figure 3-3. Where multiple treatment plants are proposed at one site, the design or actual flow rates of treated effluent may need to be added together before applying the 5,000L/day rule, depending on whether the treatment plants are connected or where they are located in relation to each other within the site. This will determine whether council or EPA approval is required. Proponents are encouraged to speak with council where multiple treatment plants are proposed to ensure the appropriate permission is obtained.
- More than one household or property serviced by a single treatment and reuse/dispersal system that is managed on private land. If scale is ≤5,000 L/day a council A20 permit is required. If scale is >5,000 L/day on any day the system requires EPA approval (for example, Figure 3-4).
- Onsite primary treatment followed by all wastewater reticulated offsite to a community-scale treatment and recycling system (STEP/STEG – a Septic Tank Effluent Pumped or Gravity system). Typically managed by water corporations and requires EPA approval (A03 development licence or development licence exemption).
- All wastewater reticulated offsite and treated at a central location. This includes township scale sewerage systems and decentralised systems. Typically managed by the local water corporations and requires EPA approval (A03 development licence or development licence exemption).

3.4 Land capability assessment

3.4.1 Land capability assessment purpose

Onsite wastewater management planning is an important step to minimise risks from onsite wastewater. This includes identifying and assessing risks from unsewered developments and identifying actions to minimise those risks and prevent wastewater from discharging beyond allotment boundaries. Assessing land capability at the earliest possible stage helps to prevent harm from onsite wastewater and inform appropriate zoning or subdivision.

Land capability assessment (LCA) is defined under the EP Regulations and the VPP. It describes an assessment of the risks of harm to human health and the environment of the proposed or existing OWMS at the site, taking into account the proposed or existing use of the system. An LCA provides information about the site and soil conditions, including an assessment of the land's capability to sustainably manage wastewater onsite. It may also provide recommendations on proposed onsite wastewater treatment, the treatment level required, and effluent dispersal and management strategies.

The LCA is performed by a person the council considers is suitably qualified – for example, an independent soil science professional. The process produces a report on the outcomes of the assessment prepared to a standard acceptable to the council.

A permit applicant must provide an LCA with their permit application where required by council or specified in the VPP. This enables the responsible authority to understand the environmental and human health risks and make an informed decision on the viability of the proposed development to sustainably manage wastewater onsite.

3.4.2 Victorian LCA Framework

The Victorian LCA Framework, outlines procedures for carrying out LCAs, including land and soil assessments and hydrological calculations for designing land application areas. A council may also provide its own guidelines on the LCA standard and the level of detail it requires. For information on LCA requirements, contact your council's environmental health team. For information about the LCA framework, refer to the MAV website: On-site-domestic-wastewater-management and for information on how to engage consultants refer to EPA's Fact Sheet 1702 on engaging consultants.

4 Design of OWMS

Site design	• Containment onsite • Wastewater generation • Wastewater treatment • Effluent dispersal and recycling • Setback distances • Responding to constraints

This chapter will help you understand the requirements to construct, install or alter an OWMS under the EP Act and the EP Regulations.

It provides information to help you design an OWMS that is suitable for your site in a manner that minimises the risk of harm to human health or the environment. It includes:

- recommendations on how to appropriately size an OWMS based on site and development requirements (household or commercial) (Section 4.2)
- information on the different treatment standards for onsite wastewater treatment and how they are used to inform a performance based OWMS design (Section 4.3)
- the types of effluent dispersal and recycling systems to disperse or recycle treated wastewater (Section 4.4)
- recommendations on how to respond to site constraints using a risk-based approach (Section 4.5 and 4.6).

4.1 Containment onsite

One factor that is important to consider when designing and installing an OWMS is whether the wastewater from an OWMS can cross site boundaries as this may create a risk of harm to human health and the environment.

Councils, when deciding whether to issue an A20 permit to construct, install or alter an OWMS will consider, among other things, the measures the permit applicant has taken to comply with the GED, the potential impact on human health and the environment and the suitability of the OWMS for the site.

Designers of OWMS should consider potential risks that the transport of nutrients, pathogens or other contaminants to neighbouring land, surface waters or groundwater pose to human health and the environment. .

4.1.1 Understanding contaminants

Wastewater can contain pathogens and disease-causing microorganism such as pathogenic bacteria, protozoan, viruses and helminths. They may cause eye and nose infections, gastroenteritis (gastro or upset stomach) or more severe illnesses in humans. Some infections may be transmitted to animals as well. Wastewater can also contain pollutants including:

- suspended solids or sediment
- chemicals and heavy metals
- nutrients (nitrogen and phosphorus).

These can impact water quality, harm plants and animals and present risks to human health.

Under the GED, you have a responsibility to minimise risks of harm to human health and the environment from pollution and waste, so far as reasonably practicable (Refer to EPA's Publication 1856: Reasonably practicable).

When designing an OWMS, consider how to minimise risk of harm from the wastewater as it enters the OWMS, as well as when it is coming out of the system. So, for example, consider how to minimise the risk of harm caused by contaminants entering the wastewater as well as treating the wastewater to a suitable standard. (See Section 6)

Wastewater can be treated in different ways. This depends on the quality and quantity of wastewater, site conditions and what the treated wastewater will be used for. (See Section 4.3).

For further information refer to EPA's webpage on wastewater.

4.1.1.1 Emerging contaminants

Emerging contaminants are compounds that are recently recognised as pollutants in the environment (for example, pharmaceutical, industrial or agricultural compounds that have recently been developed) or have only recently been detected in the environment due to advances in detection technologies (for example, PFAS and antimicrobial resistance genes). Some are present in many of the products we rely on – from medication to common toiletry products, to a wide range of common household products (for example, non-stick cookware, cleaning products, food packaging). Antimicrobial resistance (AMR) and antibiotic resistant bacteria are also recognised worldwide as emerging contaminants.

When designing an OWMS the key method available for minimising risk of harm from emerging contaminants is to prevent or reduce the risk that they will enter wastewater. For example:

- do not discharge your unwanted and expired medicines into your OWMS – the Therapeutic Goods Administration (TGA) has guidelines on disposal of unwanted medicines through the Return Unwanted Medicines (RUM) scheme (Refer to TGA's website for more information https://www.tga.gov.au/safe-disposal-unwanted-medicines)
- avoid use of products containing PFAS (per-and polyfluoroalkyl substances).

For further information on the regulatory environment and research reports for emerging contaminants, refer to EPA's webpage on emerging contaminants (including PFAS) or the EDRS Guideline section 4.7.1.4.

4.2 Wastewater generation

OWMS design flowrates and loads are used for sizing the onsite wastewater treatment plant and effluent dispersal system. They are also used to determine daily household or commercial premises wastewater generation that informs the type of permission required (i.e. council issued A20 permit for an OWMS or EPA development and operating licence for a sewage treatment plant treating, discharging, or depositing sewage, exceeding a design or actual flow rate of 5,000L/day or any day).

4.2.1 Design households flow rates and loads

OWMS should be designed in line with household occupancy and expected use of the premises. This section will assist in determining household wastewater generation to inform the OWMS design flow rate that is suitable for the site and that minimises the risk of harm to human health or the environment.

Daily household wastewater generation is calculated by multiplying the household occupancy (number of people) by the design flow rate (expressed in litres per person per day) for households (Refer to Table 4-1).

Household occupancy is determined based on the number of bedrooms plus one, not just the number of people who may be intending to live in the house initially. This provides for consideration of the potential future occupancy.

Design of the OWMS should include allowance for any additional rooms shown on the house plan that could be closed off with a door and converted to a bedroom – such as a study, library or sunroom. However, a council may choose to reduce the number of potential bedrooms based on evidence that the room is unlikely to be used as a bedroom (for example, the floor plan).

A realistic design flow rate for the OWMS needs to be adopted in line with the expected use of the premises. For example, a household being used for short-term rentals should consider the flow rates and organic loads outlined for commercial premises in Section 4.2.2.

Household flow rates can increase with additions or renovations, such as connection to reticulated water supply or the addition of a bedroom, bathroom, spa or other water-using fixture. Before making any additions or renovations that impact household flow rates, it is important that owners review whether the OWMS is suitably designed and has sufficient capacity to determine whether a permit to alter the OWMS is required. Councils may be able to assist owners to make this assessment.

Table 4-1 outlines design flow rates (expressed in litres per person per day) for households to calculate daily household wastewater generation, depending on sewage source and type of fixtures.

Table 4-1: Design flow rates for households[3].

Sewage source	Design flow rate (L/person/day)	
	Reticulated water supply[4]	Onsite roof water tank supply
Households with standard water fixtures	180	150
Households with extra sewage-producing facilities[5]	220	190
Households with WELS[6] scheme fixtures and fittings	150	120

[3] Adapted from Government of South Australia, SA Health (2013), On-site wastewater systems Code.
[4] Includes reticulated town water supply, groundwater bores or stock and domestic waterway diversion licences (where connected to household use).
[5] Extra wastewater producing facilities could include, but are not limited to, spa baths.
[6] WELS – Water efficiency labelling scheme. Requires 4 Stars or higher for dual-flush toilets, shower-flow restrictors, aerator taps, flow/pressure control valves, and 3 Stars or higher for all appliances (for example. clothes washing machines).

For blackwater-only or greywater-only treatment plant, Table 4-2 can be used to determine design flow rates.

Table 4-2: Typical wastewater design flow allowances for each household fixture source[7]

Source	Design flow rate (L/person/day)
Toilet only	50
Toilet + handbasin	60
Shower + bath + handbasin + laundry	90
Laundry only	50
Kitchen only	10

To calculate organic material loading design rates, the household occupancy is multiplied by 60 g BOD/person/day.

[7] Adapted from Table 5-2 in Government of South Australia, SA Health (2013), On-site wastewater systems Code.

Table 4-3 provides examples of household wastewater generation calculations based on values from Table 4-1.

Table 4-3: Example calculations for household wastewater generation

Water supply	Household fixtures	Number of bedrooms	Number of people[8]	Design flow rate (L/person/day)	Daily wastewater volume (L/day)[9]
Reticulated	Standard water fixtures	4	5	180	900
Reticulated	Standard water fixtures	2	3	180	540
Reticulated	Water-reduction fixtures	4	5	150	750
Reticulated	Water-reduction fixtures	2	3	150	450
Onsite roof water tank	Standard water fixtures	4	5	150	750

When OWMS designers determine design flow rates for households to assess whether the OWMS is suitable for the site and to help minimise the risks of harm to human health and the environment, they should also consider the following:

- For an existing premises connected to a reticulated water supply the metered flow rate should be reconciled against the calculated flow rate.
- Where the proposed wastewater flow rate from a residential dwelling is expected to exceed 2,000 L/day it is recommended that the designer review the reason for the high flow rate and the concurrent organic load. Regular discharges exceeding 2,000 L/day may indicate a usage that is not purely domestic and may require additional equipment (surge tanks) added to the OWMS.
- Wastewater flow rates based on water-reduction fixtures and fittings should only be accepted when the council is satisfied the fixtures were installed at the time the OWMS was commissioned and made operational.

[8] Number of people = number of bedrooms + 1.
[9] Daily wastewater volume = number of people x design flow rate.

4.2.2 Design commercial and community premises flowrates and loads

Commercial premises may produce both sewage and industrial wastewater. These guidelines apply where an OWMS is used to manage the sewage component only or any flows containing sewage, and the design or actual flow rate is not more than 5,000 litres on any day. Industrial wastewater that does not contain sewage (for example, industrial wastewater (or liquid waste) from commercial kitchens, winemaking and cheesemaking processes) is not addressed in this guideline.

Industrial wastewater is defined in EPA Publication 1910 as wastewater produced from processes at industrial or commercial premises, including all waterborne waste from these facilities except sewage and prescribed industrial waste. Industrial wastewater is managed through a different treatment process and does not contribute to the flow rate of sewage. For more information on producing and re-using industrial wastewater, refer to EPA Publication 1910: Victorian guideline for water recycling.

Use EPA's Permission Pathway Form (F1021) if you are unsure about which pathway is most suitable for your commercial activities.

