WARRNAMBOOL
CITY COUNCIL

Domestic Wastewater Management Plan 2020-2025

Acknowledgment of traditional owners

Council acknowledges the Eastern Marr people as the original custodians of the lands of this general area. Council also acknowledges the descendants of the ancestors of Aboriginal nations within the lands forming the Great South Coast and particularly the elders of the indigenous communities within both Warrnambool and this region.

Disclaimer

This publication may be of assistance to you but Warrnambool City Council and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

CONTENTS

Prepared By:

Landtech Consulting (Peter Austin)
(content and images unless sourced)

Project Team:

Warrnambool City Council
Guy Price (Coordinator EHO)
Julie Glass (Coordinator City Strategy)
Alexis Qiao (GIS)
Administration staff (WCC EH Unit)

External Agencies:

DELWP (Department of Environment, Land, Water & Planning)
Wannon Water
Environment Protection Authority
Southern Rural Water
Department of Health and Human Services
Glenelg Hopkins CMA

Acknowledgements:

Peter Mason Plumbing (audit consultancy)
Residents (as part of DWMP sample audit of systems within setbacks)

Acronyms

AS: Australian Standard

AWTS: Aerated Wastewater Treatment Systems

CA: Certificate of Approval for an onsite wastewater system (EPA Victoria)

Conventional Sewerage: Use of sewers to collect sewage

DELWP: Department of Environment, Land, Water, Planning

Desludging: The removal of sludge and sediment from the wastewater treatment system

Domestic Wastewater: wastewater arising from a domestic dwelling Domestic wastewater can comprise of blackwater (toilet waste) or greywater (sullage waste from bathrooms, laundry and kitchen appliances), or a combination of both

DWM: Domestic Wastewater Management

DWMP: Domestic Wastewater Management Plan

EHO: Environmental Health Officer

EH Unit: Environmental Health Unit (WCC)

Effluent: Liquid flowing out of a treatment process

Effluent reuse: Effluent reuse is a process where treated wastewater is recycled for useful purposes and is not discharged to a natural waterway. The treated water may be used by industry or for watering of golf courses or other recreational facilities, agroforestry, pastures and food crops.

EPA: Environmental Protection Authority

Greywater: Domestic wastewater from sources other than toilets - for example, water from washing machines, dishwashers, showers and basins.

GIS: Geographic Information System

Groundwater: Water that is found below the surface, usually in porous rock or soil or in underground aquifers

Legacy sites: OWS's persisting after sewer has been provided to an area

LCA: Land Capability Assessment - A method used to assess the capability of land to manage on-site wastewater disposal, which recommends whether effluent can be adequately treated and retained on site (process is outlined in detail in EPA publication 746, Code of Practice 891.6).

GHCMA: Glenelg-Hopkins Catchment Management Authority

MAV: Municipal Association of Victoria

Non-potable reuse: The use of treated wastewater for purposes that do not require water of a drinkable standard.

Onsite wastewater treatment system: a treatment system that treats up to 5,000 L/day of wastewater on the allotment where it was generated.

OWS: Onsite Wastewater System.

Percolation: The filtration of liquid through soil

Permeability: The rate at which water moves through a soil profile. Fast permeability rates will not allow for adequate remediation, slow rates may give rise to soil waterlogging

Rhizopod: Containment treatment and effluent system based on reed-bed principles but a sealed unit with aeration and effluent recycling through the system.

Runoff: Water that flows across the land surface and does not soak into the ground.

SEPP: State Environment Protection Policy

Septic tank: Underground tank used for treatment of wastewater through bacterial activity.

Sewage overflow: A release of sewage from a designed relief point to avoid sewage flowing back into houses.

Sewage: the waste and wastewater produced by residential, commercial and industrial sources and discharged into sewers

Sewerage: The entire system of sewage collection, treatment, and disposal.

Sludge: Solid matter that is removed during wastewater or water treatment. It can be processed into a material to be beneficially used (biosolids).

SRW: Southern Rural Water

SS: Suspended Solids

Sullage: domestic wastewater other than that which comes from the toilet.

VCAT: Victorian Civil and Administrative Tribunal

Wastewater: Another name for sewage.

Wannon Water (WW): Potable and sewer reticulation retailer.

WCC: Warrnambool City Council.

WCC LGA: Warrnambool City Council Local Government Area.

Executive Summary

Under *Section 29* of the State Environment Protection Policy (Waters), Councils that manage onsite wastewater systems (OWS's) within its municipality are required to develop a DWMP in consultation with the local water authority and community. Further to this, the policy requires Council to prioritise risks and set out strategies for responding to risks within the DWMP.

Warrnambool City Council has well-established responsibilities for orderly planning and development within the Warrnambool Local Government Area (LGA) and for the protection and promotion of public health and the environment. It has legislated powers and responsibilities in relation to the control of on-site domestic wastewater systems (septic tank systems), where flow is less than 5000 litre/day. Above this threshold, the Victorian EPA is the responsible authority. Reticulated sewerage systems are the responsibility of local water authorities such as Wannon Water.

The Domestic Wastewater Management Plan (DWMP) (2020-2025) has been developed under the requirements of the State Environment Protection Policy (Waters) (SEPP), a subordinate policy to the Environment Protection Act 1970.

The DWMP has been prepared to recognise, respond, and link with current legislation, regulation, and the relevant direction of the State Regulatory Authorities and Council policies and plans. The DWMP identifies key stakeholders and discusses recent drivers and trends relating to domestic wastewater management.

The DWMP describes the current situation relating to domestic wastewater management in the Warrnambool LGA and identifies a range of strategies and related actions Council to implement the Plan.

This DWMP identifies several challenges that impact effective wastewater disposal in the Warrnambool LGA including:

- Population growth and development pressure;
- Ageing population with greater susceptibility to infection and illness;
- High rainfall;
- Challenging soil textures (medium clays and coastal sands); and
- Reduced lot sizes for effective effluent disposal.

The plan identifies a number of threats impacting on community values including:

- Lack of owner knowledge about wastewater systems resulting in insufficient maintenance;
- Lack of Council monitoring of wastewater systems;
- Older settlements with inadequate lot sizes for wastewater treatment resulting in high concentrations of wastewater systems with potential impact to surface and ground waters;
- Non-permit systems where information on system is non-existent; and
- Proximity of wastewater systems to key local watercourses.

Chapter 7 provides township and area plans, which identifies current issues faced by townships with current wastewater prescriptions and requirements. Advice and guidance is provided around upgrade and improvement recommendations for systems within key unsewered townships.

Chapter 8 sets out tools, administrative procedures, and responsibilities required to support implementation of this Plan.

Chapter 9 sets out the key *Strategies* and related actions identified throughout the DWMP, in addition to details regarding action implementation timelines, responsibilities, and the cost to Council of this Plan.

The recommended Strategies (actions) for Council to implement within this DWMP are summarised as follows:

Strategy 1: Address data gaps, audit high-risk sites, and connect legacy sites to sewer

Strategy 2: Increase owner knowledge and maintenance of their onsite wastewater systems

Strategy 3: Develop policies and procedures

Strategy 4: Investigate enhanced Permit Conditions to increase maintenance compliance

Strategy 5 - Source funding for DWMP implementation and/or wastewater management officer

Strategy 6: Performance Review and Risk Management

Strategy 7: Work with Planning Unit and Risk Mapping outputs to enhance unsewered growth development

Strategy 8: Enhance data collection and reporting systems

Strategy 9: Increase engagement with Wannon Water to enhance OWS management across the LGA

1. Introduction

1.1. What is Domestic Wastewater?

Domestic wastewater is wastewater derived from household activities including toilet, bathroom, kitchen, and clothes washing, typically containing high levels of microorganisms, organic matter, and chemicals capable of causing illness and impacting upon the environment. This material would ordinarily be deposited in a sewer.

When failing onsite wastewater systems overflow during heavy rain or as of a result of damage, failure, non-maintenance, and surge loads, wastewater can leak from failed systems into local waterways and the environment.

There are approximately 998 Onsite Wastewater System's (OWS's) in use within the Warrnambool LGA that includes a number of systems which are failing to deliver satisfactory performance and a number of systems without OWS permits.

Figures 1-3 – Examples of failed and surface discharging wastewater systems.

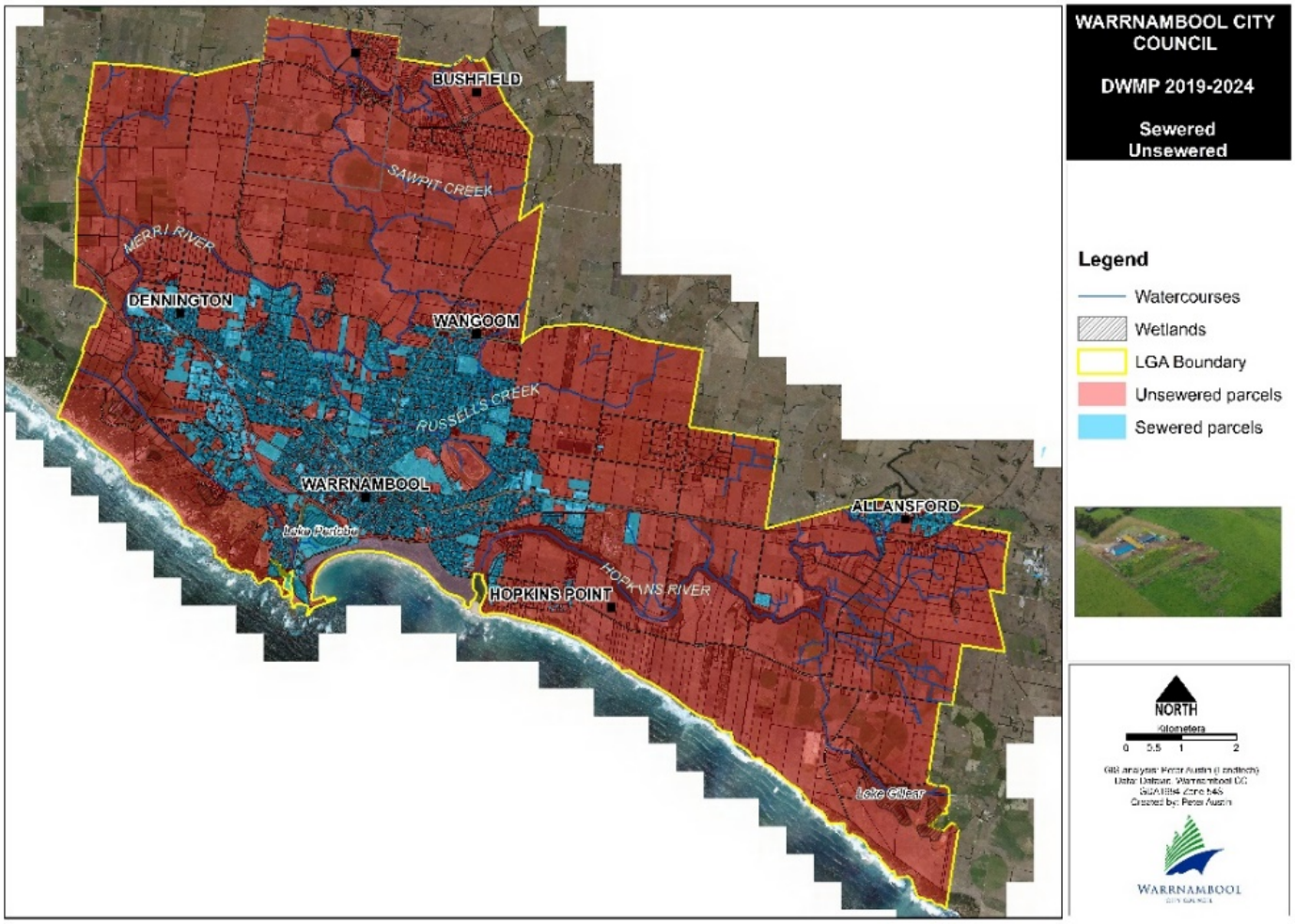


Figure 4 – Sewered and unsewered sections of the LGA with most of Allansford sewered to the east.

The environmental impacts associated with domestic wastewater are due to the many pollutants it contains. Human waste, food and beverage waste, bacteria, viruses, lint, greases, and oils, along with chemicals derived from detergents and other cleaning products, can impact greatly on the environment. These pollutants can build up in the soil, damaging its structure, altering soil pH balances, and hindering plant growth. Failed septic tank systems can result in effluent discharge at ground level resulting in odour, nuisance, attracting vermin, mosquito breeding and the potential for disease transmission.

Warrnambool LGA properties have been serviced by a variety of wastewater management systems since early settlement in the 19th century. The legislative framework regulating domestic wastewater management systems have since changed.

Council is responsible for overseeing domestic wastewater management within its municipal boundary, including the issuing of approvals for the installation of an OWS.

1.2 What is a Domestic (onsite) Wastewater System?

Wastewater for the majority of the population is typically managed in urban sewerage systems, with treatment at a centralised wastewater treatment plant (with disposal via discharge to waterways or land application).

In areas where a centralised sewerage system cannot be provided, wastewater is managed on-site at each individual lot. On-site domestic wastewater is generally managed by a variety of treatment systems (primary/secondary), including but not limited to:

- Septic Tanks (see *Figures 6 & 7*);
- Aerated Wastewater Treatment Systems (AWTS) (see *Figures 8 & 9*);
- Composting Toilet Systems (see *Figures 10 & 11*);

- Sand Filters (with septic tank) (see *Figures 12 & 13*);
- Reedbed (with septic tank) (see *Figures 14 & 15*); and
- Fabric/Biological Filter System (see *Figure 10*).

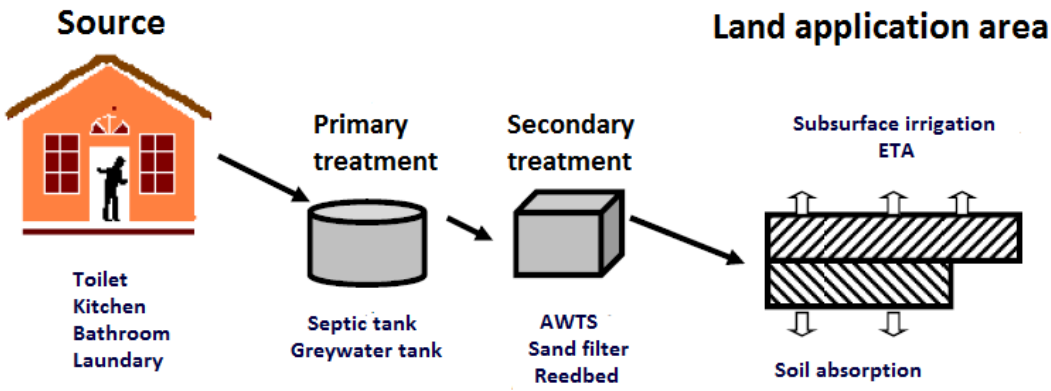
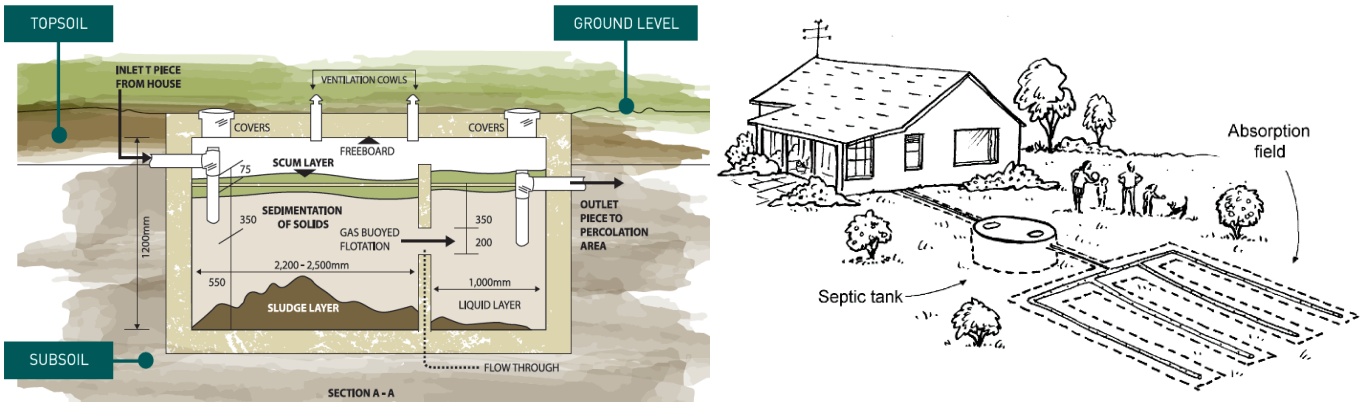
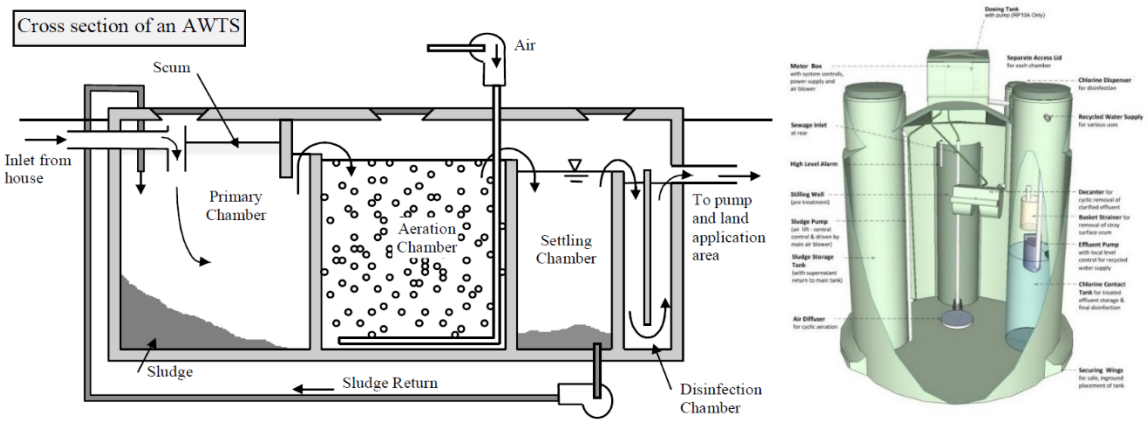


Figure 5 - Primary and Secondary Treatment options (Source: Latrobe University, 2014).