4.2.2.1 Flow rates and organic loads from commercial and community premises

To inform design flowrates and organic loads from non-household sources, OWMS designers can use Table 4-4 or for an existing premises the metered water usage data (actual or pro-rata indoor use). The minimum daily wastewater flow rates and organic loading rates in Table 4-4 are recommended values and may be varied through demonstration of risk and performance-based approach. When this occurs, you should provide supporting evidence to council that the proposed daily wastewater flow rates and organic loading rates used for the design of the OWMS is suitable.

Designers should consider the organic load of the wastewater as the primary design component when selecting an OWMS for toilet blocks and food premises such as cafes, restaurants and function centres. This is because the OWMS may be overloaded with organic matter, could fail to achieve the required wastewater quality, and could produce offensive discharges that pose a risk to human health or the environment. Options to manage high organic loads include:

- installation of a grease trap prior to the wastewater treatment plant
- increasing the size of the primary settling tank
- regular monitoring of sludge and scum levels in the treatment plant and, if required, increased frequency of desludging.

All OWMS installed on commercial premises should have a flow meter fitted to measure the daily volume of wastewater flow containing sewage.

Table 4-4: Minimum daily wastewater flow rates and organic loading rates – community/commercial premises[10]

Source	Design hydraulic flow rates for all water supplies (L/person/day)	Organic material loading design rates (g BOD/person/day)
Motels/hotels/guesthouse		
Bar trade per customer	7	8
Bar meals per diner	10	10
Per resident guest and staff with in-house laundry	150	80
Per resident guest and staff with outsourced laundry	100	80
Restaurants (per potential diner)[11]		
Premises <50 seats	40	50
Premises >50 seats	30	40
Tearooms, cafés (light refreshments and prepared food (e.g. cakes, etc.) per seat	10	10
Conference facilities per seat	25	30
Function centre per seat	30	35
Take-away food shop per customer	10	40
Public areas (with toilet, but no showers and no café)[12]		
Public toilets	6	3
Theatres, art galleries, museums	3	2
Meeting halls with kitchenette	10	5
Premises with showers and toilets		
Golf clubs, gyms, pools etc. (per person)	50	10
Hospitals – per bed	350	150
Shops/shopping centres		
Per employee	15	10
Public access	5	3
School – childcare		
Per day pupil and staff	20	20
Resident staff and boarders	150	80
Factories, offices, day training centres,		

[10] Based on EPA Publication 500: Code of Practice for Small Wastewater Treatment Plants.

[11] Number of seats multiplied by the number of seatings, i.e., may include multiple seatings for breakfast, morning and afternoon teas, lunch and dinner.

[12] For premises such as public areas, factories or offices with showers and toilets, use the flow rates for 'Premises with showers and toilets' in the calculations.

Source	Design hydraulic flow rates for all water supplies (L/person/day)	Organic material loading design rates (g BOD/person/day)
medical centres		
No showers	20	15
With showers	50	30
Camping grounds		
Fully serviced – onsite cabins/ caravans with showers, toilets and cooking facilities	150	60
Recreation areas/Amenity blocks with showers, communal kitchen and toilets	100	40

4.2.3 Irregular, intermittent and surge flows

The OWMS should be designed to deal with irregular and surge flows without untreated or partly treated wastewater being discharged into the land application system or the indoor water recycling system. Irregular and surge flows have the potential to force untreated solids through the treatment plant, which can clog land application infrastructure (for example, filters or irrigation pipes). Property owners/occupiers can minimise surge flows through the way they manage their household or facility. However, if high surge flows are likely the system should be designed to adequately deal with them, such as by installing a pre-treatment balance tank (often referred to as a surge tank), or a larger size treatment plant.

The use of a buffering or balance tank can assist in delivering uniform loads to both treatment plants and land application areas. The type of permission required is based on the design or actual flow rate of the onsite wastewater treatment plant, not the size of the balance tank. Flow balancing is used to collect and store irregularly generated loads in a balance tank before regular dosing. This will assist in maintaining a regular flow to the treatment plant, which often ensures improved treatment performance and avoids overloading with peak loads. A balance tank can also ensure regular and even dosing of the land application area and help avoid saturation due to peak flows.

If the dwelling will be used intermittently (such as a holiday home) designers should consider whether the proposed OWMS can handle variable flows and operate effectively under stop/start conditions. For example, treatment systems powered by electricity may require a low-flow switch that recirculates effluent during periods of non-occupancy.

Design and installation of a balance tank as part of an OWMS to help manage short-term flow issues should be done by a suitably qualified person and consultation with council. The design should be supported by evidence that considers the irregular and surge wastewater generation rates and volumes and appropriate dosing rates for effective treatment and effluent dispersal. The onsite wastewater treatment plant installed after the balance tank should be designed to effectively treat the cumulative wastewater loads from the balance tank.

The capacity of the balance tank should be determined using:

- expected volume and duration of irregular/surge flows
- OWMS (treatment plant and effluent disposal) capacity and storage duration – it is recommended that wastewater is stored in the balance tank for a maximum of 2 to 3 days to minimise the risk of the wastewater turning anaerobic and emitting odours.

4.3 Wastewater treatment

Determining the appropriate treated wastewater quality for a site is based on the site risk assessment and site-specific environmental constraints.

An onsite wastewater treatment plant must meet the appropriate Australian Standard outlined in Section 2.3.2.

The following sections outline the treatment quality standards for various treatment plants.

Other factors that should be considered when determining the most appropriate treatment plant for a site include:

- system capacity (flow) and treatment capability (quality)
- production of recycled water fit for the intended use or dispersal method
- capital and installation costs
- use of electricity
- use of consumables (such as chlorine)
- frequency of servicing
- sludge production and management requirements
- number and cost of parts that require replacing
- generation of greenhouse gases
- ability to reduce nutrients and sludge
- ability to reduce contaminants.

Treatment plant details need to be provided to the council when applying for an OWMS permit. The details may be accessed from the manufacturer's marketing material, the owner's manual or by contacting the manufacturer or supplier.

4.3.1 Primary and secondary treatment standards

The level of treatment provided will determine the quality of treated wastewater available and the appropriate effluent dispersal/land application options. The level of treatment is typically named primary or secondary according to the number of treatment barriers provided.

Quality standards (as outlined in the relevant Australian Standards – see Section 2.3.2.1) for treatment plants that treat all wastewater are shown in Table 4-5.

Table 4-5: Wastewater treatment quality standards

Treatment standard	Treatment quality standards[13]
Primary	No specific standard
Secondary	≤20 mg/L Biochemical oxygen demand (BOD_5) ≤30 mg/L Total suspended solids(TSS)
Advanced secondary	≤10 mg/L BOD_5 ≤10 mg/L TSS
Secondary with nutrient reduction capability	≤20 mg/L BOD_5 ≤30 mg/L TSS Maximum total N 15 mg/L Maximum total P 2 mg/L
Secondary with disinfection	≤20 mg/L BOD_5 ≤30 mg/L TSS ≤10 cfu/100 mL *E. coli*[14]
Advanced secondary with disinfection	≤10 mg/L BOD_5 ≤10 mg/L TSS ≤10 cfu/100 mL *E. coli*[14]

4.3.1.1 Primary treatment standard

Methods of primary treatment include:

- septic tanks (anaerobic) – Refer also to AS/NZS 1546.1:2008
- aerobic biological filter[15] – wet composting or vermiculture.

Primary treatment plants use physical methods such as screening, flocculation, sedimentation, flotation and composting to remove the gross solids from the wastewater, plus biological anaerobic and aerobic microbial digestion to treat the wastewater and the biosolids.

Primary treated wastewater does not have a specific water quality standard. It can range from 150 to 250 mg/L BOD_5 and 40 to 140 mg/L TSS without an outlet filter, and from 100 to 140 mg/L BOD_5 and 20 to 55 mg/L TSS with an outlet filter (Crites and Tchobanoglous 1998). The pathogen indicator, *E. coli*, can range from 10,000 orgs/100 mL in grey water to over 10,000,000 orgs/100 mL in sewage. All onsite wastewater treatment plants should be fitted with outlet filters to reduce BOD_5, TSS and fat, oil and grease content.

[13] Quality standards apply as 90th percentile.
[14] cfu = colony forming units.
[15] Some biological filter systems can produce secondary treated wastewater (where accredited).

Primary treated effluent should not be used for dispersal in sands and gravels (soil categories 1 or 2a – see Table 4-8 and Table 4-9) where there is a risk to groundwater quality (for example, a high water table or groundwater with high environmental values[16]).

4.3.1.2 Secondary treatment and advanced secondary treatment standard

Secondary treatment involves aerobic biological processing and settling or filtering of wastewater after the primary treatment process has occurred. Common onsite secondary treatment plants include:

- aerated wastewater treatment plants
- sand and media filters – typically used in combination with a separate primary treatment plant (for example, a septic tank)
- membrane bioreactors.

Refer also to AS/NZS 1546.3:2017.

Other treatment plants can be considered if they meet the appropriate standard set by EPA as discussed in Section 2.3.2. In most cases secondary treatment does not reduce the salinity and sodium levels or nutrients in wastewater.

An advanced secondary onsite wastewater treatment plant produces treated effluent of advanced secondary standard, ≤10 mg/L BOD5, ≤10 mg/L TSS.

Secondary treatment plants with nutrient reduction capability are discussed below.

4.3.1.2.1 Secondary treatment standard with nutrient reduction capability

Several secondary treatment plants have been tested and approved for their nutrient-reduction capabilities (total nitrogen, nitrates and total phosphorus). These treatment plants can provide added risk management in environmentally sensitive areas, such as in special water supply catchment areas.

4.3.1.2.2 Secondary treatment and advanced secondary treatment standard with disinfection

Disinfection can be added to secondary treatment to further reduce pathogens. Options include chlorine, ultraviolet radiation (UV) and ozonation.

Chlorine is the most common disinfection process in domestic-scale onsite wastewater treatment plants. For chlorine disinfection, the Australian Standards outline compliance criteria of greater than or equal to 0.5 mg/L residual free available chlorine.

It should also be noted that chlorine disinfection is not suitable for effluent dispersal systems (these include trenches, beds and mounds) that rely on microbial breakdown of effluent within a distribution bed, as the chlorine can kill bacteria.

[16] The Environment Reference Standard sets out the environmental values of groundwater with groundwater divided into seven segments defined by the background concentrations of total dissolved solids (TDS). The segment determines which environmental values should be protected and values include potable water supply, irrigation, ecosystem support, cultural values and so on.

4.3.2 Greywater treatment standards

Greywater treatment incorporates multiple treatment processes (as a minimum secondary treatment) and should include a disinfection process.

Due to the difficulty of treating fats, oils, grease and high loads of organic matter in kitchen wastewater, most greywater treatment plants exclude kitchen water from the waste stream. Kitchen wastewater should be diverted to sewer (or to a separate wastewater treatment plant in unsewered areas) unless the greywater treatment plant is specifically designed for treating kitchen wastewater.

Greywater treatment quality standards and their suitable uses are summarised in Table 4-6

Table 4-6: Greywater treatment standards and suitable uses[17]

Treatment standard	Quality standards[18]	Suitable indoor uses	Suitable outdoor application
Level 1	≤10 mg/L BOD_5 ≤10 mg/L TSS ≤2 NTU turbidity ≤1 cfu/100 mL *E. coli*	Toilet flushing Cold water supply to washing machines	Hand-held garden watering or car washing using a purple hose Subsurface drip irrigation Covered surface drip irrigation Spray irrigation using fixed or pop-up sprinklers
Level 2	≤10 mg/L BOD_5 ≤10 mg/L TSS ≤2 NTU turbidity ≤10 cfu/100 mL *E. coli*	Toilet flushing	Subsurface drip irrigation Covered surface drip irrigation Spray irrigation using fixed or pop-up sprinklers
Level 3	≤20 mg/L BOD_5 ≤30 mg/L TSS ≤10 cfu/100 mL *E. coli*	–	Subsurface drip irrigation

Most greywater treatment manufacturers instruct householders to exclude greywater from the laundry trough when it is polluted with contaminants such as dirty nappies, soiled clothing or cleaning chemicals, etc.

Refer also to AS/NZS 1546.4:2016.

[17] Only subsurface irrigation of greywater is recommended in multi-dwelling residential developments, hospitals, childcare facilities and schools.
[18] Quality standards apply as 90^{th} percentile.

4.3.3 Dry toilets (blackwater) treatment standard

Waterless (dry) composting toilets rely on the principle of composting by microorganisms. As the organic matter in a dry composting toilet desiccates and matures during a specified period, the pathogens die off. The mature composted material is then safe for burial in a 300 mm deep hole in the ornamental section of a garden and covered with loamy topsoil following the compost handling and safety procedures in the manufacturer's written instructions. The liquid waste requires disposal to sewer (or in an unsewered area can be dispersed to land).

Refer to AS/NZS 1546.2:2008 for information on the quality of composted end product that is regarded as safe and ready for disposal.

Incineration toilets involve the combustion/burning of human waste. These systems manage toilet waste (blackwater) only. In unsewered areas they need to be combined with a greywater treatment plant to ensure complete wastewater management.

4.4 Effluent dispersal and recycling

After wastewater has been treated by an onsite wastewater treatment plant, the treated wastewater (effluent) is managed through effluent dispersal systems (also known as land application systems) or effluent recycling systems.

Effluent dispersal and recycling systems (EDRS) form a critical part of the overall OWMS and assist in achieving environment, human health, and community amenity protection outcomes.

This guideline provides an overview of the types of EDRSs and their suitability for various application scenarios.

For detailed information on EDRS refer to EPA Publication: Guideline for onsite wastewater effluent dispersal and recycling systems (EDRS guideline). See Appendix 2 of this guideline for more information about the EDRS guideline.

The following definitions have been established to distinguish between dispersal systems and recycling systems:

- An 'effluent dispersal system' is an engineered system designed to enable controlled distribution of treated effluent into or onto the land for water and nutrient uptake and filtration, absorption and further biological degradation.
- An 'effluent recycling system' is a system designed to enable the beneficial reuse of appropriately treated effluent from greywater for either indoor or outdoor use.

Under the EP Act and EP Regulations an EDRS is not an onsite wastewater treatment plant that can be permissioned for use as a part of an OWMS unless it has a certificate of conformity. The certificate of conformity confirms the proposed the onsite treatment plant meets the relevant Australian Standard from an accredited assessment body under the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) or any other accreditation body approved by EPA. Consequently, without certification, no additional treatment provided within an EDRS should be assumed or relied upon.

Table 4-7 provides a summary of the different EDRSs that can be used to disperse effluent following treatment by an onsite wastewater treatment plant. More information on each system is included in Sections 4.4.1 to 4.4.5.

Table 4-7: Treated effluent dispersal and recycling options

Management category	Dispersal and recycling option	Suitable effluent standard	Description and application scenario
Options for primary and secondary treatment standards			
Soil absorption and evapotranspiration systems	Conventional trenches/beds	Primary or secondary	Dispersal of wastewater to subsoils. Not recommended for sandy soils or heavy clays. Special design required in these soils.
	Evapotranspiration absorption (ETA) trenches/beds	Primary or secondary	Dispersal of wastewater to subsoils and some recycling through plants grown. Not recommended for sandy soils.
	Wick trench and bed system	Primary or secondary	Similar to ETA systems but with enhanced wicking due to plants grown.
	Vegetated recirculating evapotranspiration beds	Primary or secondary	The treated effluent can be fully contained inside the bed. Treated effluent is recirculated while undergoing evapotranspiration and no seepage to the soil.
	Amended soil systems	Primary or secondary	Importing a media, soil or engineered material to enhance the distribution of effluent. Can be used to increase the pollutant removal capacity of an effluent dispersal system, which may result in a reduced system footprint.
Mound systems		Primary or secondary	Dispersal of wastewater to subsoils following sand filtration.
Shallow subsurface and surface irrigation systems	Shallow subsurface irrigation	Secondary	Provides recycling through plants irrigated. Flexible garden designs possible.
	Low pressure effluent distribution	Primary or secondary	Dispersal of wastewater to subsoils. Not recommended for sandy soils or heavy clays.

Management category	Dispersal and recycling option	Suitable effluent standard	Description and application scenario
	Surface irrigation	Secondary with disinfection	Provides recycling through plants irrigated. Increased risk of contact with humans and animals. Not suitable for multi-dwelling residences, schools, and other premises with sensitive populations.
Options for greywater treatment standards			
Greywater recycling systems	Indoor recycling	Level 1	Cold water supply to washing machines.
		Level 1 or 2	Toilet flushing.
	Outdoor recycling	Level 1	Hand held garden watering or car washing using a purple hose.
		Level 1 or 2	Spray irrigation using fixed or pop-up sprinklers. Covered surface drip irrigation.
		Level 1, 2 or 3	Subsurface drip irrigation.

Different soil absorption and evapotranspiration systems are suited to different sites based on site and soil limitations. Additionally, there are several different effluent distribution solutions and design configurations that include gravity or pressure distribution of effluent, trench or bed width, length and depth. These design considerations are discussed in detail in Appendix 2.2 of the EDRS guideline.

If this guideline or the EDRS guideline does not address an issue or a technology, refer to the most recent version of AS/NZS 1547:2012 for guidelines on the performance statements that cover the overall design of OWMS. Wastewater recycling and dispersal systems that are not covered by Australian Standards can also be considered with reference to other appropriate literature combined with a risk assessment based on site-specific conditions.

4.4.1 Soil absorption and evapotranspiration systems

4.4.1.1 Conventional trenches and beds

Absorption trenches (or beds) can be used for primary and secondary treated wastewater. Design loading rates will vary depending on soil type and the standard of wastewater treatment (see Table 4-8 and Table 4-9). Wastewater will exit through the side walls of the trench as well as the base, but only the base of the trench is used to calculate the application area.

Absorption trenches are not recommended in sandy soils (soil categories 1 and 2a) due to the high infiltration rates that can carry pathogens, salts and nutrients to groundwater. They are also not recommended for use in heavy clay soils (soil categories 5b, 5c and 6) as dispersal rates in these soils are limited.

However, in some circumstances, use of absorption trenches/beds (with special design and distribution techniques or soil modification procedures) may be used in sandy soils or heavy clay soils. This will require design by a suitably qualified wastewater practitioner to ensure risk of harm to groundwater is minimised. Where groundwater quality is at risk, secondary treatment is required and consideration should also be given to disinfection, nutrient removal, soil modification or distribution over a large application area.

The suitability of a soil for a trench bed can also depend on the composition of sandy loam and climate and other factors. A qualified person should ensure that the specific effluent dispersal system is suited to the site and soil conditions.

Depending on the soil type, the spacing between trenches will vary between 1 m (for sandy loams) to 2 m (for clay soils) and may be greater where required. The minimum spacing of 1 m is in accordance with AS/NZS 1547:2012.

The maximum trench length for a gravity-flow trench is 20 m and the base of all trenches should be level. Trenches and beds can be installed on the contour to enable provision of a flat base.

A distribution box should be installed with trench systems to assist in manipulating dosing across multiple trenches. This will allow the soil in the trenches to be rested between dosing.

Land should be allocated for a duplicate absorption trench area known as the 'reserve area' which can be used if the initial land application area fails (see Section 4.4.4).

For a more detailed description of soil absorption trenches refer to EDRS guideline section 2.4.2.1.

4.4.1.2 Evapotranspiration trenches and beds

The following land applications systems cited in AS/NZS 1547:2012 (as amended) are not recommended in Victoria due to the high loading rate of wastewater, nutrients, pathogens and salts deep in the soil profile, which could impact groundwater:

- box trenches with impermeable side walls (AS/NZS 1547:2012, Figure L3, p.152)
- discharge control trenches with impermeable side walls (AS/NZS 15472012, Figure L4, p 153).

Evapotranspiration systems use subsurface absorption of wastewater into the soil and evapotranspiration by plants.

These systems are most suited to areas with low rainfall, high evaporation and relatively low permeability soils.

Surface vegetation for evapotranspiration systems requires plants that tolerate wet conditions and have a high evapotranspiration capacity.

Evapotranspiration trenches and beds are not recommended in sandy soils (soil categories 1 and 2a) due to the high infiltration rates that can carry pathogens, salts and nutrients to groundwater.

For a more detailed description of evapotranspiration trenches and beds refer to EDRS guideline section 2.4.2.2.

4.4.1.3 Enhanced evapotranspiration

Enhanced evapotranspiration systems can be desirable on highly constrained sites, particularly in clay soils (soil category 5–6) or relatively small sites where a reduced effluent dispersal system footprint is warranted. Enhanced evapotranspiration can be achieved by a range of methods, with 2 common approaches – wick trench and bed system, and vegetated recirculating evapotranspiration beds.

For a more detailed description of enhanced evapotranspiration systems refer to EDRS guideline section 2.4.2.3 and appendix 2.2.3.

4.4.1.3.1 Wick trench and bed system

The wick system is designed to maximise the movement of wastewater up through the soil to plant roots and the atmosphere. It is a series of trenches with adjacent ETA beds that are underlain and joined by a layer of geotextile. The surface of the combined trench and ETA bed, which is approximately 3 times the width of a conventional trench, is planted with herbaceous vegetation to maximise the wicking effect over the large surface area. The geotextile acts as the 'wick' to continuously draw liquid upwards through capillary action.

Design parameters presented in Table L1 of AS/NZS 1547:2012 for trenches and beds can be adopted for wick trenches. A similar equation to Equation L1 in AS/NZS 1547:2012 is also used to calculate the size of the wick trench. This equation is presented in Section 10.8 of Designing and Installing On-Site Wastewater Systems: A Sydney Catchment Authority Current Recommended Practice (Sydney Catchment Authority, 2012).

4.4.1.3.2 Vegetated recirculating evapotranspiration beds

Vegetated recirculating evapotranspiration beds are self-contained channel systems and configured as a 'no-release' effluent dispersal system. The beds are completely lined and impervious to prevent rainwater from entering and effluent from leaving the system using methods such as deep drainage or lateral movement through the soil profile. Effluent is removed from the system through evapotranspiration. Plant selection and maintenance is critical to the success of vegetated recirculating evapotranspiration systems.

These systems can be used as an effluent dispersal system following primary or secondary treatment, and are desirable on sites with poor soil conditions, sensitive receiving environments or limited area available for land application of effluent.

An accumulation of dissolved salts, nutrients and other contaminants can occur in closed systems over time. This can be managed through periodic removal of recirculating effluent by an approved waste transport contractor for disposal at a place authorised to receive it.

Vegetated recirculating evapotranspiration beds are sized using a water balance model developed for the site. For further information on how vegetated recirculating evapotranspiration beds are sized, refer to section 4.4 of the EDRS guideline.

For zero discharge systems, the size and number of beds should be designed to be water balanced so there is no excess or 'discharged' water. The design of these systems includes sizing the bed and recirculation tank and wet weather storage tank and downstream effluent dispersal system if required. As the removal mechanism of wastewater in closed systems is through evapotranspiration processes, climatic conditions must be considered. Closed systems are most suited to relatively hot climates where evapotranspiration rates exceed rainfall.

However, it may be possible to install a vegetated recirculating evapotranspiration bed system where effluent volumes not lost to evapotranspiration are discharged to a second suitable effluent dispersal system. In this combined effluent dispersal system scenario, the risk assessment should include the consideration of the water quality of the discharged effluent being dispersed by the second effluent dispersal system. Consideration should also be given to minimising the effects of an accumulation of dissolved salts, nutrients and other contaminants that occur in closed systems over time prior to effluent being dispersed by the second effluent dispersal system.

4.4.1.4 Amended soil systems

Amended soil systems can take many forms. They involve importing a media, soil or engineered material to enhance the distribution of effluent or improve the pollutant removal capacity of an effluent dispersal system. These systems are often adopted for constrained sites with sensitive receiving environments and have been used to increase the performance of conventional trenches and beds, ETA systems, LPED systems and Sand mounds (or Wisconsin mounds). For a more detailed description of amended soil systems refer to EDRS guideline 2.4.2.4.

4.4.2 Shallow subsurface and surface systems

4.4.2.1 Shallow subsurface irrigation

Subsurface irrigation delivers secondary treated wastewater direct to plant roots, providing recycling through plant uptake and growth. When appropriately designed and installed this option will promote transpiration of secondary treated effluent, limit evaporation and significantly reduce the likelihood of surface runoff. It is suited to a range of soil types and enables flexible garden designs.