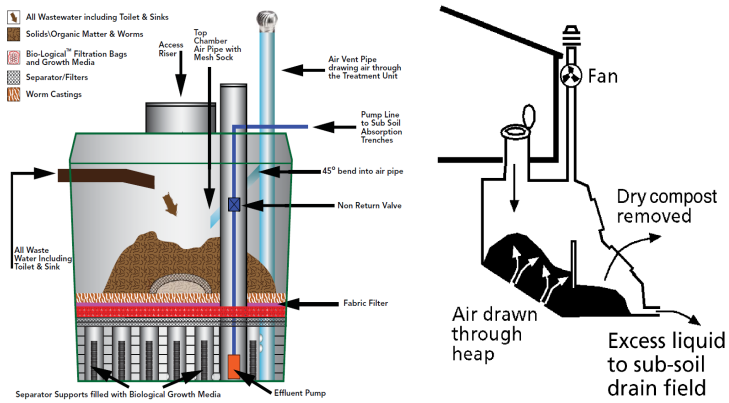
Across the Warrnambool LGA the two most common methods of onsite wastewater treatment are primary treatment using a septic tank (see *Figures 6 & 7*) and secondary treatment using an Aerated Wastewater Treatment System (AWTS), (septic tank and) sand filter, or (septic tank and) reed-bed system. Septic tanks have a three-yearly maintenance cost as opposed to quarterly maintenance for AWTS's (sand filter/reed-bed – annual maintenance).



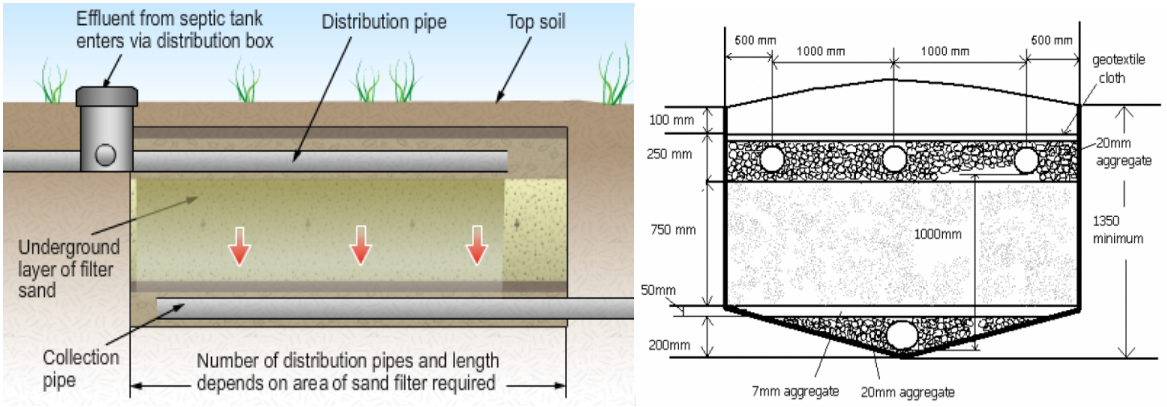
Figures 6 & 7 - Cross-sectional view of a typical septic tank (Source: Latrobe University, EHPA); A typical conventional primary treatment wastewater system (NSW Department of Local Government 2000).



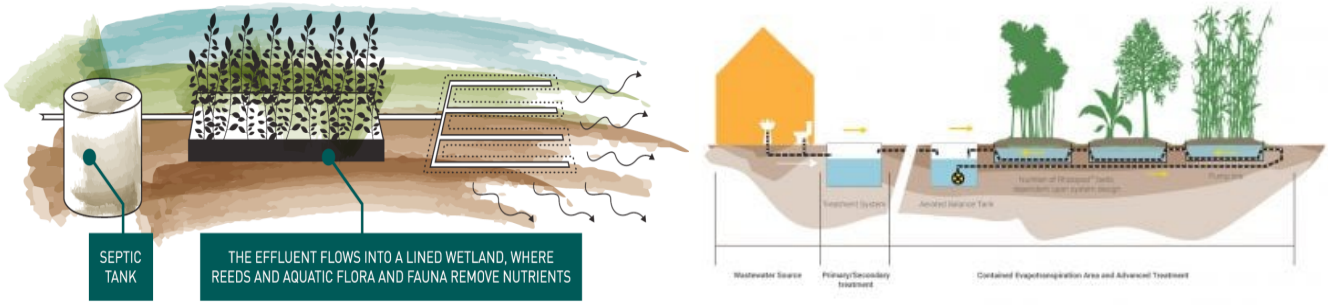
Figures 8 & 9 – Cross-sectional view of an aerated wastewater treatment system (Source: EHPA 2015, OzziKleen 2018).



Figures 10 & 11 – Wet (worm) & Dry composting treatment systems (Source: Worm Smart, Sydney Catchment Authority 2015).



Figures 12 & 13 – Sand Filter System components (Source: Golden Plains Shire Council 2015, EPA 2016).



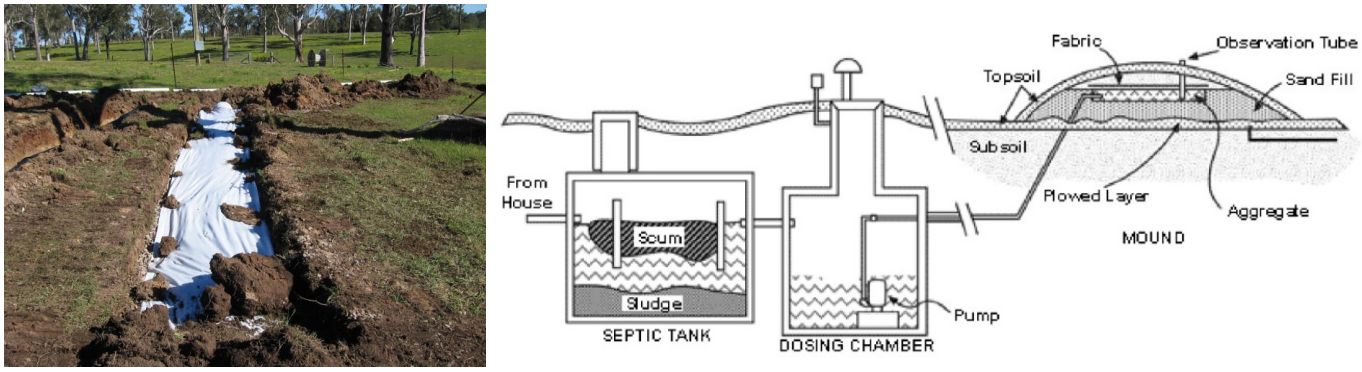
Figures 14 & 15 – Reedbed Systems – secondary treatment of wastewater (Source: EHPA); Rhizopod system supporting upgrade options on small lots where the Rhizopods are added post-septic tank to reduce effluent disposal area required (Source: Arris Wastewater Technologies 2019).

Following treatment, depending on the type of system used, the effluent is then disposed of on-site by absorption trenches, evapotranspiration beds, subsurface irrigation, or through sand mounds within what is known as the Land Application Area (or LAA). Protection of this area is critical to long-term and effective operation of effluent disposal systems.

Effluent disposal methods include:

- Soil Absorption Trenches (see *Figure 19*);
- ETA Beds and Trenches (see *Figures 17 & 18*);
- Subsurface Irrigation (pressurised) (see *Figure 16*);
- Sand Mound (see *Figure 20*);
- Amended Soil Mound (see *Figure 20*);
- Rhizopods (see *Figure 15*).

Figures 16-18: ETA beds can be used with septic tanks to reduce and concentrate affluent disposal area; another useful upgrade option for small lots and aging systems (Source: Hydroscape 2019, William Cromer 2019, Mornington Peninsula Shire Council 2015).



Figures 19 & 20: Latter stages of installation of soil absorption trenches (Source: Civcon 2019); soil mound effluent disposal (SCA 2019).

2. Purpose, Objectives & Management Responsibility

Under *Section 29* of the State Environment Protection Policy (Waters), Councils that manage domestic wastewater treatment systems (OWS's) within its municipality are required to develop a DWMP in consultation with the local water authority and community. Further to this, the policy requires Council to prioritise risks and set out strategies for responding to risks within the DWMP.

The **purpose** of the Warrnambool DWMP is to:

1. *Identify current responsibilities, practices, procedures and obligations for domestic wastewater management*
2. *Identify the public health and environmental risks associated with onsite domestic wastewater management systems;*
3. *Identify strategies to improve wastewater management.*

The **objective** of the Warrnambool DWMP is:

To provide a framework to reduce the public health, environmental, and economic risk to Council and the community posed by domestic wastewater.

The DWMP will provide WCC with:

- a strategic planning tool to allow long term strategies to be developed for wastewater system management;
- a framework for making decisions about individual OWS's;
- a framework for enforcement and compliance options;
- a framework for resource management for wastewater management within the municipality; and
- a framework for liaison between Council, the community, Water Corporations, and Catchment Management Authorities.

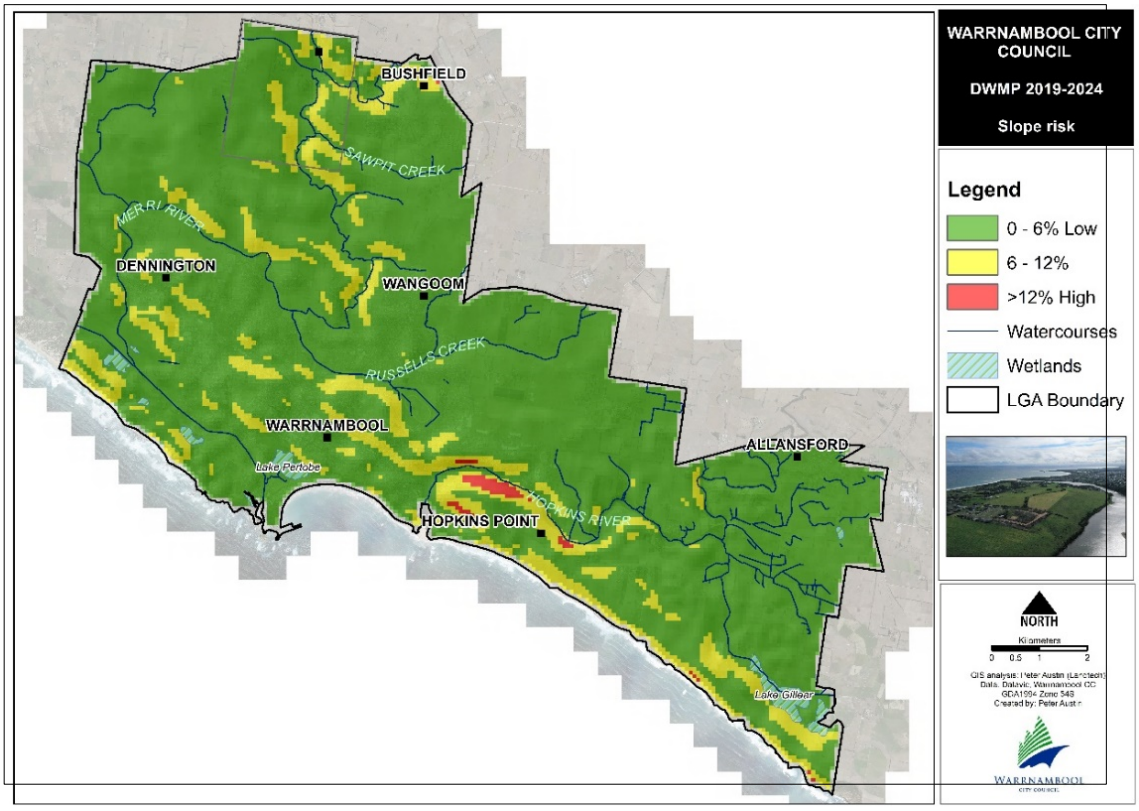


Figure 21 – Slope map modelled from an elevation surface depicting overall reduced high-risk (>12%) slope within the LGA.

2.1 The Management Responsibility of the DWMP

WCC has responsibility for implementation and monitoring of the DWMP. WCC is proposing to work collaboratively with the EPA and Wannon Water as part of this management plan.

It is proposed that the management strategies and action plans in the DWMP be established for a period of 5 years. This is consistent with the requirement in the State Environment Protection Policy (Waters) for a review of a DWMP every 5 years.

3. Domestic Wastewater Management

Figure 22 – Careful coastal planning is required to protect groundwater from rapidly draining coastal sands within the Hopkins Point area.

3.1. What is Domestic Wastewater Management?

Domestic wastewater management is the process by which landowners, occupiers, and local government manage OWS's.

Owners of houses in Victoria that are not connected to reticulated sewerage must, by law, treat and dispose of their domestic wastewater within the boundaries of their property.

3.2. Policy and Legislative framework

This section provides the legislative framework, regulations, definitions, and risks associated with domestic wastewater in Victoria.

All Councils have a legislative responsibility to protect the health of residents, visitors, and those working in the municipality, recognised in the WCC Council Plan.

The Department of Land Environment Water and Planning (DELWP), Wannon Water, as well as the Environment Protection Authority (EPA),[1] play a lead role in the strategic management of domestic wastewater in Victoria.

There is a comprehensive policy and legislative framework around domestic wastewater management which includes several State Acts and subordinate legislation, along with Guidelines, Codes, Australian Standards, and local Policies. These are outlined in *Tables 1-4* below.

[1] Victorian Environment Protection Agency (2016). EPA Code of Practice 891.4; Accessed from: https://www.epa.vic.gov.au/~/media/Publications/891%204.pdf

Table 1 – Key legislative and regulatory standards associated with domestic wastewater management.