This approach also includes covered surface drip irrigation as described in Appendix M of AS/NZS 1547:2012. The dripline is pinned to the topsoil surface and covered with mulch or another suitable material. The mulch should be secured using measures such as bird resistant netting.

Key requirements include:

- use of a pressure compensating dripline trenched or ploughed into the topsoil to a depth of 100–150 mm to evenly distribute wastewater throughout the irrigation area
- installation of filters to protect the irrigation system from solids being carried over from the treatment system
- installation of flush/scour valves or an equivalent system to enable periodic flushing to clean the pipes in the irrigation system
- installation of vacuum breakers to stop soil and other particles being sucked into, and clogging drippers.

For a more detailed description of subsurface irrigation refer to EDRS guideline section 2.4.3.1.

4.4.2.2 Low pressure effluent distribution

LPED systems are a series of thin, gravel-filled trenches with a perforated distribution pipe installed to distribute effluent evenly using pump pressurisation. Where the local soil is inadequate, topsoil should be imported to the site to help maximise evaporation and transpiration through the grass cover.

Limitations of the LPED system are the risk of distribution holes becoming blocked by biosolids and roots, and limited wastewater storage capacity between the trench aggregate. Therefore, pump dosing to ensure even distribution along the trench is crucial to use the land available and prevent failure of the system.

LPED systems can be used with either primary or secondary treated wastewater. Careful hydraulic design is required on sites where laterals are at varying elevations and zoning is often required.

LPED systems are often used on constrained sites with limited area available for onsite wastewater management.

LPED systems are not recommended in sandy soils (category 1 and 2a) or medium to heavy clays (category 6). LPED irrigation for light clay soils (category 5) needs a minimum depth of 250 mm of good-quality topsoil.

For a more detailed description of LPED systems as an effluent dispersal system refer to EDRS guideline section 2.4.3.2.

4.4.2.3 Surface irrigation

Surface irrigation applies water above ground over a vegetated area using sprinklers or 'wobbler' type sprays. Irrigation spray heads should not spray beyond the property boundary.

Surface irrigation requires secondary treatment with disinfection, or advanced secondary treatment for grey water, due to the health risks associated with the increased potential for the wastewater to make direct contact with people, animals and insects or exposure to bioaerosols.

A commercial or community premises[19] in an unsewered area may use surface irrigation with secondary or advanced secondary quality wastewater (for example, a vineyard using drip irrigation or an existing golf course with pop-up sprinklers) provided it has a 4-hour withholding period after each irrigation event and a service contract is in place with a professional service technician.

Surface irrigation is not suitable in multi-dwelling residences, schools, childcare centres, medical centres, hospitals, nursing homes and premises for other sensitive populations.

Surface irrigation is not suitable for sloping sites with low permeability soils due to the likelihood of significant runoff from these systems.

For a more detailed description of surface irrigation refer to EDRS guideline section 2.4.3.3.

4.4.3 Mound systems

Sand mounds (or Wisconsin mounds) are a raised effluent dispersal system commonly used on sites with high groundwater and shallow bedrock, or sites located within flood prone land. They are pressure-dosed systems that can be used to disperse primary or secondary treated effluent. The wastewater discharges from the sand-fill media directly into the underlying soil. Special design requirements and distribution techniques are necessary for selected clay loam and clayey soils (soil categories 4c, 5b, 5c and 6).

Mounds can use other filter media apart from or in addition to sand. They can be designed to disperse primary or secondary treated wastewater and further remove nutrients and microorganisms.

For a more detailed description of mounds as an effluent dispersal system refer to EDRS guideline

[19] Other than multi-dwelling residences or a school, medical centre, hospital, childcare centre, nursing home or premises for other sensitive populations, which need to use subsurface irrigation.

section 2.4.4.

4.4.4 Land area required for effluent dispersal

The rate and volume of wastewater applied to the land application area should not exceed the soil or plant requirements.

The land area required for effluent dispersal should be determined at the planning stage. In some scenarios, where part of the residential area is considered for effluent dispersal, Planning Practice Note 27: Understanding the Residential Development Standards(ResCode) should be considered to determine the minimum area of land required for effluent dispersal. The site coverage, permeability and private open space should be considered to determine the minimum area of land required for effluent dispersal. In addition, maintenance and management of the land application area should be planned in detail at the planning stage.

Design loading/irrigation rates

Australian Standard AS/NZS 1547:2012 provides recommended design loading rates and design irrigation rates for a range of effluent dispersal systems based on soil type. These are reproduced with permission from Standards Australia in Table 4-8. Table 4-9 outlines recommended design loading rates and design irrigation rates amendments to meet Victorian-specific recommendations (for example, absorption trenches are not recommended for sandy soils). Table 4-8 and Table 4-9 should be used together to select design loading/irrigation rates when designing effluent dispersal systems in Victoria.

The design loading/irrigation rate selected should be equal to, or less than, those listed for the relevant soil type. 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. A water balance may also indicate that a reduced application rate is required for a specific site.

As outlined in Appendix L4 of AS/NZS 1547:2012, the DLR/DIR is a conservative approximation of the long-term receiving capacity of an effluent dispersal system but is not a long-term acceptance rate (LTAR), which takes into consideration a wider range of site-specific heterogenous factors that are difficult to extrapolate as a design tool (effluent organic load, surface area of effluent dispersal systems impeded by gravel and differences in the hydraulic conductivity of upper soil horizons).

DLR/DIRs have been derived using the basal area of an effluent dispersal system only (not the sidewalls in a trench or bed system). DLRs are not an empirical parameter and represent a conservative 'best estimate' of sustainable loading rates for effluent dispersal systems. Adjustment of these values through a risk-based process is considered appropriate where justified.

Water and nutrient balance

Water and nutrient balance modelling is recommended for environmentally sensitive sites, including:

- sandy soils – nutrient balance to be considered particularly for environmentally sensitive sites (for example, special water supply catchment or high-quality groundwater)
- heavy clay soils – a water balance may indicate that a reduced application rate is required to prevent waterlogging and runoff
- sites with high rainfall (>900 mm annual average) – a water balance may indicate the need for a larger application area to manage wet weather
- land application systems not covered by AS/NZS 1547:2012.

The Victorian LCA Framework outlines procedures and assumptions for nutrient and water balance modelling and provides model templates. Alternative methods for nutrient and water balance modelling may be used provided they result in equivalent or better environmental risk management and factors of safety.

All water and nutrient balance calculations are theoretical estimates using multiple assumptions. Small variations in the inputs can lead to big differences in the estimated land application area. Therefore, a conservative approach should always be taken.

Reserve areas

A reserve area is a duplicate land area of equal size to the designated land application area that may be used if the original area fails or is inadequate or needs to be rested. A reserve area is required for all trench and bed systems – including ETA and LPED systems – unless the council is satisfied (based on evidence from a comprehensive LCA) that there is a low risk of negative impact on the environment or human health. A reserve area should be identified on the site plan as an area separate from the land application area.

Storage tanks

Fit-for-purpose effluent storage tanks may be installed downstream of the treatment plant to ensure a ready supply of water for indoor uses, garden irrigation or firefighting, or to hold excess effluent during wet weather for land application.

Table 4-8 shows how design loading rates will vary depending on soil type and the standard of wastewater treatment. This table together with Table 4-9 can be used to select design loading/irrigation rates when designing effluent dispersal systems in Victoria.

Table 4-8: Soil categories and design loading/irrigation rates (reproduced from AS1547:2012 with permission by Standards Australia)

Soil texture	Soil structure	Soil category	Indicative soil permeability Ksat (m/d)	Design irrigation rates (DIR)/design loading rates (DLR) (mm/day)						
				Absorption trenches/ beds			ETA trenches/ beds	Subsurface and surface irrigation	LPED irrigation	Mounds (basal area)
				Table L1, AS/NZS 1547:2012			Table L1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table N1, AS/NZS 1547:2012
				Primary treated effluent		Secondary treated effluent				
				Conservative rate	Maximum rate					
Gravels and sands	Structureless (massive)	1	>3.0	See Note 1 of Table L1, AS/NZS 1547:2012 for DLR values			See Note 4 of Table L1, AS.NZS1547 :2012	5 (See Note 1 of Table M1, AS/NZS 1547:2012)	See Note 3 of Table M1, AS/NZS154:2012)	32
Sandy loams	Weakly structured	2a	>3.0					5 (See Note 1 Table M1, AS/NZS 1547:2012)	4	24
	Massive	2b	1.4–3.0	15	25	50			4	24
Loams	Highly/moderately structured	3a	1.5–3.0	15	25	50		4	3.5	24
	Weakly structured or massive	3b	0.5–1.5	10	15	30		4	3.5	16
Clay loams	Highly/moderately structured	4a	0.5–1.5	10	15	30	12	3.5	3	16
	Weakly structured	4b	0.12–0.5	6	10	20	8	3.5	3	8
	Massive	4c	0.06–0.12	4	5	10	5	3.5	3	5 (See Note

Soil texture	Soil structure	Soil category	Indicative soil permeability Ksat (m/d)	Design irrigation rates (DIR)/design loading rates (DLR) (mm/day)						
				Absorption trenches/ beds			ETA trenches/ beds	Subsurface and surface irrigation	LPED irrigation	Mounds (basal area)
				Table L1, AS/NZS 1547:2012			Table L1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table N1, AS/NZS 1547:2012
				Primary treated effluent		Secondary treated effluent				
				Conservative rate	Maximum rate					
										of Table N1 AS/NZS 1547:2012)
Light clays	Strongly structured	5a	0.12–0.5	5	8	12	8	3	2.5	8
	Moderately structured	5b	0.06–0.12	(See Notes 2 and 3 of Table L1 AS/NZS1547:2012)	5	10	5	3 (See Note 1 of Table M1, AS/NZS1547:2012)	(See Note 4 of Table M1, AS/NZS1547:2012)	5 (See Note of Table N1 AS/NZS 1547:2012)
	Weakly structured or massive	5c	<0.06			8	(See Note 2, 3 5 of Table L1 AS/NZS 1547:2012)			
Medium to heavy clays	Strongly structured	6a	0.06–0.5					2 (See Note 2 of Table M1, AS/NZS1547:2012)	(See Note 3 of Table M1, AS/NZS1547:2012)	
	Moderately structured	6b	<0.06							
	Weakly structured or massive	6c	<0.06							

The design loading rates and design irrigation rates in Table 4-9 are amended to meet Victorian specific recommendations.

Table 4-9: Soil categories and design loading/irrigation rates recommended for Victoria

Soil texture	Soil structure	Soil category	Design irrigation rates (DIR)/design loading rates (DLR) (mm/day)				
			Absorption trenches/ beds	ETA trenches/ beds	Subsurface and surface irrigation	LPED irrigation	Mounds (basal area)
			Table L1, AS/NZS 1547:2012	Table L1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table N1, AS/NZS 1547:2012
Gravels and sands	Structureless (massive)	1	Recommended to use values from "conservative rate" column of Table 4-8 See also Note 1, 2 and 3 of Table 4-9	ETA/ETS systems are not normally used on soil categories 1 and 2a.	Refer to values and notes in Table 4-8 See also Note 4 of Table 4-9	LPED irrigation is not suitable on soil categories 1 and 2a	Refer to values and notes in Table 4-8
Sandy loams	Weakly structured	2a					
	Massive	2b		15		Refer to values and notes in Table 4-8	
Loams	Highly/moderately structured	3a		Refer to values and notes in Table 4-8			
	Weakly structured or massive	3b					
Clay loams	Highly/moderately structured	4a					
	Weakly structured	4b					
	Massive	4c					

Soil texture	Soil structure	Soil category	Design irrigation rates (DIR)/design loading rates (DLR) (mm/day)				
			Absorption trenches/ beds	ETA trenches/ beds	Subsurface and surface irrigation	LPED irrigation	Mounds (basal area)
			Table L1, AS/NZS 1547:2012	Table L1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table M1, AS/NZS 1547:2012	Table N1, AS/NZS 1547:2012
Light clays	Strongly structured	5a					
	Moderately structured	5b					
	Weakly structured or massive	5c					
Medium to heavy clays	Strongly structured	6a				LPED irrigation is not suitable on soil category 6	
	Moderately structured	6b					
	Weakly structured or massive	6c					

Notes to Table 4-9:

1. There is elevated risk associated with primary treated effluent being dispersed to trenches and beds in soil categories 1 and 2a. This is due to the high infiltration rate of these soils, which leads to uneven distribution along the base of the trench. These soils have low nutrient retention capacities, often allowing accession of nutrients to groundwater.
2. Use of absorption trenches/beds in category 1 and 2a soils require design by a suitably qualified and experienced person. Where groundwater quality is at risk, secondary treatment is required and consideration should also be given to disinfection, nutrient removal, soil modification or distribution over a large application area.
3. Use of absorption trenches/beds in category 5b, 5c and 6 soils requires special design and distribution techniques or soil modification procedures. In most situations the design will need to rely on more processes than just absorption by the soil.
4. The design irrigation rate for subsurface or surface irrigation may be increased in sandy soils (categories 1 and 2) where secondary treatment is installed with disinfection and nutrient reduction.

4.4.5 Greywater recycling systems

4.4.5.1 Indoor recycling

Greywater treatment incorporates multiple treatment processes (as a minimum secondary treatment) and should include a disinfection process (See section 4.3.2 Greywater treatment).

Advanced secondary treated greywater can be used for toilet flushing and clothes washing in single dwelling households.

The use of treated greywater for clothes washing may not always result in the desired outcome, especially when washing light-coloured clothes. Householders should discuss the risks with the system manufacturer or supplier and be careful of the colours of cleaning and personal care products used.

Multi-dwelling residential developments, hospitals, childcare facilities and schools should only use subsurface irrigation for greywater recycling. Indoor greywater recycling poses a higher risk in multi-dwelling, commercial and business premises due to:

- the health risks of viruses and other pathogens not being adequately treated
- the risk of failing treatment plants and inadequate disinfection due to lack of servicing
- the risk of cross-connection between drinking water and wastewater supply pipes.

The greywater treatment and storage system should be designed to match the volume of greywater collected to the household recycled water needs (for example, for toilet flushing, washing machine use and garden irrigation). Wastewater storage tanks may be installed to ensure a ready supply of water for indoor uses, garden irrigation or firefighting.

Greywater recycling systems for indoor use should include:

- backflow prevention devices to protect drinking water supplies
- purple colour-coded pipework for internal recycled water plumbing
- an appropriate backup supply of water (for example, drinking water) if the supply of recycled greywater fails or is insufficient
- an automatic valve to divert wastewater to the sewer if the system fails due to a malfunction or power failure or if the wastewater storage tank is full
- a manual valve to divert wastewater contaminated with chemicals, dyes or faecal matter from any sink, bath or shower to the sewer.

4.4.5.2 Outdoor recycling

Domestic households can install approved greywater treatment plants to reuse greywater treated to Level 1 standard for lawn/plant irrigation by subsurface irrigation systems or a dedicated hand-held purple hose that is connected to a purple tap with a left-hand thread. The recycled greywater can be used to water lawns and gardens, but not hard surfaces such as paths and driveways because the nutrients and pathogens in the greywater may flow through the stormwater drains and could negatively impact the local waterways.

Treated wastewater or greywater should not come into contact with the edible parts of herbs, fruits, or vegetables.

In unsewered areas greywater treated to Level 1 or Level 2 standard may be used for commercial applications including:

- horticultural crops – such as grapevines – where drip irrigation is used, and the treated greywater does not make contact with the edible parts of the herb, fruit, nut or vegetable
- sporting fields with existing surface irrigation systems and where the sport does not involve players' bodies coming into contact with the grass on the field (such as golf courses) – a 4-hour withholding period is recommended between the application of treated wastewater and use of the sporting field.

4.5 Setback distances

OWMS (including the treatment plant, balance/storage tank and land application areas) should be installed with a buffer or 'setback distance' to nearby infrastructure and the surrounding environment (waterways) to minimise potential environmental and human health risks.

Even when OWMS are properly designed, installed and maintained, environmental and human health risks may exist. The consequences of failing OWMS are diverse and depend on the type of treatment plant or EDRS, the characteristics of the site and the wastewater, the sensitivity of the surrounding environment/land use and the proximity of neighbouring households.

A two-tiered approach should be used by OWMS designers or councils and referring authorities to determine setback distances.

Tier 1

The setback distances and guideline information documented in this section provides a simple yet conservative approach to the selection of setback distances.

Table 4-10 provides a guide on the setback distances that may be applied to OWMS. These setback distances are a conservative minimum that may be varied if sufficiently justified by the applicant and approved by the council.

Tier 2

In some limited situations, the adoption of one or more setback distances referenced in this guideline (Table 4-10) is not practicable for the site. Wastewater consultants and assessors may decide to seek alternative setback distances through demonstration of appropriate protections and controls. When this occurs, a risk and performance-based approach can be used to determine alternative setback distances.

A guide on the alternative setback distance assessment method is provided in section 4.5 of the EDRS guideline.

When assessing a request to vary the setback distances, councils may consider the following:

- Evidence has been provided (for example, a comprehensive LCA) that demonstrates the risk to human health and the environment is minimised so far as reasonably practicable, despite the reduced setback distance. Table 4-11 sets out site constraint risk factors that can be used to justify the reduced setback distance to the council. These risk factors are adapted from Table R2 in AS/NZS 1547:2012.
- The potential impact of nutrients from the proposed OWMS, and the cumulative impact of other existing OWMS in the area can be properly managed and the risk is minimised.
- System failure usually occurs under wet conditions when the soil is saturated. Consequently, any assessment of a reduction to setback distances should consider the

cumulative impacts of multiple systems failing during wet weather, including minimising the risk of the cumulative impacts.

- The setback distance to a waterway in a special water supply catchment area should not be less than 30 m wide along waterways to maintain the natural drainage function, minimise erosion and sediment, nutrient and salinity related impacts.
- Where a request is to vary setback distances to a waterway in a special water supply catchment area, additional controls should be considered.
  - wastewater is treated to an appropriate secondary standard.
  - a maintenance and service contract are in place with a service technician accredited by the manufacturer
  - additional engineering controls are implemented to minimise the risks to human health and the environment
  - a compliance program is in place or can be put in place to ensure the system functions as designed.

Appendix R in AS/NZS 1547:2012 provides further guidelines on recommended setback distances for OWMS, including discussion of site constraints. This includes (in Table R2) a site constraint scale for use as a guide to also inform determination of setback distances. A council may increase the setback distances if it concludes that there is an increased risk to human health and the environment from the application.

Table 4-10: Setback distances (m) [20,21]

Landscape feature or structure	OWMS with primary treated effluent	OWMS with secondary treated effluent or Level 3 greywater effluent	OWMS with Level 1 and 2 greywater effluent
Building/allotment boundary			
Up-slope of building (See Note 1)	6	3	3
Down-slope of building	3	1.5	1.5
Up-slope of adjacent lot	6	3	1
Down-slope of adjacent lot	3	1.5	0.5
Services			
Water supply pipe	3	1.5	1.5
Up-slope of potable supply channel (stock and domestic)	300	150	150
Down-slope of potable water supply	20	10	10

[20] Setback distances are measured horizontally from the external wall of the treatment plant and the boundary of the land application area, except for soil depth as per Note 10.

[21] The setback distances for flat land are equivalent to down-slope setback distances.

Landscape feature or structure	OWMS with primary treated effluent	OWMS with secondary treated effluent or Level 3 greywater effluent	OWMS with Level 1 and 2 greywater effluent
channel (stock and domestic)			
In-ground water tank (See Note 2)	15	7.5	3
Closed stormwater drain	6	3	2
Open stormwater drain	50	30	10
Gas supply pipe	3	1.5	1.5
Recreational areas			
Children's grassed playground (See Note 3)	6	3	2
In-ground swimming pool	6	3	2
Surface waters			
Dam, lake or reservoir (used as source water for drinking or within a special water supply catchment) (See Notes 5, 6)	300	300	150
Waterways (used as a source of water for drinking or within a special water supply catchment) (See Notes 4, 5)	100	100	50
Waterways not used as source of water for drinking or within a special water supply catchment (for example, wetlands (continuous or ephemeral); estuaries (See Note 4)	60	30	30
Ocean beach at high-tide mark; dams, reservoirs or lakes not used as source of water for drinking or within a special water supply catchment (See Note 6)	60	30	30
Dam, lake or reservoir (used as source water for drinking or within a special water supply catchment) (See Notes 5, 6)	300	300	150
Drainage lines (See Note 7)	40	20	20

Landscape feature or structure	OWMS with primary treated effluent	OWMS with secondary treated effluent or Level 3 greywater effluent	OWMS with Level 1 and 2 greywater effluent
Up-slope of cutting/escarpment (See Note 8)	15	15	15
Groundwater bores			
Groundwater bores – category 1 and 2a soils	NA	50	20
Groundwater bores – category 2b to 6 soils	20	20	20
Soil depth (See Note 9)			
Depth to highest seasonal water table (See Note 10)	1.5	1.5	1.5
Depth to hydraulically limiting layer (for example, bedrock)	1.5	0.6	0.6

Notes to Table 4-10:

1. Establishing an OWMS up-slope of a building may have implications for the structural integrity of the building. This should be examined by a building surveyor on a site-by-site basis.
2. It is recommended that OWMS are installed down-slope of an in-ground water tank.
3. Means a school, council, community or other children's grassed playground managed by an organisation which may contain play equipment but does not mean a sports field.
4. Means a waterway as defined in the *Water Act 1989*.
5. Applies to land adjacent to a dam, lake, reservoir or waterway that provides source water used for the supply of public drinking water or, which is subject to an environmental significance overlay (ESO) that designates maintenance of water quality as the environmental objective to be achieved, or within a special water supply catchment area listed in Schedule 5 of the *Catchment and Land Protection Act 1994*.
6. Does not apply to dams, lakes or reservoirs located above ground level that cannot receive runoff.
7. An intermittent stream that is found to be a drainage line (drainage depression) with no defined banks and the bed is not incised. The topography of the drainage line should be demonstrated in writing and photographs in the LCA report.
8. A cutting/escarpment from which water is likely to emanate.
9. Depth is measured vertically through the soil profile from the base of absorption/ETA trenches/beds or from the irrigation pipes.
10. The highest seasonal water table occurs when groundwater is closest to the ground surface. This usually occurs in the wettest months of the year.

Table 4-11 shows risk factors that may influence setback distance.

Table 4-11: Site constraint risk factors

Risk factor	Parameter
Soil type and geology	Permeability of soil
Topography	Slope Landform Drainage Position of land application area (including system/soil interfaces)
Groundwater	Depth and quality
Weather conditions (rainfall)	Rainfall Evaporation Flood potential
Wastewater quality	Primary treated effluent Secondary treated effluent
Microbial quality of effluent	Consistency of high microbial quality of effluent
Application method	Drip irrigation or subsurface application versus surface/above ground application of effluent
Sensitivity of the receiving environment	Proximity to sensitive receptors (drinking water reservoir/offtake/catchment)

4.6 Responding to constraints

4.6.1 Flood-prone areas

Planning a new development

The VPP provides requirements and strategies in floodplain management. Refer to Clauses 13.03 in the VPP for further information or consult with the floodplain management authority in the planning scheme. Floodplain managers will assess proposals on merit and having regard for the provisions of Clause 13.03 and requirements in the relevant flood overlay.

OWMS are not suitable for areas within a Floodway Overlay, which identifies land having a high flood hazard. If an area is known to be flood prone but is not covered by a floodway overlay, OWMS are not suitable if the area is likely to flood more frequently than every 20 years (on average) or 5 % Annual Exceedance Probability (AEP).

It is also preferable to avoid siting OWMS in areas affected by the 1 in 100-year (1 % AEP) flood. These areas are identified as a Land Subject to Inundation Overlay or Special Building Overlay in planning scheme maps. If an area is known to be flood prone but is not covered by an overlay, where possible, avoid siting OWMS that flood more frequently than every 100 years on average.