Victorian State Legislation	
Environment Protection Act 1970	Describes the regulatory framework for managing OWS's. This is achieved by reference to supporting documents such as the Victorian Land Capability Assessment Framework January 2014 and the EPA Code of Practice for Onsite Wastewater Management (EPA Publication 891.4 July 2016).
Water Act 1989	Section 183 of the Water Act 1989, provides the Water Corporation with the power to inspect and monitor existing septic tank systems within their sewerage district, and if the system does not comply with the Environment Protection Act 1970 and the Public Health & Wellbeing Act 2008, then the Water Corporation can require the owner to connect to sewer where it is available under Section 147 of the Act.
Public Health & Wellbeing Act 2008	The objective of the Public Health and Wellbeing Act 2008 is to impose a duty on Councils to achieve the highest attainable standard of public health and wellbeing by investigating and remedying conditions that are liable to be dangerous to health or offensive, by: • Protecting public health and preventing disease, illness, injury, disability or premature death • Promoting conditions in which persons can be healthy • Reducing inequalities in the state of public health and wellbeing
Local Government Act	The Local Government Act empowers councils to enact local laws and set special charges for council activities. Councils could use these powers to develop local regulations for wastewater management provided these regulations are consistent with State policy and legislation, and to raise revenue for its wastewater management programs.
Planning & Environment Act	The key legislation relating to land development in Victoria is the Planning and Environment Act 1987. The Act requires that all land use and development take place in accordance with the planning scheme for the municipal district. The two objectives of the planning framework under the Act are: • To enable land use development and planning policy to easily integrate with environmental conservation and resource management policies; and • To ensure that the effects on the environment are considered when decisions are made about the use and development of land.
Catchment & Land Protection Act	The Catchment & Land Protection Act 1994 requires Catchment Management Authorities to prepare and implement a Regional Catchment Strategy which includes: • An assessment of long-term requirements and the prioritisation of these requirements; • Identification of threats to environmental, economic, and soil values; and • Identification of opportunities for improving natural resource management processes. The Act also requires property owners to take reasonable steps to protect the catchment with particular regards to water resources, avoid soil disturbance, weed growth and pests.
Building Act	The Building Act 1993 and Building Regulations 2006 require the report and consent of the relevant Council must be obtained to an application for a building permit that requires the installation or alteration of a septic tank system.

Figure 23 - Wannon Water has sewered two new estates within the Hopkins Point precinct providing a future connection framework for the area.

Table 2 – Subordinate legislation, Policies, Codes, Strategies and Guidelines.

Subordinate Legislation, Policies, Codes, Strategies, and Guidelines	
State Environment Protection Policy (SEPP) (Waters) (2004)	SEPP Waters aims to ensure that all residential subdivisions are provided with reticulated sewer access at the time of subdivision. Where this is not possible each lot must be capable of treating and retaining the domestic wastewater within the boundaries of the proposed allotments. The policy directs councils to use the EPA's Septic Tanks Code of Practice, to assess the ability of proposed developments to retain wastewater within allotment boundaries. The State Environment Protection Policy – Waters of Victoria requires; 1. Occupiers of premises with an on-site domestic wastewater system need to manage that system in accordance with permit conditions and the Code of Practice – Septic Tanks On-site Domestic Wastewater Management (2016) as amended. Occupiers also need to regularly assess the performance of their system against permit conditions. 2. Municipal Councils to develop and implement a DWMP.
EPA Code of Practice – Onsite Wastewater Management (891.4) (July 2016)	This Code of Practice (EPA 2016) outlines the measures which are required to sustainably manage household wastewater to minimise public health and environmental impacts. This Code is not limited to domestic wastewater systems; it also applies to systems at other premises including small scale commercial systems. The Code outlines planning requirements, system selection, and system maintenance following installation. The Code will need to be followed for all aspects of the system design, approval, installation and long-term system maintenance.
Victorian Land Capability Assessment Framework (January 2014)	This document outlines the LCA process to be undertaken when assessing a site for its suitability for onsite DWM management. An LCA must be prepared for some sites and submitted to Council with an "Application to Install" or with an application for a Planning Permit.
VCAT Decisions & Precedents	The main role of the Victorian Civil and Administrative Tribunal (VCAT) is to provide **affordable, timely and quality access to justice** for civil matters including wastewater issues. VCAT hears approximately 83,000 cases per year, 60-70% of which are solved during mediation. An additional role of VCAT is to reduce pressure on the courts. It hears small matters that otherwise would create a backlog in the courts.

Table 3 – National Standards relating to domestic wastewater treatment.

National Standards	
AS/NZS 1547: 2012 On-site domestic wastewater management	AS/NZS *1547:2012* provides standardised guidance for the sizing, design, and construction of land application areas. If there is an inconsistency between an Australian Standard (2012) and the Victorian Code of Practice (2016), the Code takes precedence. Where the Code of Practice (2016) is silent on a topic, the relevant Australian Standard (2012) should be followed. The Standard will be used for land application area sizing and in the selection of a suitable land application area type, i.e. trenches, beds, irrigation or mound systems.
JAS-ANZ	Joint Accreditation System of Australia and New Zealand is an accreditation authority and framework, with the purpose to enhance national, trans-Tasman and international trade via accreditation to achieve international recognition for the excellence of Australian and New Zealand goods and services.

Australian Standards have relevance to the construction and design of septic tank systems. The EPA requires that systems meet these standards as part of its approval process. The primary standard with respect to septic tank system design has relevance to the construction and design of systems.

AS/NZS 1547:2012	On-site Domestic Wastewater Management
AS/NZS 1546.1	On-site Domestic Wastewater Treatment Units – Septic Tanks
AS/NZS 1546.2	On-site domestic wastewater treatment units - Waterless composting toilets
AS/NZS 1546.3	On-site Domestic Wastewater Treatment Units – Aerated wastewater treatment systems
AS/NZS 1546.4	On-site domestic wastewater treatment units – Domestic grey water systems
AS/NZS 3500	National Plumbing and Drainage – Domestic Installations

Table 4 – Warrnambool City Council related Strategic Plans and Policies.

Warrnambool City Council Strategic Plans and Policies	
Warrnambool Planning Scheme[2]	The Warrnambool Planning Scheme (WPS), approved under the Planning & Environment Act 1987, sets out the planning policies for the municipality, and contains information about zones, overlays, and other provisions which affect how land could be used and developed in Warrnambool LGA. The WPS identifies triggers for planning permit applications and outlines application requirements and decision guidelines for the use, development, and subdivision of land in different zones. On land where an OWS is required, a planning application may need supporting information such as a Land Capability Assessment (LCA) to show the system can accommodate the development. The WPS identifies the need to undertake a sewerage and effluent management strategy for Bushfield and Woodford, examining options and making recommendations regarding the more effective and cost beneficial way to enable growth to occur without environmental degradation.
Council Plan 2017-2021	Sets out a vision for Warrnambool City Council and specifically *Objective 1.* Sustain and enhance the natural environment; Ensure all septic tanks meet EPA guidelines and requirements;
Warrnambool Health & Wellbeing Plan 2017-2021 (Warrnambool A Healthy City 2017-2021)	The Victorian public health and wellbeing outcomes framework provides a basis for monitoring and reporting progress in our collective efforts to achieve health and wellbeing. Health 2040: advancing health, access and care presents a clear vision for the health and wellbeing of Victorians and for the Victorian healthcare system.
Warrnambool 2040	Goal 14 of Warrnambool 2040 relates to the management of OWS. It suggests 'We will care for and regenerate our waterways, our coast and marine environment and support a natural water cycle. We will carefully use rainwater to contribute to the amenity of the city by bringing water management and green infrastructure together. Water conservation and water sensitive urban design, including improved stormwater systems, will improve our waterway and marine health. We will capture rainwater and reuse stormwater to reduce our reliance on depleting water sources'.
Green Warrnambool 2018[3]	Warrnambool citizens will be environmentally informed, and ethically motivated consumers of goods and services. Goal 2040 includes no wastewater or waterway pollution by 2040.
Warrnambool Floodplain Management Strategy 2018-2023	Appendix 4: Floodplain Management Planning Policy - State Planning Policy Framework (SPPF): *Clause 11.11-6 Environmental Assets:* Protect waterways from the effects of urban and rural land use change and facilitate growth at established settlements where water and wastewater can be managed. *Clause 21.05-2 Water Strategies:* Defer growth within Bushfield and Woodford pending resolution of sewerage and effluent management options; Encourage the re-use of wastewater and stormwater run-off within greenfield growth areas.
Logan's Beach Strategic Framework Plan 2017[4]	As a result of community input (Section 3.1) to this framework many of the respondents were interested in further subdivision of their properties if given the opportunity and suggested:

[2] Warrnambool Planning Scheme, 21.10-3 22/09/2016 C93 Development Infrastructure Water supply, sewerage and drainage, Accessed from: https://planningschemes.dpcd.vic.gov.au/schemes/warrnambool/ordinance/21_mss10_warr.pdf

[3] Warrnambool City Council Green Warrnambool 2018; Accessed from: https://www.warrnambool.vic.gov.au/sites/warrnambool.vic.gov.au/files/documents/council/plans_strategies/Green%20Warrnambool%20FINAL%20adopted%203%20September%202018.pdf

	- Larger lots should be allowed to subdivide; and - Improvements to current sewerage, electricity and gas services. Wannon Water have stated that existing services can be augmented should additional development be supported by Council. In all scenarios, DELWP advises that development within 100 metres of the coastal reserve should be avoided in order to direct stormwater and sewerage management away from the coastline.
Moyne Warrnambool Rural Housing and Settlement Strategy 2010[5]	The section regarding Established Infrastructure and Settlements suggests that the established patterns of larger settlements, with their range of services, which most importantly include reticulated sewer, are an important influence in identifying where growth should be directed. The evidence of inadequate performance of septic services in some locations where the size and density of lots and the attributes of soils do not enable effective absorption is a clear warning regarding the unsustainable development that have characterised the recent past. While it is not necessary that all new housing in rural areas be connected to reticulated services, it is desirable that it occur in areas where conventional residential densities are encouraged (such as Township or Residential 1), and where the soils and existing conditions on land zoned Low Density and Rural Living warrant this level of service. Such are the circumstances of Bushfield and Woodford to nominate some of the more acute circumstances.

3.3. Roles and Responsibilities

This section outlines the roles and responsibilities of the relevant stakeholders in ensuring that OWS's are EPA approved systems that are installed, operated and maintained in accordance with the relevant EPA Code of Practice and Certificate of Approval, to protect the environment from the potential source of pollution and unplanned development.

3.3.1. Property Owners or Occupiers

Property owners or occupiers must ensure the OWS on their property is operated, maintained, and monitored in accordance with the relevant Council permit, Certificate of Approval requirements (CA-EPA), & the Code of Practice Onsite Wastewater Management (currently 891.4; 2016), and site-specific Land Capability Assessment requirements. It is the owner's responsibility to meet the costs of any maintenance and servicing, and to provide reporting as required to the responsible authority.

Landowner's responsibilities include:

- Connect to the mains sewerage system where it is available (where the existing OWS does not meet EPA standards at the time the sewer became available);
- In unsewered areas, obtain a permit to install an OWS before building permit issued;
- Obtain a permit/certificate to use the system once installed;
- Operating, maintaining and monitoring the OWS by following specified maintenance requirements and checks for the system; and
- Keeping Council informed of all maintenance.

3.3.2. Councils Role

Council is responsible for assessing OWS permits and ultimately the installation of systems in accordance with the EPA-approved system list. It is Council's responsibility to ensure that all on-site wastewater systems are:

[4] Warrnambool City Council, Logan's Beach Strategic Framework Plan 2017; Accessed from: https://www.warrnambool.vic.gov.au/sites/warrnambool.vic.gov.au/files/documents/property/planning/Logans%20Beach%20191117%20Report%20V8.pdf
[5] CPG Australia, Moyne Warrnambool Rural Housing and Settlement Strategy 2010; Accessed from: https://www.warrnambool.vic.gov.au/sites/warrnambool.vic.gov.au/files/documents/property/planning/strategies/FINAL%20Rural%20Housing%20and%20Settlement%20Strategy%20Report.pdf

- Operated and maintained in accordance with the State Environment Protection Policies (SEPP's), Code of Practice Onsite Wastewater Management, and the EP Act 1970;
- Providing education and advice regarding OWS's to the community;
- Installed and operated in compliance with Section 173 agreements that may relate to required OWS permit conditions,
- Ensuring that the conditions of any approved permit are met, including monitoring the system to ensure that the OWS's are maintained in accordance with relevant permit conditions, EPA codes, and Australian standards; and
- Collating and submitting information in relation to OWS's to the EPA on an annual basis (as required under the EP Act 1970).

3.3.3. Plumbers Role

Plumbers are required to stay abreast of onsite wastewater industry requirements as they would for urban plumbing activities. Council should provide specific LGA-related prescriptions, education, information on approvals/upgrade processes, and system advice to plumbers on an ongoing basis.

Plumbers are therefore required to stay updated of Code changes via mail-out, workshop, and/or meeting-based approach to information provision based on best-practice wastewater management. OWS's can only be installed by a licensed plumber.

3.3.4. Key Stakeholders

Key stakeholders and referral authorities that have a direct or indirect impact on development and therefore wastewater treatment.

Table 5 – Key stakeholders influencing domestic wastewater management within the LGA.

Internal stakeholders (WCC)	• Building Department • Environmental Health Department • Infrastructure Department • Assets and GIS • Planning Department
Wannon Water	Water and sewerage services within the City are provided by Southern Rural Water (wholesaler) and Wannon Water (retailer). This DWMP covers areas where sewer is not provided to a premise, by any of these water corporations. However, the water corporations have interest in protecting the drinking water catchments impacted by OWS's.
Department of Environment, Water, Land, Planning (DELWP)	The State Government has responsibility for the natural and built environment providing an oversight role in domestic wastewater management and involved in the referrals process when required by Clause 66 of the Warrnambool Planning Scheme.
Department of Health (DoH)	The Department of Health (DoH) is responsible for ensuring that all Victorians have access to services that protect and enhance the community's physical, mental and social well-being. They are responsible for water quality standards including drinking water, irrigation water and reuse. DoH have no direct impact on domestic wastewater management.
Environment Protection Authority	The Environment Protection Authority (EPA) is responsible for ensuring that the environment is protected from adverse impacts resulting from human activities. The EPA produces a list of approved technologies for the treatment of wastewater within allotment boundaries
Glenelg-Hopkins Catchment Management Authority	The Glenelg-Hopkins Catchment Management Authority (GHCMA) is responsible for ensuring on-site treatment facilities do not / will not have adverse impacts on their water supply catchments, in addition to assessing all referred applications from Council in relation to water supply catchments and protection of natural resources.
Southern Rural Water	Rural Water Corporations provide water services comprising non-potable water supply, drainage, and salinity mitigation services for irrigation and domestic and stock purposes. Water Corporations provide potable and non-potable water supply and sewerage services to urban customers within their respective service districts such as Wannon Water. Both Rural and Urban Water Corporations have a responsibility for assessing and responding to all referred applications under *Clause 66* of council planning schemes for Declared Water Supply Catchments as listed in schedule 5 of the Catchment and Land Protection Act 1994

VCAT	VCAT is a tribunal by which civil disputes, administrative decisions and appeals can be heard before Judge or member. It provides a dispute resolution service for both government and individuals within Victoria.
MAV	Has developed a model LCA report and procedures for undertaking LCA to assist land capability assessors and regulators; and has developed this in accordance with EPA Codes and AS/NZS *1547:2012*.
Plumbing Industry Commission (PIC)	Licenses all plumbers, drainers and septic tank installers across Victoria; and regulates the installation of all plumbing works including internal plumbing works on septic tank systems.

Figure 24 – Potential accelerating sea-level rise increases the required compliance and maintenance for these systems.

3.4. Current and Future Drivers

3.4.1. Community Expectations

The level of expectation across the community regarding wastewater management standards has increased. The Warrnambool community has placed a high value on the protection and preservation of the waterways.

This was highlighted in the development of Council's Green Warrnambool Plan where the community supported the goal to eliminate wastewater pollution. This expectation contributes to a reduced tolerance for old and failing septic systems.

3.4.2. New State Environment Protection Policy (SEPP) Waters amendments

The suite of OWS requirements in the new SEPP Waters is more specific than the previous SEPP (Waters of Victoria) requiring Council to undertake a more comprehensive process in developing, adopting, and implementing their DWMP.

The new SEPP (Waters) ensures that Victoria has a contemporary statutory policy for the protection and management of surface water and groundwater in Victoria. This is achieved by establishing in law the uses and environmental values to be protected, defining the level of environmental quality required for their protection, and setting rules and obligations to ensure management actions are taken to protect water quality.[6]

[6] https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/state-environment-protection-policy

SEPP (Waters) updates and replaces two previous SEPPs to provide a single instrument to guide water quality management in Victoria and improve protection of our waterways, bays and coastal waters. It provides environmental quality objectives which better reflect conditions of our water environments and is based on extensive monitoring data, the latest scientific understanding and relevant national standards. It also more clearly identifies rules for decision makers and obligations on industry to guide the protection and management of water quality in Victoria.

By approving the new SEPP (Waters), the Victorian Government is confirming policy positions on a range of issues as well as setting new environmental standards based on contemporary science. This will provide a streamlined transition to the new regulatory framework following the commencement of the Environment Protection Amendment Act 2018 in mid-2020.