OWMS design in flood-prone areas:

If it is not possible to locate an OWMS outside land affected by the 1 in 100 year flood, floodplain managers will need to be assured that the OWMS is consistent with the provisions of VPP Clause 13.03. If the development is deemed to be acceptable, at the discretion of the floodplain management authority, the following flood protection measures may be relevant:

- Treatment plants should be watertight and have backflow prevention – for example, install seals, access risers and backflow prevention devices (in accordance with manufacturers' requirements).
- Position treatment tanks so that the lid of the tank is above Nominal Flood Protection Level and ensure electrical control components are located above the flood level.
- Ensure anchoring of floatable tanks is adequate.
- Dispersal systems with subsurface application may be suitable with special design.
- Special design is required for stormwater cut-off drains to minimise run-on to land application areas without compromising flood plain function.

4.6.2 Small unsewered lots

OWMS in small lots of land can create a risk to the environment and human health as it is difficult to manage wastewater onsite due to the limited space available.

The VPP provide that new dwellings must be connected to reticulated sewerage where available. If reticulated sewerage is not available, all wastewater from each dwelling must be treated and retained within the lot in accordance with the requirements in the EP Regulations under the EP Act for OWMS.

Lots larger than 1 hectare are generally able to retain all wastewater onsite and are considered low risk in relation to lot size.

The VPP (32.03-2) requires that when subdividing land in Low Density Residential Zones each lot must be at least 0.4 hectares where reticulated sewerage is not connected. Any existing lots that are smaller than 0.4 hectare and unsewered are considered high risk for onsite wastewater management.

To enable small lots to manage all wastewater onsite:

- minimise the wastewater volume generated through:
  - use of water saving fixtures
  - use of a dry composting toilet
  - indoor recycling of treated greywater (with blackwater managed separately)
- use secondary treatment with nutrient reduction to improve quality of wastewater for dispersal
- use dispersal methods that minimise land application area required (for example, enhanced evapotranspiration).

Dwelling size may be constrained on small lots, even where these actions are taken.

Advanced secondary treatment plants are useful for constrained sites that may have sensitive receiving environments or reduced setback distances, or on properties with limited area available for the application of effluent. It should also be noted that chlorine disinfection is not suitable for effluent dispersal systems (include trenches, beds and mounds) that rely on microbial breakdown of effluent within a distribution bed, as the chlorine can kill bacteria.

Note that the land application area should be dedicated to effluent dispersal and should be well maintained. It should not be used for other infrastructure or activities (such as carports, driveways, patios, play equipment).

4.6.3 Pump-out tanks

Pump-out tanks, independent of an OWMS, are large wastewater holding tanks designed to contain effluent from premises usually for one week to 3 months. Because there is no treatment, they should only be used for storage according to the manufacturer specifications. They are only suited to premises/situations with low or intermittent use, or where an OWMS is not practicable. Where a pump-out tank is connected to an OWMS, an A20 permit for the OWMS (which includes the connected pump out tank) will be required.

You have the responsibility under the GED to minimise the risks to human health and the environment from pump-out tanks. This requires that the risks to human health and the environment associated with pump-out tanks and wastewater are understood by relevant land owners or managers and are minimised so far as reasonably practicable.

Land owners or infrastructure managers where pump-out tanks are located should undertake a risk assessment to identify potential risks of harm and controls to minimise the risks as a part of their GED obligations. Sewage from a pump-out tank is considered a 'priority waste' under the EP Act and EP Regulations. When pump-out tanks are pumped out, the waste must be transported to an appropriate licenced facility.

It is recommended that pump-out tanks are installed with setback distances similar to applicable setback distances for onsite primary treatment plants in Table 4-10. Pump-out tanks pose similar risks to primary treatment plants, such as structural deterioration of the tank or poor maintenance that results in overflow.

When a pump-out tank is necessary, the following practices should be considered as controls to manage potential risks:

- a pump-out tank should be certified in accordance with AS/NZS 1546.1
- water conservation fittings and fixtures, including dual-flush toilets and spring-loaded taps may be installed to prevent excess water filling the tank
- a suitably sized tank for the application in accordance with AS/NZS 1547 (as amended) and based on the frequency of pump-outs to minimise any adverse environmental impact – generally, this means a minimum storage capacity of 15,000 L for a residential premises where the effluent is pumped out fortnightly
- a water meter on the water supply to the premises
- a water meter on the effluent dispersal system if a pump-out tank forms part of an OWMS
- an audio/visual or telemetric alarm system which alerts the premises occupier when the tank is three-quarters full and requires pumping out, in the event the tank fills more quickly than the pump-out schedule
- extra ballast to weigh down the tank to prevent groundwater lifting it out of the soil after it has been pumped out from private premises.
- ensure that the contents of the tank are pumped at appropriate intervals into a sewage-sludge truck and transported and discharged to an approved sewer main access hatch or centralised sewage treatment plant – this may be done through a contract with a sewage/sludge pump-out operator to regularly pump out the wastewater
- a strategy for sending a copy of the receipt and volume of wastewater removed to council after each pump-out from private premises.

4.6.4 Sand and gravels

Sandy soils are highly permeable and have low nutrient retention capacity. When used for onsite wastewater dispersal they can pose a risk to the environment through the accession of nutrients and other contaminants to groundwater.

Where OWMS are used on sandy soils, the following practices should be considered:

- minimise wastewater volume produced
- minimise use of detergents containing phosphorus
- promote uptake of wastewater by ETA trenches/beds – LPED are not considered suitable
- secondary treatment or advanced secondary treatment is recommended
- secondary treatment with disinfection is recommended where there is risk of pathogen contamination of groundwater supplies (for example, there are bores in the vicinity of the site)
- ETA trenches/beds and LPED are not considered suitable dispersal methods and absorption trenches/beds require special design by a suitably qualified wastewater practitioner
- use nutrient balance analysis to assist in determining the size of the land application area
- nutrient removal should be considered where sites are in proximity to waterways or have shallow water tables
- select high nutrient use vegetation.

4.6.5 Heavy clay soils

Clay-dominated soils have low permeability, creating a risk of waterlogging and runoff when wastewater is applied. This can be exacerbated where soils are dispersive (sodic) or show shrink/swell behaviour.

Where OWMS are used on heavy clay soils the following practices should be considered:

- minimise wastewater volume produced
- secondary treatment or advanced secondary is recommended
- minimise design loading/irrigation rate by increasing the size of land application area (use water balance analysis to assist in design)
- LPED is not considered suitable for dispersal – absorption trenches/beds require special design and distribution techniques or soil modification procedures
- ETA trenches/beds can only be used with secondary treated wastewater
- prepare receiving soil by deep-ripping, cultivation, gypsum application[22] or addition of more permeable topsoil
- install stormwater cut-off drains up-slope of the land application area
- avoid using soaps and detergents with high sodium content to minimise discharge of sodium salts
- where soils have dispersive (sodic) or shrink/swell behaviour, seek specialist soil advice and consider special design techniques.

4.6.6 Shallow soils

Table 4-10 outlines setback distances relating to soil depth above seasonal water tables and hydraulic limiting layers (for example, bedrock). Depth is measured vertically through the soil profile from the base of absorption/evapotranspiration trenches/beds, or from the irrigation pipes.

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[22] Gypsum adds calcium to the soil, which can improve the cation balance with sodium and magnesium. In soils dominated by calcium the clay particles aggregate and form crumbs, which improves water infiltration and internal drainage.

Shallow soils constraint may be overcome through raising the level of the effluent dispersal system by importing fill.

Where a hydraulically limiting layer is present, the WaterNSW (2019) Designing and Installing On-Site Wastewater Systems guideline and the EDRS guideline sets out hydraulic linear loading rates that can be used in conjunction with the design loading rates outlined in Table 4-8 and Table 4-9.

The linear loading rates are designed to ensure that wastewater cannot return to the surface as it travels downslope due to the presence of a hydraulically limiting layer. Linear loading rates are assigned based on a combination of soil depth, soil type and slope. By ensuring that the design loading rate used does not cause the linear loading rate to be exceeded, the trenches or beds are kept sufficiently narrow to prevent seepage at the downslope side. The consequence of this is the design of trenches and beds which are generally narrower and longer (along the contour).

4.6.7 Salinity

The salt content of the wastewater, measured as total dissolved solids (TDS) or electrical conductivity (EC), should be considered. To maintain productive and healthy plantings over dispersal areas the treated wastewater should have a TDS of <500 mg/L or EC of <800 µS/cm.

The salt content of the water supply to the premises is a key determining factor. However, domestic wastewater will always contain more salts than water supplied to the premises because salts, especially sodium, are in food, laundry and dishwasher detergents, and other cleaning products.

The total concentration of the salts and the proportions of sodium, magnesium, calcium and potassium affect irrigated soil, particularly where the soil contains clay. Irrigation water with a high sodium adsorption ratio (SAR) can cause irrigated clay soils to become more dispersive and much less permeable to air and water. EPA Publication 168 Victorian guideline for irrigation with recycled water (2022) provides details on the interaction between TDS and SAR. Soil affected by high SAR can be improved by adding gypsum to it.

5 Installation

Installation	• Installation requirements • Documentation • Council inspection and certificate of use • Building surveyor approval requirements

An A20 Permit from the relevant council is required before installing an OWMS. This chapter contains information to assist you in ensuring compliant installation when a permit has been obtained. The relevant Australian Standards also provide detailed guidelines about the installation, operation and maintenance requirements for OWMS.

Installation of OWMS also has requirements under the *Building Act 1993*, Plumbing Regulations 2018, the Plumbing Code of Australia and relevant referenced technical standards (the plumbing regulatory framework).

The Plumbing Code of Australia, which refers to the relevant Australian Standards, are incorporated into the Plumbing Regulations 2018.

The EDRS guideline provides guidance on the construction and installation of EDRS. It provides key information to consider during preconstruction, construction and post-construction activities that are common across most effluent dispersal systems. It also provides recommendations for inspection activities before the commissioning stage.

5.1 Installation requirements

5.1.1 Appropriate contractors

OWMS must be installed by a qualified plumbing practitioner. Any work involving a below-ground sanitary drainage system from the above-ground sewage or waste pipes to (and including) the land application system and associated pipework must be installed in compliance with the requirements of the Plumbing Regulations 2018 by an appropriately licensed or registered plumbing practitioner.

Before installing and commissioning an OWMS anywhere in Victoria (including on government land) the installer should ensure that an A20 Permit has been issued. Note that any drainage work will also require a compliance certificate to be issued by the licensed plumber.

OWMS installers or plumbers need to comply with installation requirements under the *National Construction Code 2022 Volume 3 – Plumbing Code of Australia (PCA 2022*).

When an OWMS is to be constructed, installed, replaced, altered or maintained the *Plumbing Code of Australia* (NCC Volume 3) requires the OWMS to be installed in accordance with the most recent version of AS/NZS 1546.1, AS/NZS 1546.2, AS/NZS 1546.3, AS/NZS 1546.4 and AS/NZS 1547 as appropriate.

5.1.2 Pipework

All pipework must be installed by an appropriately licensed or registered plumbing practitioner (Section 221D of the *Building Act 1993*)). This includes pipework:

- from the premises to the treatment plant
- from the treatment tank to the land application system
- for indoor wastewater recycling
- for the land application/dispersal systems.

Pipework must be installed in compliance with the requirements of the following (where applicable):

- the Plumbing Regulations 2018 (or as amended)
- the Plumbing Code of Australia
- relevant referenced technical standards
- the manufacturer's specifications
- council A20 permit conditions
- the site LCA recommendations.

The international colour code for plumbing installations for recycled water is lilac, but it is generally referred to as purple in Victoria (purple pipe). Under the plumbing regulatory framework, the pipework connecting the treatment unit and land application area, the pipes in irrigation fields and the pipes supplying advanced secondary treated greywater to fixtures within the house must be colour-coded purple[23].

Under the plumbing regulatory framework, when a treatment plant is retrofitted to connect to existing irrigation pipes that are not purple pipe the above-ground fixtures such as taps, pumps and hatches must be covered with purple. This can be achieved by the use of a close fitting, durable material, such as tape.

System components should be installed to prevent public access where possible. For example, flushing taps should be installed below ground or with a removable/lockable tap.

5.1.3 Signage

Under the plumbing regulatory framework, appropriate signage with the symbols or words indicating 'Recycled Water — Do Not Drink' needs to be clearly displayed. It should be displayed on the treatment unit adjacent to any dedicated greywater hose tap and adjacent to any land application area.

Signage must be in accordance with the most recent version of AS/NZS 1319.