3.4.3. Environment Protection Amendment Act 2018

A new general environmental duty, which will require individuals conducting activities posing a risk to human health and the environment, to understand those risks and take reasonable steps to prevent or minimise them.

Included is a new funding model recommended to the EPA and catchment authorities based on a new licencing scheme (as is used in NSW) and introduced under an amended legislative framework. In such a scheme, system owners will be required to demonstrate system compliance or civil and criminal penalties can result.

Funds generated from the licensing scheme would be used for such activities as mandatory inspections and licencing renewal programs. This model reflects what is currently in place to manage licenced activities that deliver food safety and public health compliance programs. Inevitably political will is required to accept this required change, with details not expected until 1 July 2020.

The EH unit and Council must advocate, with support of stakeholders and industry associations, for amendments to the EP Act, supporting improved council management and enforcement of OWS's, including retrospective Permits (non-permit systems) and retrospective Permit conditions, requirements to maintain systems, and connect to sewer requirements.

As a result of such amendments the EH Unit should seek advice from DELWP, EPA, and WCC legal sources regarding the opportunity to retrospectively amend existing permits, issue permits to non-permit systems, or introduce a local law to add conditions requiring regular maintenance and replacement of systems after 30 years (all permits). This should concur with outcomes of the updated EP Act in 2020.

3.4.4. Findings and recommendations of the VAGO Report

Some of the most recent statements by DELWP and EPA regarding domestic wastewater may be found in Appendix A and B of the recently released report: *Managing the Environmental Impacts of Domestic Wastewater (19 September 2018),* and used to inform this Plan (see https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf). The report summary is detailed below:

Effective treatment and management of domestic wastewater generated by kitchens, laundries, and toilets is integral to managing the public health and environmental risks posed by this waste. This done either by treating the waste on site or connecting to sewer if available.

Traditionally, sewering has been the preferred option for managing high-risk townships and properties. However, for remote townships, or those with challenging topography and/or soils, providing sewer may not be the most cost-effective option.

In these situations, water authorities must explore other wastewater treatment options that deliver similar environmental and human health benefits, such as contemporary onsite systems. Councils oversee the installation, use, and management of onsite systems by property owners. They also ensure property owners install an onsite system approved by the Environment Protection Authority Victoria (EPA).

Owners are responsible for regularly servicing and maintaining the system so that their wastewater is treated and contained within the boundaries of their property.

In Victoria, the State Environment Protection Policy (Waters of Victoria) (SEPP WOV) requires Councils to develop a domestic wastewater management plan (DWMP) where they identify that an unsewered township is high risk due to either the number of unsewered properties or the risk posed by properties unable to contain their wastewater on site.

When developing their DWMP's, Councils must assess risks from properties unable to contain their wastewater on site, identify strategies to manage them, and refer high-risk, unsewered townships to water authorities so they can be connected to either a sewer system or an alternative service.

Water authorities are responsible for determining the most cost-effective, fit-for-purpose domestic wastewater treatment option for an unsewered, high-risk township. They must consider community and other stakeholder views, costs, and environmental health benefits in their decisions. In the 2006 (VAGO Vic) audit report 'Protecting our Environment and Community from Failing Septic Tanks', it was found that agencies were not effectively protecting the environment from poorly-performing onsite systems.

Since then policy has evolved, priorities for water authorities and community views have changed, and Councils and water authorities have implemented a range of new initiatives to better understand and manage domestic wastewater risks.

3.4.5. VAGO expectations that Council conducts auditing activities to address wastewater information gaps

The Victorian Auditor General's Report Managing Impacts from Domestic Wastewater[7] *was pointed in its emphasis on the universal need for Council's to audit their existing OWS database/records to identify information gaps.*

Once the gaps in wastewater information have been identified, the auditing process must extend into the field to locate and verify previously unknown system locations and configurations.

Key recommendations (as detailed in Table 6 *below) of the Victorian Attorney General's Department considered in this Plan provide a useful guide on which to base OWS management planning.*

Table 6 – VAGO recommendations relating to DWM in WCC LGA includes:

Recommendation 1	Consult with water authorities, the EPA, DELWP and other key stakeholders in undertaking integrated water cycle management planning processes for their municipalities, so that the management of domestic wastewater risk is not planned in isolation of the management of stormwater, floods, alternative water supplies, and drinking water supplies.
Recommendation 2	Implement a rolling annual program of compliance inspections in high risk properties and townships to bring onsite systems in line with permit and/or policy requirements and follow up non-compliance.
Recommendation 3:	Develop and implement a data management plan to collect accurate information on the number, location and performance of onsite wastewater systems. Data collection should be prioritised using a risk-based approach to identify areas for collection based on highest to lowest risk.
Recommendation 4:	Develop an education plan to inform property owners of their responsibilities and requirements to maintain and upgrade their onsite systems as required, which must include an evaluation framework to assess its effectiveness.

3.4.6. Scientific and Merits-based Decision-making

Making decisions about wastewater system selection, sizing, and siting, needs to be based on intrinsic site conditions, rather than adopting a 'one size fits all approach' to minimum lot size or wastewater land application area requirements.

This DWMP advocates an approach whereby all wastewater systems are designed to match intrinsic environmental conditions. This approach should ensure that future unsewered rural residential development within each study area only

[7] Victorian Government 2018, Victorian Attorney General's Department. Managing Impacts from Domestic Wastewater. Accessed from: https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf

proceeds on land that has an acceptable capacity for on-site wastewater management and effluent assimilation within lot boundaries.

4. PROFILE

WARRNAMBOOL CITY PROFILE

The current Warrnambool City Council (WCC) area was created in September 1994 after Council amalgamations throughout Victoria. The City encompasses a total land area of approximately 120.7 km², located in the south-west coastal and volcanic plain region of Victoria, 257 kilometres west of Melbourne.

Framed by the Moyne Shire to the west, north, and east, and the Southern Ocean to the south, the WCC LGA includes the urban foot-print of Warrnambool City, within rural agricultural landscapes, including small hinterland townships, villages, and rural-residential areas such as Woodford, Bushfield, Allansford, and Dennington.

Rural land is generally fertile and therefore used largely for mixed agriculture including dairy, sheep and cattle grazing, and mixed crop growing. The urban precinct includes a dynamic education, health, food processing, and recreational opportunities within a region attracting families for an improved lifestyle from across Australia.

Figure 25 – Location of Warrnambool City to the south-west of Melbourne (Source: MAV 2019)

Land use zoning shown below illustrates the dominance of Farm Zone areas with variable zoning in the townships and settlements within the LGA.

The WCC has a strong environmental focus and keen desire maintain and enhance the natural values of the City which attract both residents and visitors alike.

Deloitte Access Economics and *Ipsos* has revealed that Warrnambool is considered Australia's most liveable city.[8] WCC is significant in being located in the lower Hopkins and Merri River catchments which converge on urban coastal areas of the City, before entering the Southern Ocean.

Reticulated sewerage is provided to Warrnambool, Allansford and Dennington. The remainder of the City is unsewered including the Wangoom Road area, parts of Allansford, Dennington, Hopkins Pont Road, Bushfield, and Woodford.

[8] Warrnambool City Council 2019; Australia's Most Liveable City, *Deloitte Access Economics* and *Ipsos*. Accessed from: https://warrnambool.vic.gov.au/news/australias-most-liveable-city

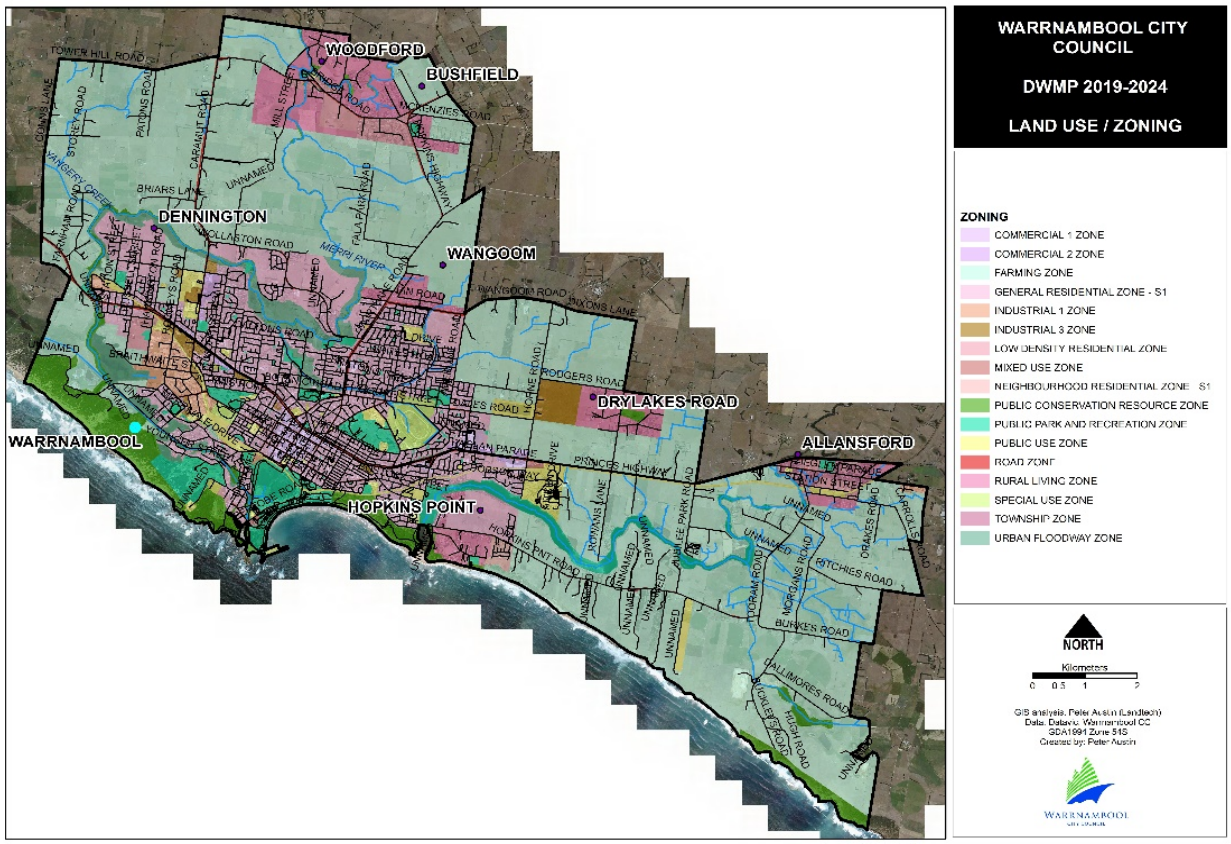


Figure 26 – Land-use zoning through the Warrnambool City LGA.

4.1. Catchments and Waterways

The Warrnambool LGA has two major catchments, including the Merri Catchment (comprising the Merri River) and its tributaries, including Russell's Creek, Yangery Creek, and Saw Pit Creek, and the Hopkins River Catchment (comprising the Hopkins River) (see *Figure 27, below*).

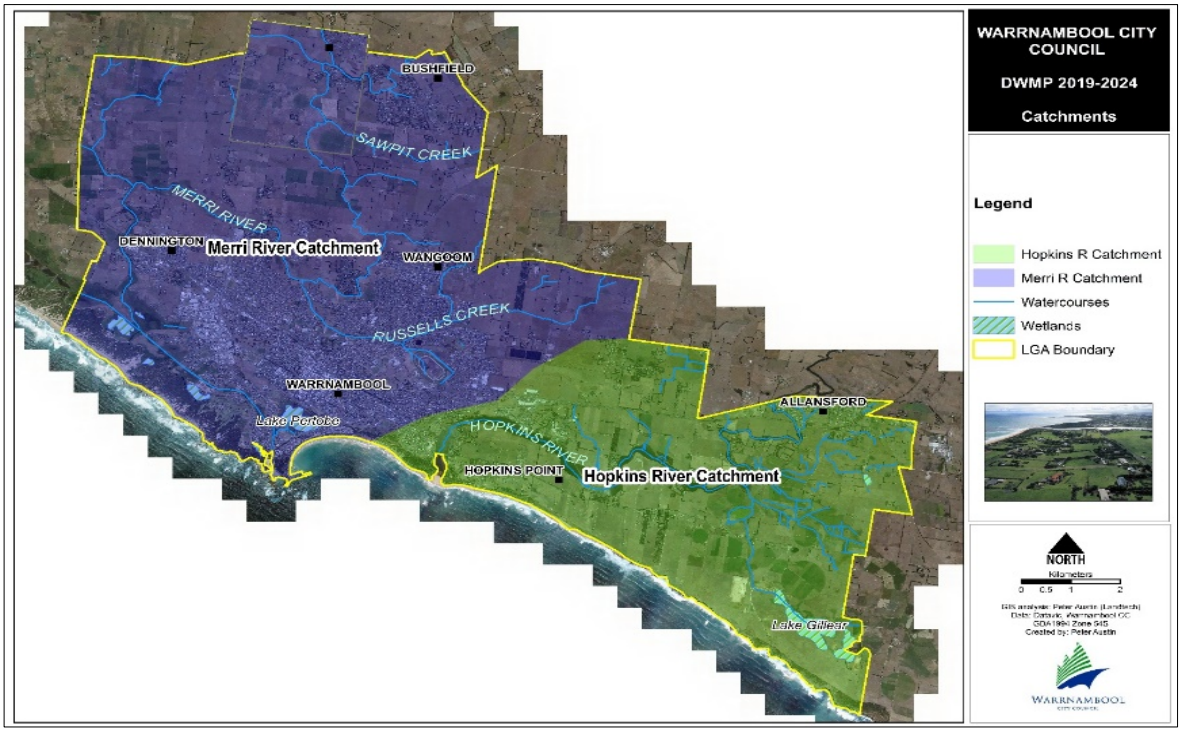


Figure 27 – Map depicting the extent of the two key catchments influencing impacts to the two key river systems.

The two catchments contain areas of great natural beauty and ecological and cultural significance, with unique landscapes and a diversity of aquatic riverine ecosystems. These are highly valued for fishing, boating, camping, swimming, picnicking, conservation, and agricultural water supply.

Stormwater runoff from the municipality discharges into these two major receiving environments. OWS's that are poorly located and/or not performing to a satisfactory standard can contaminate stormwater and harm receiving environments that are highly valued by the community. The map below shows the location of the above two catchments within including the rivers and tributaries within them.

4.2. Population

Children and the elderly are at significantly greater risk from wastewater-related illnesses than the general population. A total of 29% of persons within the Warrnambool LGA will be of vulnerable age (under 4 & over 60 years), and by 2030 (31%) an increase of 2% on 2011 numbers.[9]

Further to this, the wider population of the Warrnambool LGA is expected to rise, placing greater demands for improvements to infrastructure, services, and for increased development and population density. Such demands have implications for wastewater management.

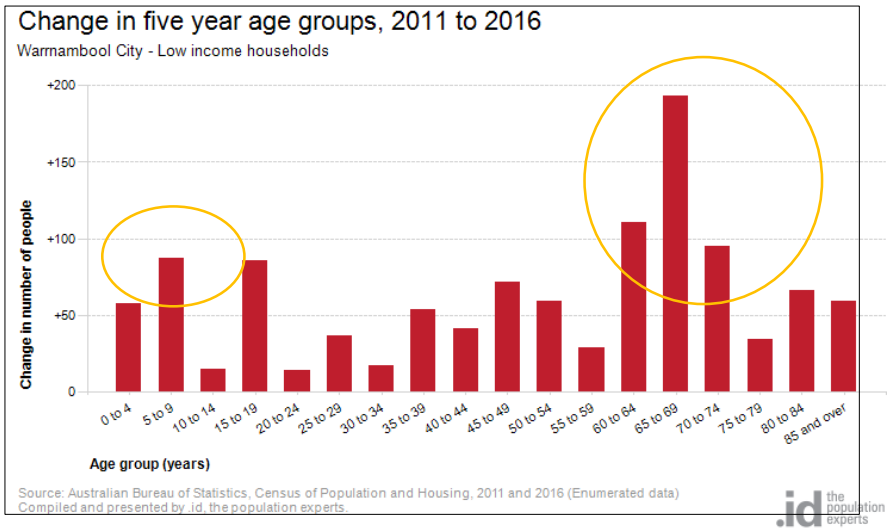


Figure 28 – Vulnerable persons population change 2011 to 2016 within low income groups (Source: .id 2019).

Population growth (1.51% annual growth) is expected to occur in the established urban footprint of Warrnambool City, the townships, and agricultural areas.

Between 2016 and 2026, the age structure forecasts for Warrnambool City indicate a 25.2% increase in population under working age, a 29.1% increase in population of retirement age, and a 12.3% increase in population of working age.

4.3. Household size and types

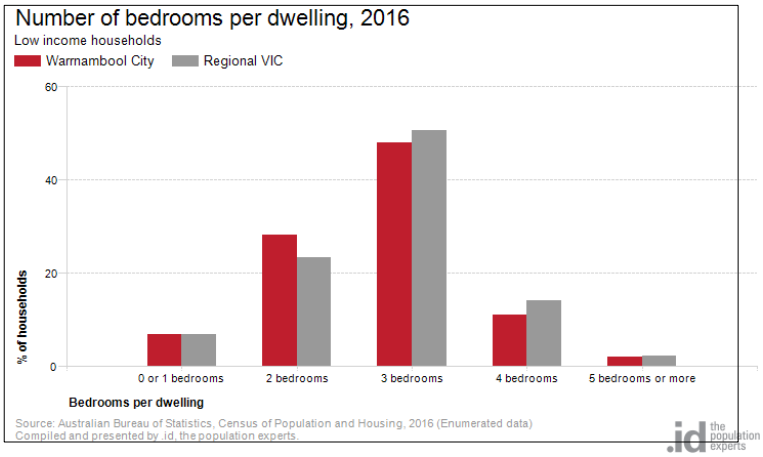
Household size and type can have a significant impact on the amount of wastewater generated. For example, two or more persons showering consecutively, or many washing loads completed within a short timeframe, could impact the OWS.[10]

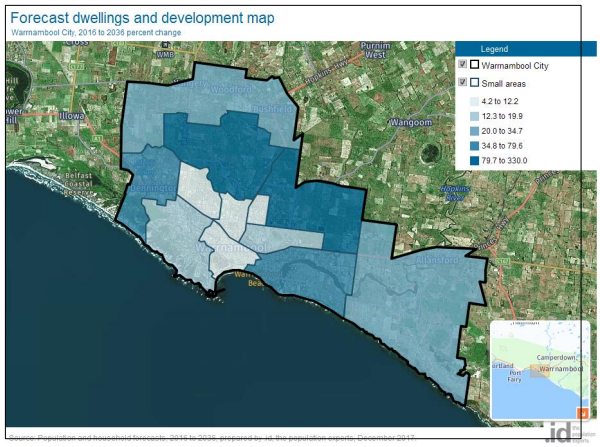
The majority of dwellings in the unsewered townships of Bushfield and Woodford and rural areas adjoining are three or more bedroom dwellings occupied by families. The figures below indicate a dominance of 2 to 4 bedroom dwellings

[9] Australian Government (2019); ABS Quick Stats Census Data Warrnambool City LGA. Accessed from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/UCL212005

[10] .id (2019). Population Statistics data, Forecast map of dwellings and development; Accessed from: https://forecast.id.com.au/warrnambool

placing pressure on unsewered areas with recent five-year development growth increased in areas such as Hopkins Point, Dennington, and southern parts of Bushfield; all unsewered areas.





Figures 29 & 30 – Increased 2-4 bed dwellings, increased development in unsewered areas.

4.4. Climate

Warrnambool has a temperate climate with a warm to hot summers and cold winters. The WCC LGA experiences an average annual rainfall of 743mm (Warrnambool) and an average of 166.7 rain days per year mostly falling during winter-spring months. Annual pan evaporation is taken as 1714.5mm.[11]

Climate, specifically rainfall and evaporation play a significant role in determining the appropriate loading rates of effluent and associated sizing of land application areas for OWS. The city has high seasonal (winter) rainfall when evaporation rates are low, creating adverse conditions for treatment and disposal of wastewater throughout the Warrnambool LGA.

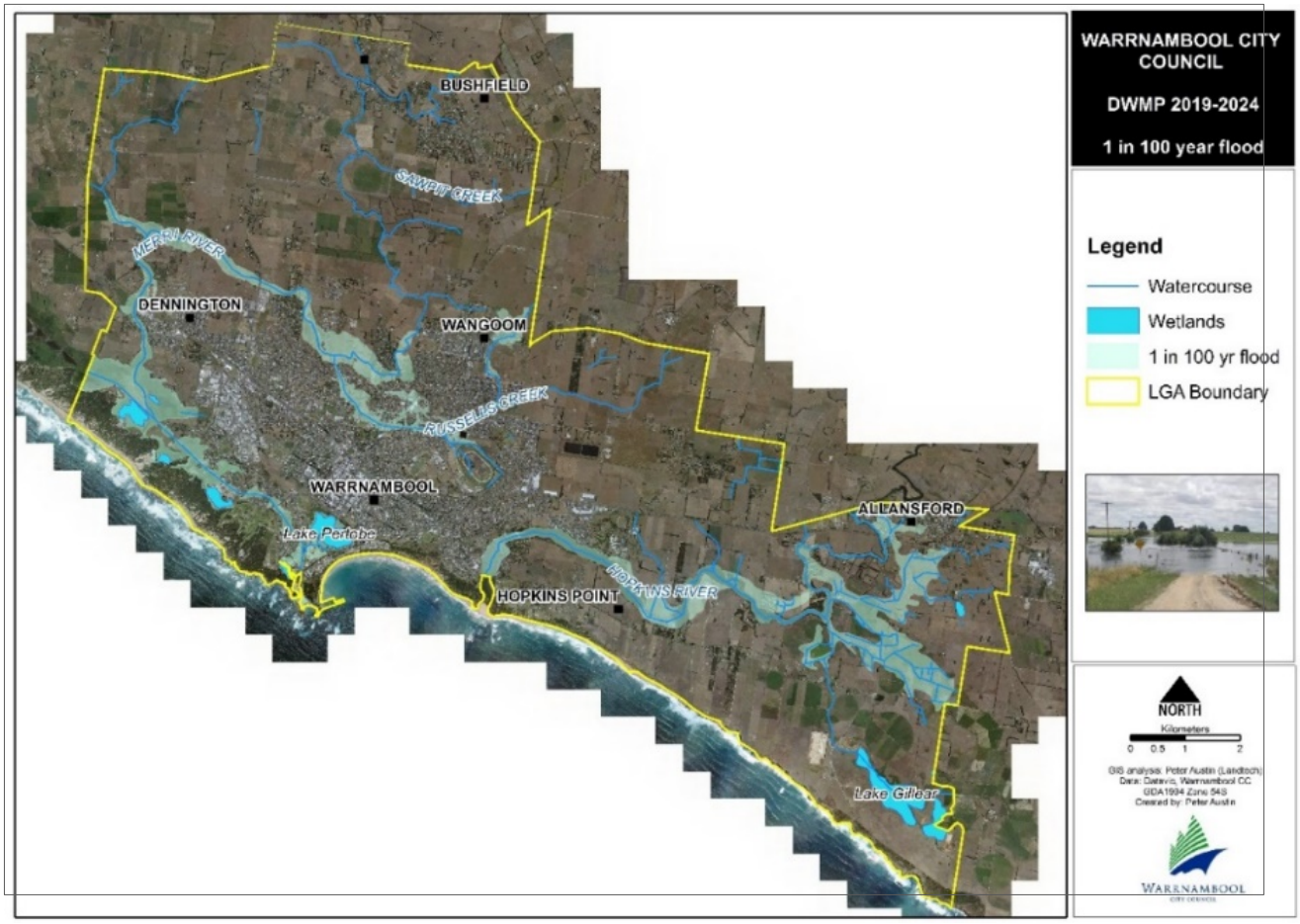


Figure 31 – Although data coverage for 1 in 100-year flood is not complete (no Bushfield, Woodford data), what exists provides a guide to impact of flood inundation.

4.4.1. Climate Change

Increased frequency and intensity of rainfall events[12] will increase pressure on Onsite Wastewater Systems (OWS/septic systems), increasing the risk of surface and groundwater contamination. The DWMP 2020 – 2025 includes steps to address such challenges:

- Supporting new Wannon Water sewerage programs;
- Continued education of residents and businesses on correct wastewater management;
- Development of a compliance and enforcement process to address failing wastewater systems, developed in conjunction with residents and the local wastewater industry;

[11] Bureau of Meteorology (2017); Climate Data (Warrnambool). Accessed from: http://www.bom.gov.au/climate/data/
[12] Mornington Shire Council 2019. Adopted Wastewater Management Plan 2019. Accessed on 9.10.2019 from https://www.mornpen.vic.gov.au/files/assets/public/new-website-documents/about-us/strategies-amp-plans/docs/wastewater-management-plan-2018.pdf

- Planning for the impact of storm events and flooding on septic systems (diversion drainage, education, use of vegetation buffers etc.);
- Increasing the reuse of treated wastewater via sub-surface irrigation to support water resource management in rural areas; and

4.5. Soils

Soils of the WCC LGA have been mapped and described in the *Port Campbell Embayment* (8365) (1:100 000) map (Geological Survey of Victoria) and Geological Survey of Warrnambool Report 86 (Geoscience Victoria 1986) and belong to the Basalt Land Unit.[13] Soil geological origins are based on Quaternary (Pleistocene) (Qvn) Newer Volcanics,[14] consisting of 'undifferentiated lava flows, lava ridges and valley floors'.[15]

The Victorian Western Plains are made up of low-lying undulating plains formed on both volcanic and sedimentary lithologies. The landscapes of this geomorphological unit are formed on some of the youngest rocks of Victoria. Soils on the Western Plains reflect the underlying lithology and age of the rocks. The youngest landscapes, the stony rises, have skeletal uniform or gradational soils, whereas the earlier lava flows have deeper soils varying from friable gradational to strongly texture contrast soils.

The soils developed on the **Pliocene** sand plains are often sandy, sometimes ferruginised or podsolic (sands with **coffee rock** or sand over clay) soils. Further south on the marls and limestones, the soils vary from clay-rich (medium or heavy textured) gradational to strongly texture contrast soils and generally heavy (uniform) clays. Much of the area is a natural grasslands plain, bounded by the **Western Uplands (WU)** to the north.

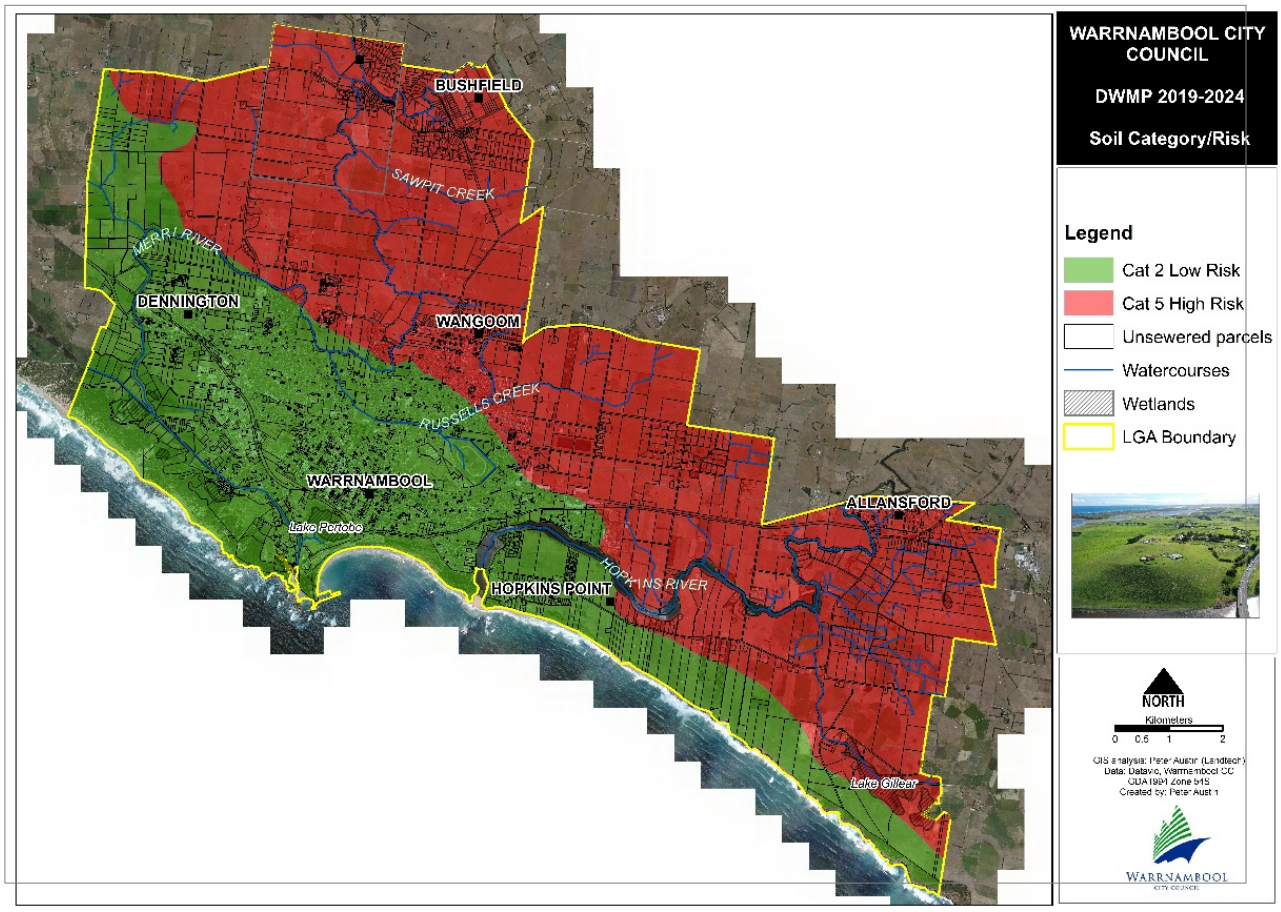


Figure 32 – The LGA includes two broad overarching soil types; Category 2 containing mostly conducive sandy loam soil texture, with Category 5 including light to medium clay-based textures; an increased challenge for effluent disposal year-round.

[13] Victorian Government (2017). Victorian Resources Online; Glenelg-Hopkins Land Units map; Accessed from: http://vro.agriculture.vic.gov.au/dpi/vro/glenregn.nsf/pages/glenelg_soil_map_lhm/$FILE/glenelg-hopkins-landunits-sm.pdf
[14] Edwards, J., Tickell, S.J., Abele, C., Willocks, A.J., Eaton, A.R., Cramer, J.J., King, R.L. & Bourton, S., 1994. Port Campbell Embayment 1:100 000 geological map. Geological Survey of Victoria. Accessed from: http://earthresources.efirst.com.au/product.asp?pID=214&cID=18&c=3449
[15] Edwards, J., Tickell, S.J., Abele, C., Willocks, A.J., Eaton, A.R., Cramer, J.J., King, R.L. & Bourton, S., 1994. Port Campbell Embayment 1:100 000 geological map. Geological Survey of Victoria. Accessed from: http://earthresources.efirst.com.au/product.asp?pID=214&cID=18&c=3449

Associated soil types are predominantly black and brown sodic mottled, heavier textured subsoil horizons, and texture contrast soils such as Brown Sodosols, Black Chromosols, and Sodosols.[16]

Maher and Martin[17] classified soils (which includes the LGA) into soil profile classes suggesting the study area soils consisted of soils with strongly developed hard-setting surface horizons, over mottled clay subsoils that are yellow or yellow-grey. Soils with acid, neutral and alkaline soil reaction trend to occur throughout the region along with indications of intermittent waterlogging.

The A1 (uppermost) horizon typically consists of fine very dark greyish brown to dark brown sandy clay loams, silty clay loams, but more commonly clay loams, 20cm thick, and ranging from 5-30cm.

The A2 horizon similarly consists of sporadically bleached light grey dry, dark brown moist fine sandy clay loams, silty clay loams, but more commonly medium to heavy clays, 20cm thick, and ranging from 10 - 35cm. Moderate to abundant levels of ironstone gravel or buckshot are usually concentrated in the lower portion of this horizon.

4.6. Challenges

The challenge to long-term sustainable wastewater management within the LGA depends on balancing the preference for lifestyle acreage lots on the City's unsewered edge and environmental sustainability and amenity protection.

The following section summarises key OWS issues within each key township within the WCC LGA.