5.1.4 Commissioning primary treatment plants (septic tanks)

After installation and before use, the primary treatment plant (septic tank) should be two-thirds filled with clean water to:

- reduce odours
- test and calibrate physical and mechanical components within the OWMS
- provide ballast in the tank to prevent groundwater lifting it out of the ground
- enable any subsequent secondary treatment plant to be switched on, commissioned and used.

When wastewater from the dwelling flows into the primary treatment plant (septic tank) it contains sufficient microbiological organisms to enable the treatment process to work. There is no need to 'feed' or dose a new (or desludged) septic tank with starter material or microorganisms. If odour

[23] AS/NZS 3500.1, clause 9.6.1 provides further information on acceptable purple colour range"

occurs after commissioning, a cup of garden lime can be flushed down the toilet until the odour disappears. If the odour persists the property owner should seek professional advice from a licensed plumber or service technician.

5.1.5 Installation requirements for greywater systems

For specific plumbing requirements for greywater systems (greywater treatment plant or recycling system), refer to the Plumbing Regulations 2018, the Plumbing Code of Australia and relevant referenced technical standards.

One example of installation practices that can help minimise the risk of harm to human health or the environment is the installation of failsafe diversion valves to divert greywater to sewer (or to blackwater systems in unsewered areas):

- during wet weather
- during a power outage or system malfunction
- when greywater production exceeds demand and the storage capacity limit is reached.

Soil moisture sensors or rain sensors should be integrated into greywater irrigation systems to automatically divert greywater to sewer before the soil becomes saturated. Consult the soil moisture or rain sensor manufacturer for installation advice to ensure the sensor location is appropriately sited.

The internal plumbing of pipes to the toilet cistern or clothes washing machine for greywater recycling must be done by an appropriately licensed or registered plumbing practitioner in accordance with the Plumbing Regulations 2018, the Plumbing Code of Australia and relevant referenced technical standards.

Note: Under the plumbing regulatory framework, treated greywater pipes must not be cross-connected to drinking water supply pipes. Appropriate backflow prevention devices must be installed on any drinking water backup to the treated greywater supply in accordance with the Plumbing Code of Australia. Consultation with the relevant water corporation is recommended where reticulated drinking water is supplied.

Refer to Section 4.4.5 for more information on indoor reuse.

5.2 Documentation

On completion of the installation, testing and commissioning of the OWMS, a licensed plumbing practitioner must issue a plumbing compliance certificate[24] . The plumbing compliance certificate must also be lodged with the Victorian Building Authority for plumbing work that includes the plumbing[25] :

- from the house to the treatment plant
- from the treatment plant to the land application system and the installation of the land application system
- for any indoor recycling using purple pipes and backflow prevention devices.

The installer is recommended to provide the following documents to the council or the landowner/occupier:

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[24] section 221ZH(2)(a) of the *Building Act 1993*
[25] section 221ZH(2)(b) of the *Building Act 1993*

- a commissioning report in accordance with AS/NZS 1547:2012
- a 'work-as-built' plan and report of the plumbing, treatment and dispersal systems in relation to the house, driveway and allotment boundaries
- statement of service life and warranty of parts
- manufacturer or distributor's warranty that the OWMS installed for a commercial or community premises is appropriate for the intended use
- owner's manual
- maintenance/service manual including a service report template
- a copy of the plumbing compliance certificate.

5.3 Council inspection and certificate of use

On completion of construction, installation or alteration of an OWMS, the council that issued the A20 permit must inspect the system. If the council is satisfied the system complies with the permit it must issue a certificate approving the use of the system (regulation 33 of the EP Regulations).

5.4 Building surveyor approval requirements

Building permits are issued by registered building surveyors in accordance with the Building Regulations 2018. When an unsewered allotment requires the installation of an OWMS or the erection or alteration of a building with an existing OWMS, building surveyors must be satisfied that a 'report and consent' from the relevant council is obtained, or an A20 permit is issued under the EP Act before issuing a building permit.

In addition, a 'report and consent' or a certificate of use is required from the council before a building surveyor issues an occupancy permit or a certificate of final inspection.

These requirements ensure that:

- a building permit is only issued for an unsewered property where suitable wastewater management arrangements have been made
- an occupancy permit or a certificate of final inspection is only issued when the council has issued a certificate of use for the OWMS.

6 Operation and maintenance

Operation / maintenance	• Managing household flow and loads • Onsite wastewater treatment plant lifespan • Monitoring OWMS • Service contracts • Desludging treatment plants • Rectification of failed land dispersal systems

The information provided in this chapter can assist you to operate and maintain an OWMS correctly. For specific guidelines on the maintenance and operation of EDRSs, refer to Chapter 7 of the EDRS guideline.

The EP Regulations require OWMS to be operated and maintained correctly.

The owner of land on which an OWMS is located must provide the person in management or control of an OWMS written information regarding correct operation and maintenance (regulation 160). The EP Regulations (regulation 163 (1) – (3)) outline that councils may order maintenance on OWMS that are not operated and maintained correctly.

Council can request a site inspection or access to maintenance records to assess an OWMS's compliance with the EP framework. Refer to EPA Publication 1974: Regulating onsite wastewater management systems: local government toolkit for more information.

6.1 Managing household flow and loads

The total volume of wastewater generated – and any irregular, intermittent or surge flow patterns – can disrupt the operational performance of an OWMS. The long-term functionality of the OWMS will depend on the hydraulic loading, the composition of the wastewater and the ongoing maintenance of the treatment plant and dispersal system.

As required by regulation 159 (1) of the EP Regulations, a person in management or control of land on which an OWMS is located must take all reasonable steps to ensure the system is operated so as not to pose a risk of harm to human health or the environment. For example, if the treated wastewater is not confined within the land application area situated within the site where the wastewater is generated, it may create a risk of harm to human health or the environment.

To maintain the operational performance of an OWMS, occupants should avoid discharging:

- large volumes of water at one time, such as might occur when emptying a spa bath or washing numerous loads of clothes/linen in one day
- inappropriate chemicals, such as paints, pesticides and other inorganic liquids
- high quantities of any chemicals, such as bleach or washing powder
- non-degradable objects such as nappies, tampons or sanitary pads
- unwanted and expired medicines (return these to the local pharmacy)
- swimming pool water, because the additional water, chlorine or salt will disrupt the functioning of the treatment system and land application area

Positive actions that occupants can take to help an OWMS function well include:

- choosing chemical-free cleaning products, such as soapy water (made from natural unscented soap), vinegar and water or bicarbonate of soda and water to clean toilets and other water fixtures and fittings
- reading labels to learn which bathroom and laundry products are suitable for the treatment plant installed
- using detergents with low levels of salts (for example liquid detergents), sodium, phosphorus and chlorine (see www.lanfaxlabs.com.au)
- wiping oils and fats off plates and saucepans with a paper towel and disposing of them in the kitchen compost bin
- using a sink strainer to restrict food scraps from entering the treatment plant
- ensuring no structures such as pavements, driveways, patios, sheds or playgrounds are constructed over the treatment plant or land application area
- ensuring the land application area is not disturbed by vehicles or machinery
- keeping a record of the location of the treatment plant and the land application area and all maintenance reports (including the dates of inspections).
- ensuring vegetation is well maintained.

6.2 Onsite wastewater treatment plant lifespan

The effective lifespan of a treatment plant is typically specified by the manufacturer and is expected to be a minimum of 15 years according to the Australian Standards for both primary and secondary treatment plants (AS/NZS 1546 1:2008 and AS/NZS 1546.3:2017). However, it is recognised that with regular maintenance the lifespan can be extended to a range of 20 to 30 years.

Replacing failed onsite wastewater treatment plants requires decommissioning by an appropriately licensed or registered plumbing practitioner.

6.3 Monitoring OWMS

Owners and occupiers need to monitor their OWMS (including legacy systems) to confirm it is performing correctly, take any actions required to keep it working well and keep a record of those actions. The treatment and land application areas need different monitoring actions.

The system manufacturer's documentation will provide guidelines on site-specific monitoring requirements.

6.3.1 Onsite wastewater treatment plants

The frequency and type of monitoring required varies considerably depending on the type of treatment in place. General monitoring principles for onsite wastewater treatment plants include:

- all treatment plants should be maintained in accordance with the manufacturer's recommendations
- all onsite wastewater treatment plants should be fitted with outlet filters, which are maintained (cleaned) at least quarterly
- inspection points and grease traps should be checked quarterly for noxious odour and visual signs of failure, such as unusually high water levels
- sludge and scum levels within the primary settling tank should be maintained at or below 50% of the operational capacity of the treatment tank
- the scum layer should not block the wastewater outflow.

6.3.2 Effluent dispersal or Land application areas

Effluent dispersal or land application areas should be managed above and below ground to ensure they continue to operate effectively. Some monitoring principles for land application areas include:

- vegetate land application areas immediately after installation with suitable plants and observe quarterly to ensure the area is not being compromised by other uses
- protect the vegetation growing, because plants (together with sunlight and wind) play a vital role in supporting the use of wastewater
- isolate land application areas as much as possible from other domestic facilities and activities to protect people and pets from potential contamination from wastewater and to protect the land from disturbance
- check signs erected to inform householders and visitors of the proximity of the land application area quarterly
- avoid installing paving, driveways, patios, fences, building extensions, sheds, children's playgrounds or utility service trenching above or near the land application area.

If you see the signs below, it may indicate failure of a land application area:

- pooling of water (waterlogging) in/around the land application area
- lush green growth down-slope of the land application area
- lush green growth down-slope of the treatment plant
- inspection pits consistently exhibiting high water levels
- presence of dead and dying vegetation around and down-slope of the land application areas
- noxious odour near the treatment plant or the land application area.

6.3.3 How to fix effluent dispersal systems (land application areas)

If an effluent dispersal system fails, investigation is required to determine the cause and potential options for repair. The options for repair could include:

- soil remediation techniques, such as the application of gypsum in clayey soil or application of good quality loamy topsoil with a high level of organic matter
- installing a root barrier to rectify a root infestation problem, which involves digging a 1 m deep narrow trench 1 m to the side of the dispersal area where the trees and shrubs are sending out their roots, and lining it with plastic
- installing cut off drains to intercept stormwater to protect the application area from excess hydraulic load
- replacement of failed dispersal system using the reserve land application area (consideration could be given to alternative dispersal methods)
- investigation of connection to sewer if available (refer also to Section 3.2).

6.3.4 OWMS operation and maintenance during a flooding event

During a flood:

- Do not enter flood waters
- Limit water usage to essentials (to minimise wastewater production)
- Follow system manufacturer's documentation on site-specific operation requirements during a flooding event
- If flooding lasts for longer than 24 hours or the treatment system becomes full (indicators include that the plumbing begins to drain slowly) stop all water use

Following a flood:

- Submerged equipment will require inspection by a licensed plumber and may require maintenance or replacement
- Treatment and storage tanks may need to be emptied
- If restarting a wastewater treatment system after a period of inactivity, refer to the operations manual for guidance
- Avoid compaction of wet soils in the land application area – do not drive or operate equipment in the area
- Plants (vegetation) in land application areas may need to be replaced if flooding has caused die off

6.3.5 Indoor reuse

Installation and testing of backflow prevention devices can be requested by a relevant water corporation under regulations 11 and 12 of the Water (Estimation, Supply and Sewerage) Regulations 2014.

Backflow prevention devices must be tested by a licensed plumbing practitioner (holding a qualification in the specialised class of 'backflow prevention work' as per the Plumbing Regulations 2018) and the results submitted to the relevant water corporation within 20 business days of receiving the notice from the water corporation.

It is recommended that a NATA-accredited laboratory analyses the recycled water for BOD_5, TSS and *E. coli*[26]. If the effluent quality results show the backflow prevention device is not functioning at the required quality standard the device should be serviced to achieve the required standard.

6.4 Service contracts

The EP Regulations include ongoing obligations on a person in management or control of an OWMS, as outlined in Section 2.3.3 of this guideline.

Where a property has an onsite wastewater treatment plant, it is recommended that the property owner has a service contract with an accredited and trained service technician who will routinely service and maintain the treatment unit in accordance with its maintenance requirements.

It is recommended that OWMS used by patients with transplants or on dialysis or chemotherapy are serviced more frequently or pumped out as the drugs are likely to kill the beneficial microbes in the treatment plant.

The service technician should complete a service report detailing:

- the operating condition of the system
- the maintenance that was performed, and the percentage of scum and sludge in the primary settlement tank (as required).

The property owner is required to keep a record of all maintenance activities carried out on a system (including pump out and service records) (see regulation 162 of the EP Regulations). A copy of the maintenance report should be forwarded to the property owner/occupier after each service.

Property owners or occupiers should not service their treatment plant themselves unless they:

- are a registered plumbing practitioner or wastewater engineer

[26] Where the recycled water is used outdoors, Electrical Conductivity (EC) and Sodium Absorption Ratio (SAR) is recommended as well.

- have been trained and certified as competent by the manufacturer or distributor of their specific treatment plant
- have shown written evidence of their qualifications and certification to the council.

6.5 Desludging treatment plants

Over time the sludge and scum layers build up and need to be removed for the primary settling tank to function properly. The level of solids accumulating in the treatment plant cannot be accurately predicted and will depend on the waste load coming in. If a treatment plant is under a maintenance contract, regular assessment (every 1 to 3 years) of the sludge and scum layers should be part of the maintenance agreement.

To ensure a well-functioning treatment tank, it is recommended that the sludge and scum is pumped out with a vacuum suction system when their combined thickness equals 50% of the operational depth of the treatment tank. The frequency of pump-out depends on:

- whether the tank is an adequate size for the daily wastewater flow
- the composition of the household and personal care products
- the amount of organic matter, fat, oil and grease washed down the sinks
- the use of harsh chemicals, such as degreasers
- the use of antibiotics and other drugs, especially dialysis and chemotherapy drugs
- whether any plastic or other non-organic items are flushed into the system.

A well-functioning primary treatment tank (septic tank) typically only needs to be desludged once every 3 to 8 years (depending on the size of the tank). A septic tank connected to a home with a frequently used dishwasher will need to be pumped out more frequently (typically every 3 to 4 years) than a home with no dishwasher connected (typically every 5 to 6 years). A holiday home used irregularly will need to be pumped out less frequently. Large septic tanks (6,000 litres) have been proven to require desludging only once every 10 to 15 years (Bounds, 1994).

After pump-out, primary treatment tanks should not be washed out or disinfected. They should be refilled with water to reduce odours and ensure tank integrity. A small residue of sludge will always remain and will assist in the re-establishment of bacterial action.

Householders should keep a record of their treatment plant pump-outs and notify the council that a pump-out was undertaken where required in response to a written notice from the council requiring maintenance.

7 Acronyms and abbreviations

Acronym/abbreviation	Definition
AS	Australian Standard
AS/NZS	Australian/New Zealand Standard
BOD5	Biological oxygen demand (5-day test)
CFU	Colony-forming units
DEECA	Department of Energy, Environment and Climate Action
EC	Electrical conductivity
E. coli	Escherichia coli
EDRS	Effluent dispersal and recycling systems
EP Act	Environment Protection Act 2017
EPA	Environment Protection Authority Victoria
ETA	Evapotranspiration absorption
GED	General environmental duty
Ksat	Saturated Hydraulic Conductivity of Soil
LCA	Land capability assessment
LPED	Low pressure effluent distribution
MAV	Municipal Association of Victoria
NTU	Nephelometric turbidity units
OMLI	Obligations for Managers of Land or Infrastructure
OWMP	Onsite wastewater management plan
OWMS	Onsite wastewater management systems
PFAS	Per-and polyfluoroalkyl substances
SAR	Sodium adsorption ratio
TDS	Total dissolved solids
TSS	Total suspended solids
UV	Ultraviolet
WELS	Water efficiency labelling standards

8 Glossary

Term*	Definition
Absorption	The process by which a solid material takes in a liquid, for example, the uptake of wastewater into the soil.
Adsorption	The process by which a substance binds other substances onto its surfaces, for example, soil particles bind molecules to their surface.
Aerated wastewater treatment plant	Air bubbled through wastewater in a tank provides oxygen to microorganisms to facilitate aerobic biological digestion of the organic matter in the wastewater.
Aerobic	Organisms and processes that require oxygen (i.e., microbiological digestion and assimilation of organic matter using oxygen).
Anaerobic	Living or occurring without oxygen (i.e., microbiological digestion and assimilation of organic matter in the absence of oxygen).
Blackwater	Wastewater from toilets.
Escherichia coli (*E. coli*)	A species of bacteria in the faecal coliform group found in large numbers in the intestines of animals and humans. Its presence in freshwater indicates recent faecal contamination and is measured in 'colony-forming units' (cfu) per 100 mL of water.
Effluent dispersal system	An engineered system designed to enable controlled distribution of treated effluent into or onto the land for water and nutrient uptake and filtration, sorption and further biological degradation.
Effluent recycling system	A system designed to enable beneficial reuse of appropriately treated effluent from a greywater treatment plant for either indoor or outdoor use.
Emerging contaminants	Emerging contaminants are compounds that are newly introduced into the environment (e.g. pharmaceutical, industrial or agricultural compounds that have only recently been developed) or that, although possibly around for longer times, have only recently been detected in the environment due to advances in detection technologies, or only recently understood to cause harm to the environment or human health (e.g. PFAS). They present a new regulatory challenge, as their prevalence and concentrations, and their potential risks, are not generally well understood.
Evapotranspiration	Transfer of water from the soil to the atmosphere through evaporation and plant transpiration.
Greywater	Wastewater from showers, baths, hand basins, washing machines, laundry troughs and kitchens.
Groundwater*	Groundwater means any water contained in or occurring in a geological structure or formation or an artificial landfill below the surface of land;
Irrigation	The artificial supply of water to land and vegetation.
Land capability assessment	An assessment of the risks of harm to human health and the environment of the proposed or existing OWMS at the site, taking into

* Denotes that the definition is consistent with Environment Protection Regulations Part 1.2 s4

Term*	Definition
	account the proposed or existing use of the system.
Legacy system	Onsite wastewater management systems that were installed before 1996 that do not have a permit, have a permit without adequate maintenance requirements or were approved to discharge domestic wastewater offsite.
Onsite wastewater management system (OWMS)*	An onsite wastewater treatment plant with a design or actual flow rate of sewage not exceeding 5,000 litres on any day and includes all beds, sewers, drains, pipes, fittings, appliances and land used in connection with the treatment plant.
Onsite wastewater treatment plant*	A treatment plant for the bacterial, biological, chemical or physical treatment of sewage generated on site. For example, a septic tank system, a wet or dry composting toilet, aerobic treatment and sand filter.
Reasonably practicable	Put in proportionate controls to mitigate or minimise the risk of harm. Proportionate means the greater the risk of harm, the greater the expectation for you to manage it. Refer also to EPA Publication 1856
Sewage*	Wastewater containing any of human excreta, urine and toilet flush water and includes greywater (which is also called sullage and may include water from the shower, bath, basins, washing machine, laundry trough and kitchen).
State of knowledge	All the information you should reasonably know about risks your business may pose to human health and the environment and steps you should take to eliminate or reduce those risks. This includes information from EPA and other sources. Refer also to State of knowledge guideline
Stormwater	Stormwater is surface run-off from rain and storms that enters our drains. It contains pollutants such as chemicals, leaves and litter.
Wastewater*	Waste principally consisting of water and includes any of the following: • sewage or other human-derived wastewater • wash down water or cooling water • irrigation runoff or contaminated stormwater • contaminated groundwater • water containing any commercial, industrial and trade waste.

9 Useful references

Crites, R and Tchobanoglous G 1998, *Small and Decentralised Wastewater Management Systems*, WCB McGraw-Hill, Boston.

Department of Energy, Environment and Climate Action 2024, Planning permit applications in open special water supply catchment areas.

EPA Publication 168 (2022) Victorian guideline for recycled water irrigation.

EPA Publication 1910 (2021) Victorian guideline for water recycling.

EPA Publication 1911 (2021) Technical information for the Victorian guideline for water recycling.

EPA Publication 1974 (2021) Regulating on-site wastewater management systems (local government toolkit).

EPA Publication 1976 (2021) Guidance for owners and occupiers of land with an OWMS ≤ 5,000 litres on any day (including septic tank systems).

EPA Publication (2024) Guideline for onsite wastewater effluent dispersal and recycling systems

Municipal Association of Victoria, Department of Environment and Primary Industries and EPA Victoria (2014) Victorian Land Capability Assessment Framework.

National Water Quality Management Strategy (2006), Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1).

Government of South Australia, SA Health (2013), On-site Wastewater Systems Code

Standards Australia 2008, AS/NZS 1546.1: *On-site domestic wastewater treatment units – Septic tanks*.

Standards Australia 2008, AS/NZS 1546.2: *On-site domestic wastewater treatment units – Waterless composting toilets*.

Standards Australia 2017, AS/NZS 1546.3: *On-site domestic wastewater treatment units – Secondary treatment systems*.

Standards Australia 2016, AS/NZS 1546.4: *On-site domestic wastewater treatment units – Domestic greywater treatment systems*.

Standards Australia 2012, AS/NZS 1547: *On-site domestic-wastewater management*.

Standards Australia 1994, AS/NZS 1319: *Safety signs for the occupational environment*.

Standards Australia 2003, AS/NZS 3500 [set]: *Plumbing and drainage*.

Standards Australia 2009, AS/NZS 4130: *Polyethylene (PE) pipes for pressure applications*.

WaterNSW 2023, Designing and installing On-site wastewater systems.

Appendix 1: Wastewater permissions

The flowchart below provides a general overview of the type of permit or licence required for the management of wastewater based on the design or actual flow rates of wastewater treated.

Development Licence

A03 (Sewage treatment) development licence or development licence exemption

Development phase	Operational Phase
Design or actual flow rate > 100,000 L/ day Design or actual flow rate between 5,000 to 100,000 L/ day. Waste **not** discharged or deposited solely to land	**Licence** A03 (Sewage treatment) operating licence or operating licence exemption
Design or actual flow rate between 5,000 to 100,000 L/ day. Waste discharged or deposited solely to land	**Permit Possible** A14 (reclaimed wastewater supply or use) or A15 (biosolids supply or use) permit. Licence required if permit is not held

Permit

A20 (on-site wastewater management system) permit or permit exemption

Development phase	Operational Phase
Design or actual flow rate less than 5,000L/day	EP Regulation 33 - Approval of use of an on-site wastewater management system

Appendix 2: Reference guide to the EDRS guideline

The EDRS guideline provides information on the classification, selection, design, installation, maintenance and management of EDRSs as summarised in the table below.

Summary of EDRS guideline

EDRS guideline chapter	Summary of content
Chapter 2: Classification of effluent dispersal and recycling systems.	Specifies what is categorised as an EDRS and clarifies which EDRSs are suited for soil types referenced in AS/NZS 1547:2012 and other land capability risks.
Chapter 3: Selection of effluent dispersal and recycling systems.	Provides risk-based assessment criteria to guide the selection of appropriate EDRSs.
Chapter 4: Design of effluent dispersal and recycling systems.	Provides practical design guidelines on the different EDRS types and what technical design aspects should be considered when determining the final EDRS design.
Chapter 5: Assessment of effluent dispersal and recycling systems.	Specifies a performance and risk-based approach for use by councils or water corporations to assess the suitability and functionality of EDRSs. It also addresses the technical and practical aspects of EDRS assessments for compliance with the requirements under Regulation 28(h) of the EP Regulations.
Chapter 6: Construction of effluent dispersal systems.	Outlines practical guidelines on the construction of EDRSs and guidance about inspections and commissioning.
Chapter 7: Operation and maintenance of effluent dispersal and recycling systems.	Includes a guide for maintaining EDRSs and factors to consider for the maintenance and management of these systems.
Appendix 1	Contains individual effluent dispersal system schematics and drawings.
Appendix 2	Contains supplementary detailed guidance information on EDRS design parameters and considerations that influences on the EDRS system configuration.
Appendix 3	Contains a permit application checklist and an example OWMS assessment checklist that can be used by councils as a tool to prompt, document and record the outcomes of the assessment processes.
Appendix 4	Contains an example system designer statement.
Appendix 5	Contains an example constructor verification statement.

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