- Ensuring stormwater runoff does not impact on the receiving environments and waterways;
- Increasing population pressure placing greater demands on infrastructure;
- Adaptation of policies and programs to changing demographic groups;
- Small lots, aged, non-permit, and unmaintained systems;
- Challenging soil textures in areas of small unsewered lots.

5. Risk Assessment

5.1. Risks Associated with Domestic Wastewater

The DWMP needs to assess the potential threats from domestic wastewater and the values of the receiving environments within a risk assessment process that has regard for both issues. All wastewater generation and/or discharges are seen to be a threat with potential harm to human health or damage to the receiving environment.

Domestic wastewater is typically high in nutrients and human pathogens.[18] Wastewater poses a public health, environmental, legal, and economic risk. Warrnambool is a city that prides itself on its natural assets as well as living amenity. Poor wastewater management threatens these values and undermines the municipality's ability to attract more residents, businesses, and tourists to the area.

Wastewater risks and threats that need to be considered, their cause, and key impacts are described below.

Table 7 – Potential risks associated with inadequately managed wastewater.

Public Health Drinking and Recreational Water	Drinking water supplies becoming contaminated with chemicals and bacteria from effluent as a result of poorly drained soils; small lot sizes; high usage; ageing septic tanks; and lack of proper maintenance of septic tanks. Illnesses that are contracted from effluent contaminated water include Gastroenteritis, Shigellosis, Giardiasis, Cryptosporidiosis and Hepatitis. Statistically significant risk of illness if people come into contact with contaminated water used for

[16] Victorian Government (2017). Victorian Resources Online; Geomorphology of Victoria - Tier 2. Accessed from: http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/grq_vic_tier2
[17] Maher J & Martin J (1934). Soil and Landforms of South-Western Victoria Part 1: Inventory of Soils and Their Associated Landscapes, Research Branch, State Chemistry Laboratory Department of Agriculture and Rural Affairs, Melbourne.
[18] Victorian Environment Protection Agency (2016). EPA Code of Practice 891.4; Accessed from: https://www.epa.vic.gov.au/~/media/Publications/891%204.pdf

	recreational purposes. Illnesses include ear and eye infections and respiratory infections.
Environmental	Septic tanks contribute high rates of nitrogen and phosphorous to water catchments due to surface runoff. Septic tanks create direct bacterial contamination of the environment stimulating algal and weed growth.
Economic	From an economic perspective, rectifying environmental contamination is costly. Management should be focused on prevention. In the event of contamination of ground and other waters there is the cost of advising residents, the effect on visitors and tourists to the area, managing community anxiety and the indirect costs associated with the perception that the area is unsafe. For the owner/occupier the cost of replacing wastewater systems can be expensive.
Legal	Council has quite clearly established statutory duties under the provisions of the *Environment Protection Act 1970 and Public Health and Wellbeing Act 2008*. Council has a duty to exercise its enforcement powers where it knows there is a breach of the legislation and there is a likelihood of injury.

Table 8 – Key threats and impacts of onsite wastewater management systems.

Threat	Cause	Key Impacts
Failed systems with off-site discharge **LOW**	Damaged effluent disposal drains/trenches Increased loading from extensions to dwellings Design criteria not complied with Faulty installation New works and activities impacting on disposal envelope Age of septic system Septic tank full Poor maintenance	Nutrients Pathogens Odour Visual amenity Oxygen depleting material Local land degradation Pollution of watercourses Pooling of water causing mosquito breeding
Treated off-site effluent discharge **LOW**	Permitted system	Pollution of watercourses Local visual amenity
Untreated off-site greywater discharge **LOW**	Poorly maintained system with sand filter not functioning, sand filter bypassed to stormwater, septic tank full	Nutrients and pathogens Odour Visual amenity Oxygen depleting material
Treated on-site effluent discharge **HIGH**	▪ Permitted system	▪ Pollution of groundwater ▪ Local visual amenity
Ineffective regulation **HIGH**	• Failure to comply with permit conditions • Ineffective database • Non-connection to sewer • Unclear regulatory responsibilities	▪ Liability ▪ Increased incidence of preventable pollution and environmental degradation ▪ Increased risk to public health

6. Assessment of current situation

6.1. Overview of unsewered/sewered issues within the LGA

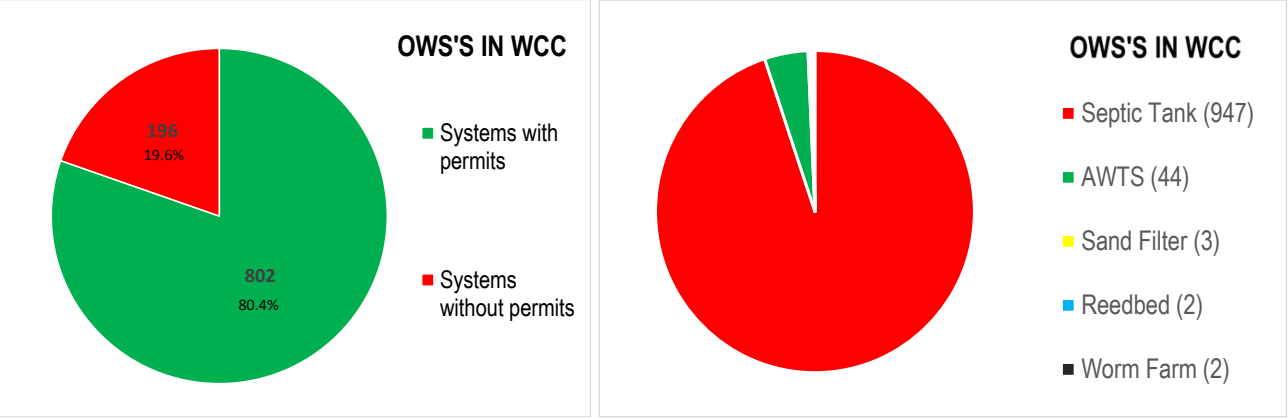
The existing onsite wastewater situation in Warrnambool City Council mirrors that of surrounding rural and coastal-rural City's further afield in Victoria.

Compliance with relevant wastewater management policy and legislative framework is possible with constructive minor modifications to EH Unit OWS management process, while reducing the environmental and public health impacts of OWS's, and meeting compliance with *ISO 30001 Risk Management* standard.

Findings:

- WCC has knowledge of every parcel in the LGA with an OWS, and has 80.4% system knowledge coverage, 40% higher than the Victorian LGA average.

- Currently 998 OWS's exist within Council boundaries. Of these 998 systems, 196 non-permit systems (19.6%) exist in key areas of constraint such as Bushfield, Woodford, Allansford etc., that are typically aged systems (>25-years old) situated on reduced size lot sizes (<2000m²), and within watercourse setbacks (see *Figure 33*).
- A further 802 systems have permits, with a proportion of these influenced by similar constraints listed above, and with a proportion of these systems due for upgrade. This is a significant issue highlighted by Jago (2018)[19] where reduced knowledge of existing system location, age, management, and impacts LGA-wide system performance. With 80.6% of the systems already known, the compilation of high-coverage system data is therefore a key requirement of this DWMP.
- Legacy systems (OWS within sewer area not connected to sewer) within sewered areas such as Allansford, Dennington, and Warrnambool are also a key issue requiring attention due to the potential impact of failing OWS's within the potable water coverage area. Such systems can only remain if they include an existing secondary treatment system where monitoring, management, and reporting are key components of retaining such devices. Unsewered areas within the LGA include western fringes of the city such as Dennington and Yarpturk, Woodford, Bushfield and Wangoom to the north, Allansford to the east, and Hopkins Point to the south. Parts of Dennington and Hopkins Point contain in some cases excessively-draining sand-based soils, whilst all other areas include medium-clay subsoils with reduced subsoil depths. Sewered areas include parts of Allansford and the greater Warrnambool urban area.
- Various OWS types are utilised within the LGA, dominated by septic tanks and soil absorption disposal systems, however recent changes to EPA Codes of Practice have increased the use of secondary treatment systems (see *Figure 34*). Like all other Victorian Council's, maintenance of all system types is severely lacking and must be addressed across Victoria into the future.



Figures 33 & 34 – Status of OWS (permits v non-permits) within the Warrnambool LGA; types of treatment systems used.

6.2. Small lots

The potential for sustainable OWS and determination of suitable OWS system options is dependent on the amount of adequate area available for the OWS. This useable lot area for effluent management broadly refers to available (i.e., not impacted by infrastructure footprints) where the OWS will not be unduly constrained by site and soil characteristics.

The smaller the lot, the more difficult it is to treat and retain wastewater onsite in accordance with current EPA Code of Practice requirements (see below). A properly sized land application area provides long term, sustainable effluent loading rates that match the assimilative capacity of the soil and vegetation systems. Conversely, improperly designed or undersized land application areas are more likely to fail and lead to potential adverse impacts on both human health and the environment.

Using cadastral data, slope and soil characteristics, there are some parcels that will struggle to contain effluent within lot boundaries if systems fail (see *Figure 35* below). These parcels are located concentrated in Bushfield, Woodford, and Allansford, which have a relatively large number of small lots less than 2,000m² and 5,000m². Clay-based soils on small

[19] Victorian Government 2018, Victorian Attorney General's Department. Managing Impacts from Domestic Wastewater. Accessed from: https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf

lots don't have the repeated assimilation capacity especially in winter to support trench-based systems on lots less than 2,000m².

The EPA Code (2016 - Section 2.3.5) suggests; the principles of efficient resource use should also be applied when considering the options for all onsite wastewater management. This is especially the case for homes on small lots of land (<4,000m²) in unsewered areas which, to contain (recycle) all wastewater onsite, must minimise the amount of wastewater generated.

Through the planning process, the feasibility of providing a reticulated sewerage system should be seriously considered for the subdivision/development of small lots. In allotments smaller than 10,000m² (1 hectare), this area should not be seen as a minimum lot size but as a risk threshold, as lots smaller than 10,000m² may be unable to retain all wastewater onsite.

Treating greywater and 'blackwater' separately, and recycling a portion of the greywater effluent indoors for approved household uses, is one way of reducing the volume of wastewater discharged to the land, even though the nutrient and salt loads applied to the dispersal area remain the same. Retrofitting septic tanks if 3200L with sand filter or Rhizopods can reduce land application area footprint and provide enhanced wastewater treatment.

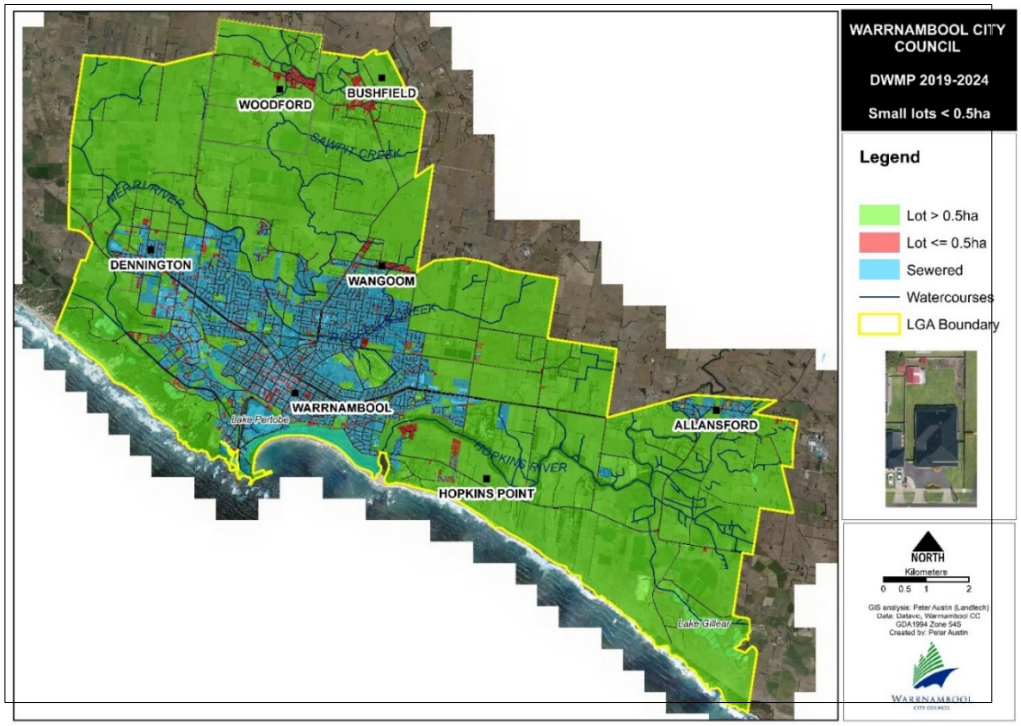


Figure 35 – Image depicts the predominance of small lots through Woodford, Bushfield and older parts of the LGA, increasing required management.

Findings:

Small lots will require special consideration as they generally do not meet the broad design objective of this DWMP. The first priority with restricted sites is to protect public health and deal with hydraulic load. This usually involves the secondary treatment of the wastewater, and in some cases the installation of a compost toilet to reduce the hydraulic load. With upgrades on small blocks it is sometimes necessary to place the LAA (i.e. disposal area) inside buffers. In such cases it is usual practice that if the buffers cannot be met, secondary treatment is required and depending on site constraints, disinfection may be required.

6.3. Aged systems

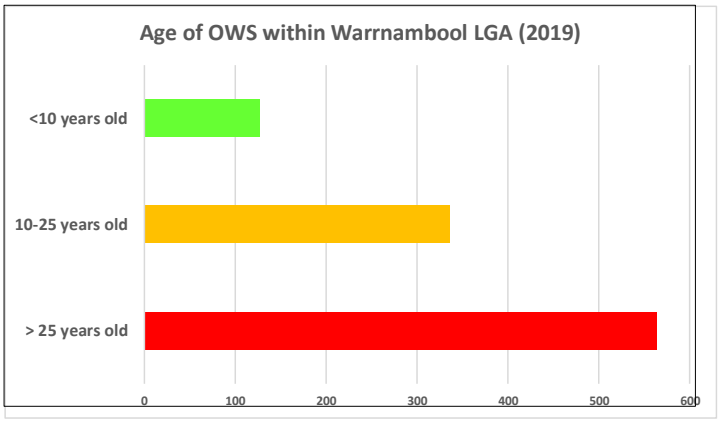


Figure 36 – Existing permits vs non-permits (pre-1995) and age of the current WCC wastewater systems.

With a suggested typical lifespan of 25-30 years, most OWS's in the WCC LGA are aged, reflected by the number of non-permits (pre-1995), and based on WCC database data collection periods (see *Figures 36-37*).

With age comes system failure due to few or many integrating factors such as lack of maintenance, system abuse, effluent disposal area compaction, lack of septic tank pump-out or AWTS maintenance. This has significant potential, via intense rainfall events and background failure, to impact surface water quality and reduce public health outcomes.

Findings:

- Some home owners are unaware of maintenance requirements and thus performance. System performance is the key indicator of OWS health and functionality that typically reduces as systems age.
- Areas such as Allansford, Bushfield, Woodford, and north Wangoom contain elevated dwelling numbers with aged OWS's requiring future upgrade, and subsequent increased direction and regulation by Council.
- These dwellings are on reduced-sized lots, have a non-baffled septic tank, and an undersized and non-functioning trench system. Such situations can be managed however may require costly system replacement and/or modification.

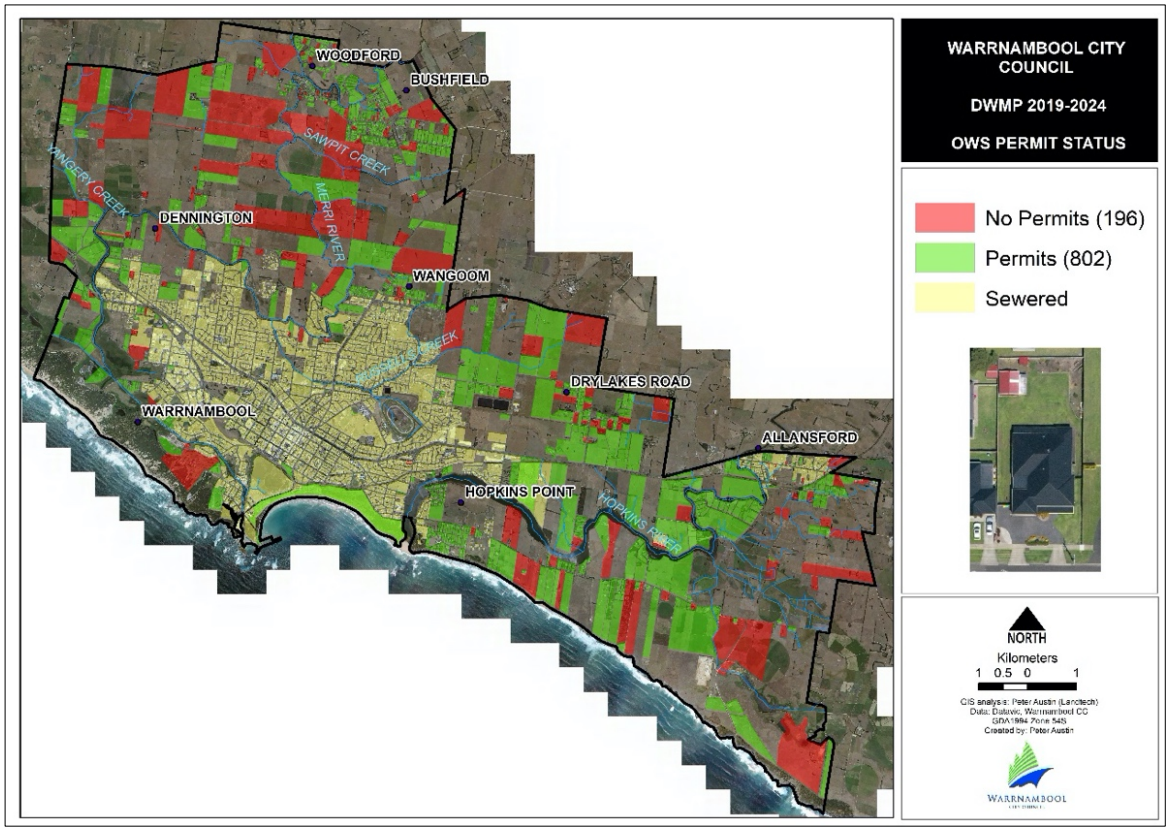


Figure 37 – Map depicts parcel-based permit vs no permit which shows permits are lacking in aged and unsewered parts of the LGA.

6.4. Upgrade challenges

With potentially 50% of OWS's in the LGA requiring upgrade (see *Figure 36*), it is clear a transparent and evidenced-based approach to such a challenge is used. Increased system maintenance requires continued behaviour change via targeted education, increased engagement and enforcement, with the promotion of both cost-effective and useful owner information required.

Potential upgrade requirements have been analysed at desktop level reflected by approximate (indicative) systems without permits (pre-1995 and >25 years old) in each area, such as shown in figure 38.

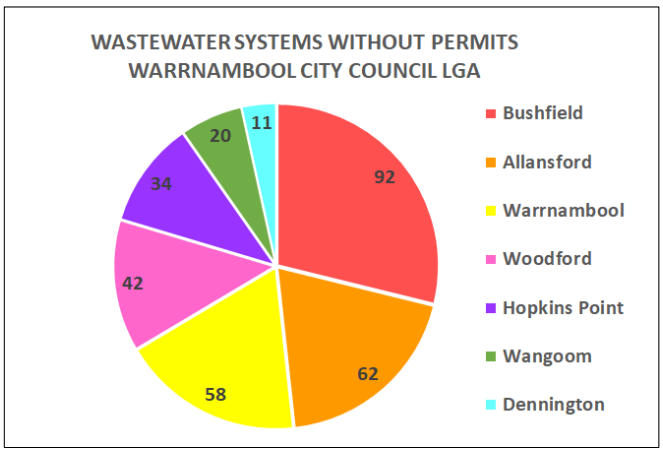


Figure 38 – Graph and table depicts the current number of non-permit systems within various unsewered areas.

Findings:

- Council must provide clear and effective wastewater regulation that is pragmatic to not only the needs of the community, but also to environment and public health protection.

- Systems requiring upgrade should be inspected by Council EHO's who should assess each site based on site context, hydraulic load, owner's future extension plans, and socio-economic limitations. Abrupt upgrade of systems (system failure/surface discharge/nuisance) requires immediate attention from the EH Unit, owner/occupier, and plumber, typically via a site meeting.
- Upgrades on small lots (<2000m²) should be prioritised, in addition to targeted education material and advice.
- Lots 2000m² to 5000m² should then be next inspected, with owners encouraged to view the real importance of their OWS to their hip pocket when systems are not maintained.
- Bushfield, Allansford, Warrnambool, and Woodford will require increased attention from the EH Unit based on the potential upgrade requirements ahead of it. Council should implement equitable development approvals and upgrade guidelines, to work with existing owners in achieving effective public and environmental health outcomes. This DWMP details an upgrade process, which will provide a clear and transparent upgrade assessment process. In some instances, system pump-out and trench renovation may be enough to extend the life and compliance of a particular OWS.
- Other systems will require more extensive modification works which may include for example on small lot's; septic tank (with baffle) retained and pumped-out, with pump-well and Rhizopod system installed on reduced foot-print (and with treatment to secondary quality 20:30:10 and higher). These systems are said to produce no effluent output and may be a cost-effective system renovation option for the large number of small lot/upgrades required throughout unsewered Victoria.

6.5. Operational performance unknown

Based on the information regarding extent of aged systems and upgrade requirements, it could be suggested that operational performance is currently unknown within the LGA. The commencement of an Operational Risk (OR) rating program for each system (via inspection) is required, to manage collective OWS performance, a key part of this Plan.

Findings:

- Septic tank pump-out compliance within most Victorian LGA's is generally low influencing system operational performance and therefore system and risk management failure. Enforcement of permit conditions is a challenging regulatory environment for Council, requiring simple and flexible enforcement tools.
- Septic pump-out can be increased through targeted education as owners realise the cost-impost of replacement of trench areas after the system has passed solids to the effluent field. This clogs the field requiring expensive and inconvenient repair works.

Figures 39-42 – Systems within watercourse setbacks evidenced during DWMP audit; all locatable, managed, and maintained therefore reducing operational risk.

- AWTS's also require quarterly maintenance which is completed by approximately 1 in 7 AWTS owners throughout Victoria. Cost impediments and lack of local plumbers willing to service systems further reduces system maintenance and collective LGA-wide system performance. Increased post-treatment sampling (testing) is required and must include output performance of systems based on TSS/BOD/E.coli parameters.
- Owners of AWTS's, including commercial-sized businesses, are required to submit annual wastewater samples for analysis and reporting to Council. This occurs in a third of cases and where cost-restrictive quarterly service impediments strain socioeconomic groups across the LGA. Innovative options such as RTO-based owner service training may be a solution to low service of AWTS's within the LGA and across Victoria.

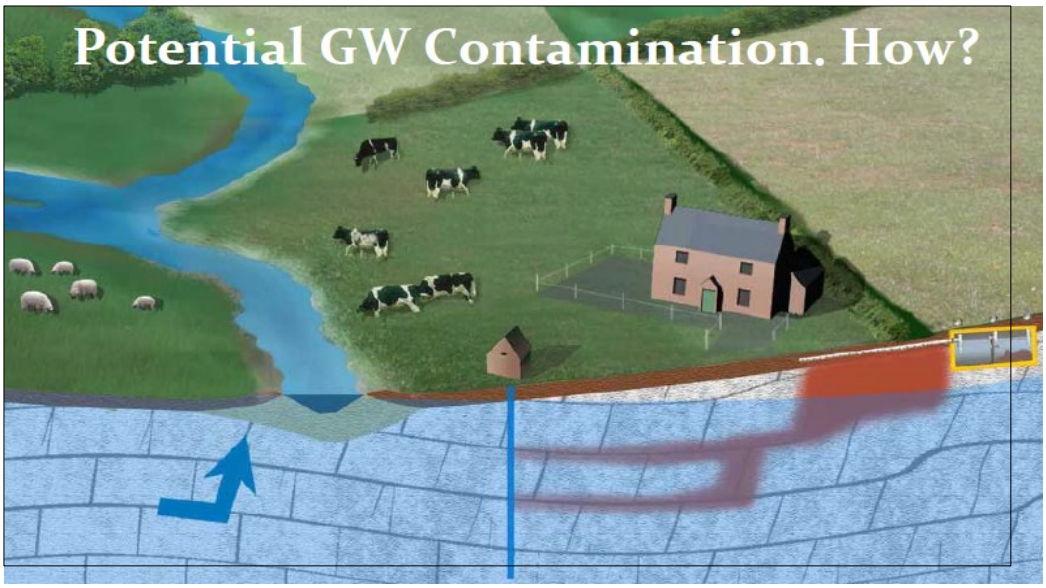


Figure 43 - Potential groundwater contamination pathways for onsite wastewater effluent (Source: Latrobe University 2014).

6.6. Cumulative impacts

"The impact of OWS on the local environment is increased by the concentration of wastewater disposed to land. The number of houses per square hectare becomes an important consideration when assessing the current conditions within a particular township area. Current research[20] [21] [22] suggests a threshold of 40-50 OWS's per square kilometre and above begins to impact groundwater due to concentration of septic tanks.

Findings:

- Areas such as Woodfield and Bushfield are already at this threshold point (see Figure 53), requiring conservative wastewater planning into the future. Section 1.6 of the current EPA Code of Practice suggests: To minimise the cumulative impact of wastewater, effluent must be contained onsite within the boundaries of the allotment. This aims to prevent the transport of nutrients, pathogens and other pollutants to surface waters and to prevent any negative impacts on 'groundwater beneficial uses' within the catchment (Clause 32, SEPP Waters of Victoria 2003).
- OWS are not recommended for high density allotments. *Figure 44* shows the septic density throughout the Warrnambool LGA, showing significant potential impacts in the townships of Woodford and Bushfield and the Wangoom Road and Hopkins Point areas.
- Assessment of allotment density (used instead of dwelling density for future planning purposes) is a significant consideration during township land capability assessment.
- Assess existing block density in unsewered areas and investigate options to reduce density to sustainable levels.
- Develop clear policy guidelines for future developments in unsewered areas and for unsewered allotments.
- Review Planning Scheme and other relevant Council policies to identify opportunities for improvements to wastewater management clauses and/or policies.
- Continue to investigate and upgrade appropriate design standards for high risk areas so as to inform any future improvement plans.

[20] Whitehead JH, Geary PM (2000) Geotechnical aspects of domestic on-site effluent management systems. Australian Journal of Earth Sciences 47, 75-82.
[21] Edis R (2013). Approaches For Risk Analysis Of Development With On-Site Wastewater Disposal In Open Potable Water Catchments, Prepared for Mansfield Shire Council.
[22] Urban Groundwater Pollution: IAH International Contributions to Hydrogeology 24, edited by David Lerner.

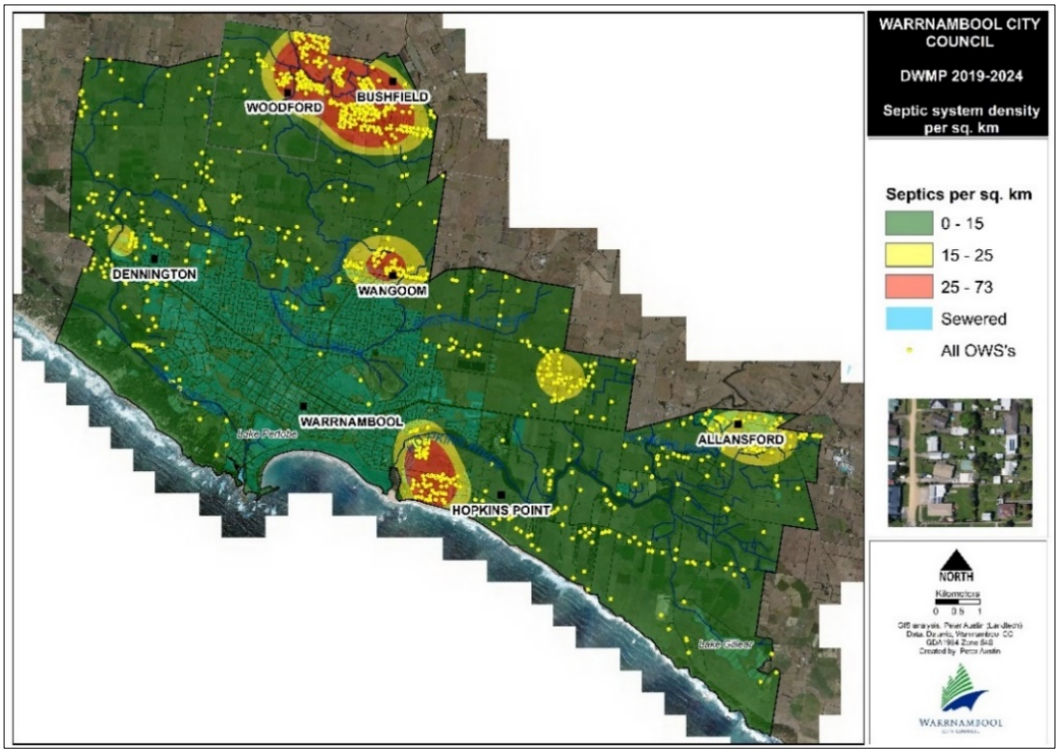


Figure 44 – Septic density throughout the LGA includes significant potential impact in Woodford, Bushfield, and Hopkins Point areas.

The West Australian Water Authority has set a limit of 25 septic tank and trench systems per square kilometre where there are significant potable water supplies from groundwater.[1]Other references suggest a density of 15 septics/ km² which has often been 'rule of thumb' and commonly used with the caveat being implications of soil type, system maintenance, and the age of septic tank systems. This is similar to a *US Environment Protection Authority* recommendation that more than 15 septic tank and trench systems per square kilometre have the potential to contaminate groundwater. Studies of on-site system density and surface and groundwater quality in five sensitive coastal catchments in New South Wales and Tasmania demonstrate some direct linkages between on-site system performance, system density and receiving water quality.

6.7. Awareness of alternative systems

Wastewater management policy and legislative framework continues to evolve, requiring plumbers to stay up-to date. This is easier said than done. Council understands that time off-site for plumbers means lost revenue.

Local plumbers require transparent onsite wastewater installation options which will contribute to OWS best-practice and environmental benefit.

6.8. Agency support for connect to sewer

More support is always needed from water authorities such as Wannon Water with connect to sewer provisions, monitoring of 'legacy' systems, and supporting small township schemes for additional unsewered areas of Allansford, and new planning for Bushfield, and Woodford.

6.9. Systems inside watercourse setbacks

Within the WCC LGA there are significant numbers of dwellings and their OWS's situated within either of the critical 30m and 60m watercourse/wetland setbacks, and the 1 in 20-year flood setback. The main areas containing systems within setbacks includes Woodford, Dennington, Bushfield, Hopkins Point, and Allansford. Detecting and auditing all non-permit systems within setbacks must be a first priority of this plan.

Figure 45- High-risk effluent disposal adjoining (within 30m setback) the Merri River. Excessive weed growth within adjoining parts of the river provide a clue to this system's sustainability and reason to connect to sewer.

Findings:

- Whilst this is not an optimal outcome, it was evident from targeted recent audit that system owners (within such areas) were aware of setback risk and with direction from previous Council EHO's had well-located, designed, and maintained systems.
- Inside setbacks typically require a higher level of treatment, with disinfection and effluent disposal fields located above or outside setbacks.
- Pumping to such fields (as evidenced in Woodford, Bushfield, and Dennington) is not optimum, but due to past planning intricacies must be EH-Unit audited if use.

7. Township Wastewater Challenges and Solutions

7.1. Woodford

Woodford is a key unsewered township 5 km to the north of Warrnambool and includes rural and residential-type lifestyle lots including varied age dwellings, and therefore varied-age onsite wastewater systems.

Riverine and floodplain landscapes dominate this area especially proximal to the village precinct (primary school) with flood and setback constraints, in addition to sloping sites proximal to the Merri River and tributaries.

The Woodford precinct is dominated by ex-volcanic and highly weathered clay-based light to medium soil textures, forming part of constraints that include slope, lot/parcel size, and setback constraints.

A number of properties from 2019 audit exist within the 60m and 30m watercourse (Merri River) setback and pump effluent away from watercourses. This is not an optimum management option however with monitoring can be effectively managed.

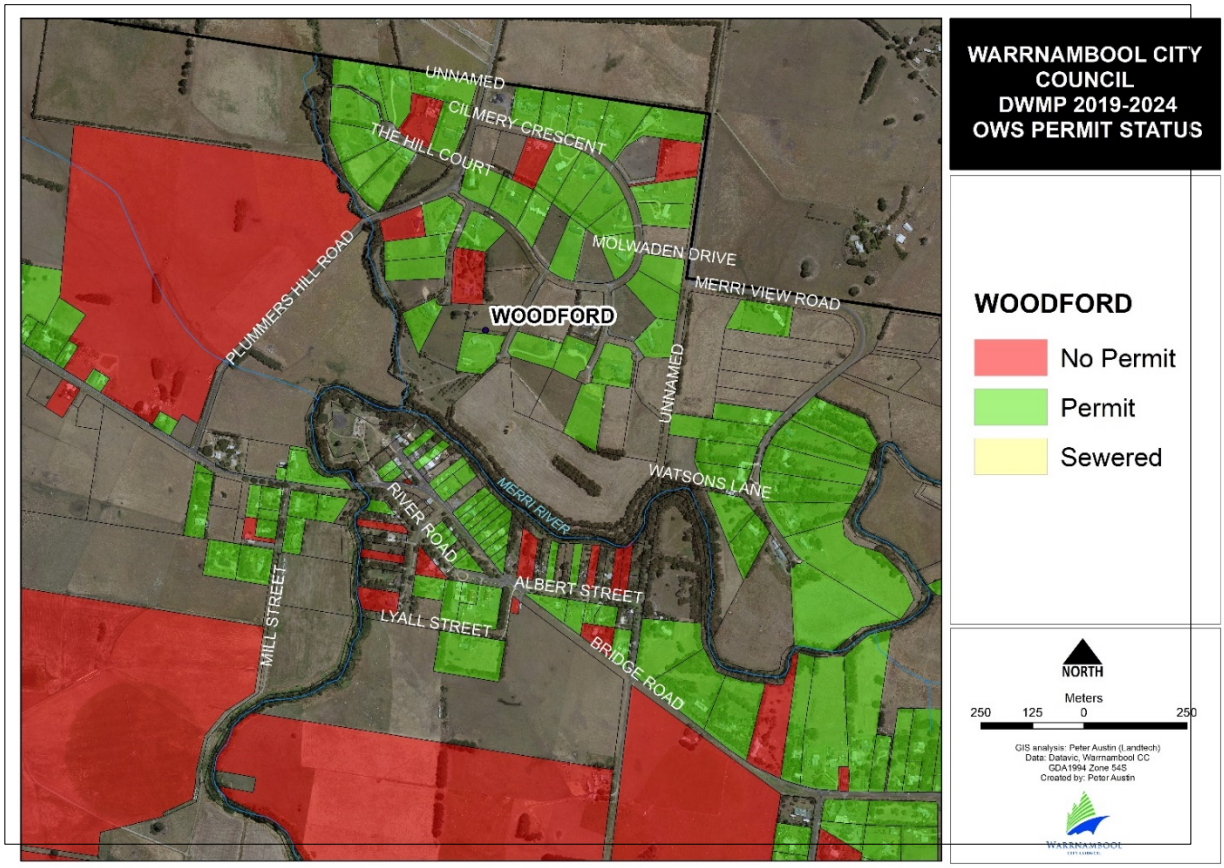


Figure 46 – As can be clearly seen, the Woodford/Bushfield study areas have an issue with many unknown system status and performance via not having an existing OWS permit.

Figure 47 – Watercourse setback is a feature of this part of Woodford, looking toward the Woodford Primary School.

Parcels exist within watercourse setbacks, some on small lots (<0.5ha), with a number of lots inside the 1 in 20-year flood inundation coverage (contravening the EPA Code).

Historic small lot titles contribute to highly constrained lots within the floodplain section proximal to the Woodford Primary School and Jubilee Park.

Many of these lots have no OWS permit, with aged septic tank-based primary systems now requiring upgrade.

The same lots are within Merri River watercourse setbacks and 1 in 20-year flood inundation levels. Such areas require close scrutiny until entire upgrade of the area is completed. Risk mapping outcomes within this area reflects the varied constraints influencing such sites (see *Figure 46)*.

Risk-based wastewater performance monitoring is therefore suggested for the Woodford area reflecting its overall higher risk-rating.

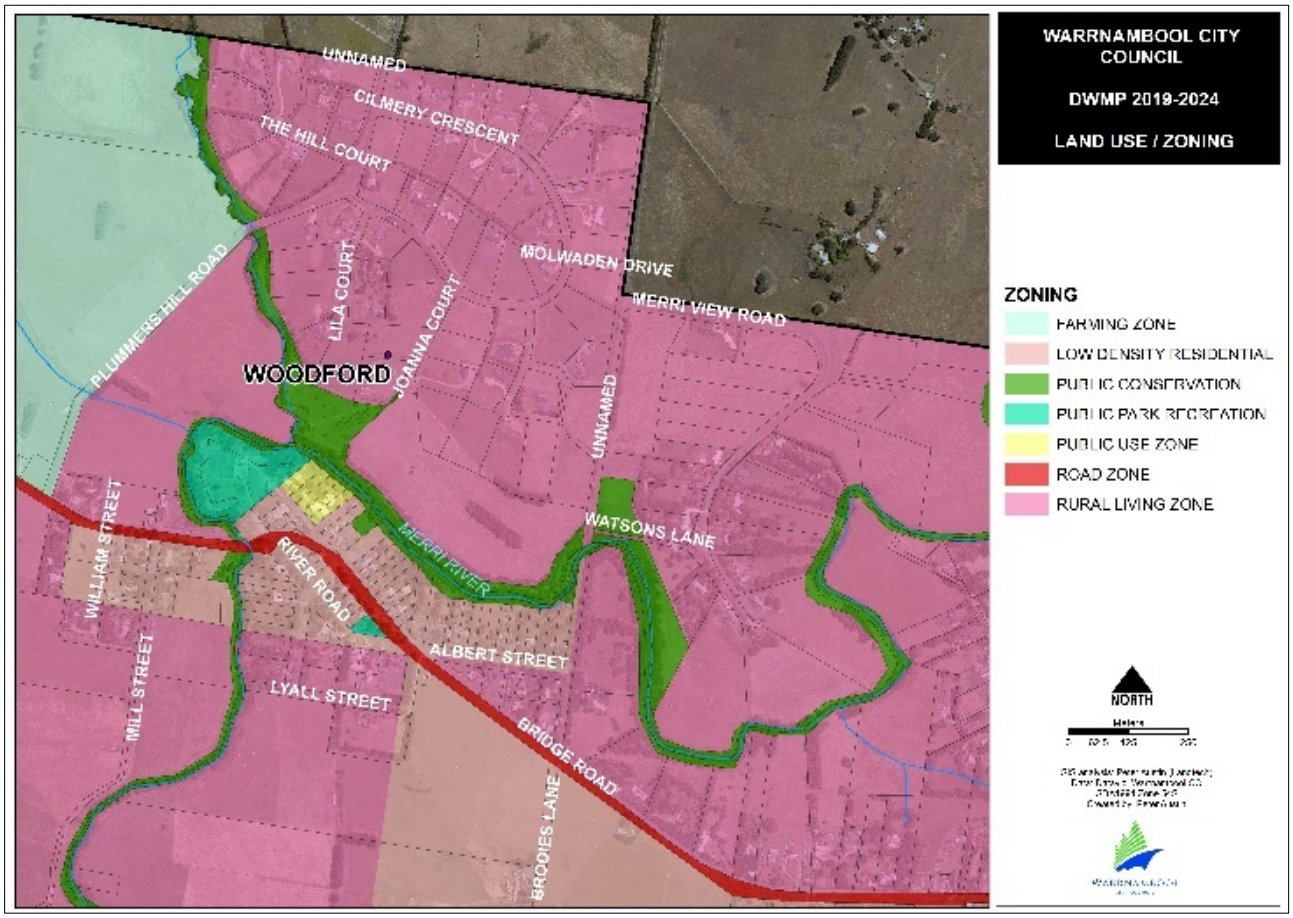


Figure 48 – Woodford's dominance of Rural Living and Low Density Residential zoning.

Effective wastewater treatment and disposal is obviously influenced by lot size with Woodford including varied larger lot sized zoning such as: Rural Living Zone (RLZ) (2ha minimum), Low Density Residential Zone (LDRZ) (0.4ha minimum), in addition to overlays such as Heritage Design Development and an Environmental Significance Overlay (Merri River).

Similarly houses permitted on land of 2ha without a permit except at Plummers Hill where 0.5ha applies. In the Low Density Residential Zone a minimum lot size of 0.4ha applies.

It must be accepted that some risk within the Woodford area is curbed by this zoning where larger lot sizes increase longer-term effective wastewater outcomes (such as within the Cilmery Crescent precinct).

The *RHHS*[23] suggests both Woodford and Bushfield are poorly served with utility and convenience services, and that given the waste management issues (wastewater) it is questionable whether the purpose of the Low-Density Residential Zone can continue to be met.

The report suggests that '*constraints on development include a lack of services, in particular the provision of a sewer service, the inability of soils to carry much further growth in septic services, and the topography of the river environs*'.

Deferred growth pending early resolution of sewer servicing options should be considered which might include changing the minimum lot sizes in various parts of the settlement.

Council would be aware that considerable opportunities for growth in both Low Density and Rural Living housing.

Council and water agencies should place a priority on supplying connection to a sewer or other waste treatment before facilitating further major growth or infill.

Sustainability of onsite wastewater management within the Woodford area is strongly influenced by housing age, therefore due to much recent-decade development.

Evidence of this is contained within the Cilmery Crescent subdivision which although constrained by slope, includes more recent secondary treatment systems within large Rural-zoned lots.

Figure 49 – Older sections of Woodford contain small lots <2000m² on often medium clay soil textures.

Recommended improvement options

-Assess existing block density and investigate options to reduce density to sustainable levels. Develop clear policy guidelines for future developments within the township.

-Stormwater quality should be monitored to assess impacts to the adjacent waterways, including the Merri River. This should be conducted in addition to audits of septic tank systems that will provide further information on the types of systems installed and their suitability.

[23] CPG Australia, Moyne Warrnambool Rural Housing and Settlement Strategy 2010; Accessed from: https://www.warrnambool.vic.gov.au/sites/warrnambool.vic.gov.au/files/documents/property/planning/strategies/FINAL%20Rural%20Housing%20and%20Settlement%20Strategy%20Report.pdf

-It is possible that in the future the community may support the development and implementation of a sewerage service to the township. The investigation of a sewerage scheme including a new Wastewater Management Treatment facility should be considered if evidence of significant risk is discovered and sufficient community interest is shown.

Figure 50 – Climery Crescent Woodford contains some slope-constraining lots managed via terracing, secondary treatment, and upslope diversion drainage.

7.2 Bushfield

Adjoining Woodford to the east, Bushfield also consists of a dominance of historic-title-based small lots (<0.5ha) within Low *Density Residential* zoned areas, with the more optimum *Rural Living* zoned areas, separated by the Merri River. Both Bushfield and Woodford are continue to emerge as one discernible settlement whilst sharing similar OWS constraints.

Bushfield is specifically more residential in character and subject to recent growth and development as an alternative housing choice and environment to Warrnambool. It is said to have a distinctive village character and sense of retreat, valued by the local community.[24]

Bushfield includes a mix of parcel sizes (zoning) influencing lot size constraint, and therefore sustainable wastewater treatment. Constraining such lots further is the influence of highly weathered volcanic soils with a high clay fraction, compacted via years of intensive dairy farming.

[24] CPG Australia, Moyne Warrnambool Rural Housing and Settlement Strategy 2010; Accessed from: https://www.warrnambool.vic.gov.au/sites/warrnambool.vic.gov.au/files/documents/property/planning/strategies/FINAL%20Rural%20Housing%20and%20Settlement%20Strategy%20Report.pdf

Figure 51 – Bushfield from an OWS perspective is a contrast of the old small lots near the football ground and better-planned rural allotments further west.

Bushfield contains Farming (FZ), Rural Living (RLZ), and Low Density Residential Zone (LDRZ) lots significantly influencing wastewater treatment and disposal. Bushfield includes the earliest subdivisions in the area with constrained lot sizes adjacent to the Mortlake Highway, with larger lots to the west along Bridge Road toward Woodford. Farming Zone lots surround the settlement providing potential for future subdivision and rezoning.

The area based on the east-west (Bridge Road) ridgeline includes north-sloping riverine areas proximal to the Merri River. Soil depth become constrained on such ridgelines with most areas dominated by impermeable clay-based soils.

Flatter sites such as those areas of Bushfield close to the recreation reserve/football ground (Hopkins Highway) are dominated by small lots, medium clay soils, and aged wastewater systems (without an OWS permit).

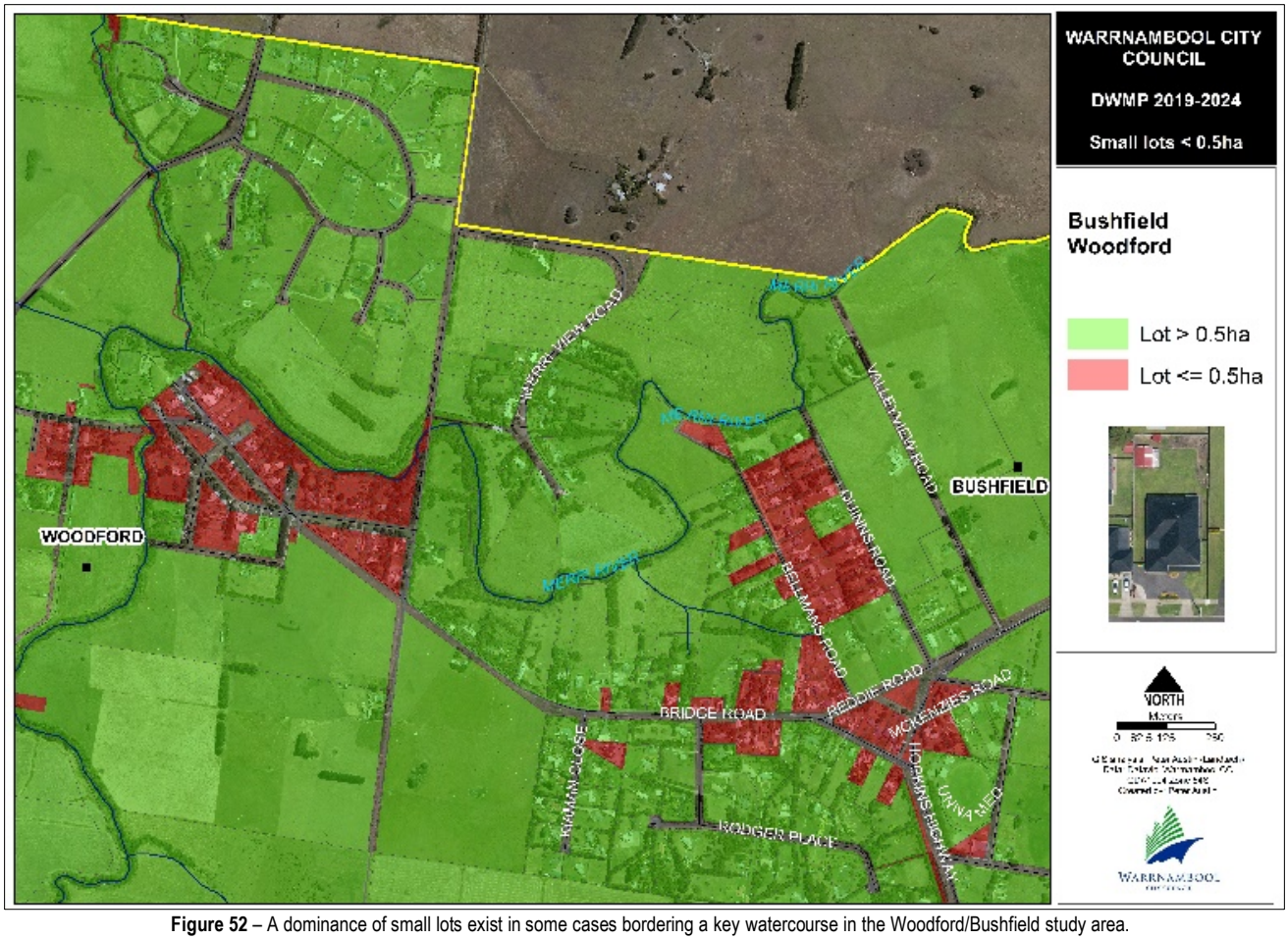


Figure 52 – A dominance of small lots exist in some cases bordering a key watercourse in the Woodford/Bushfield study area.

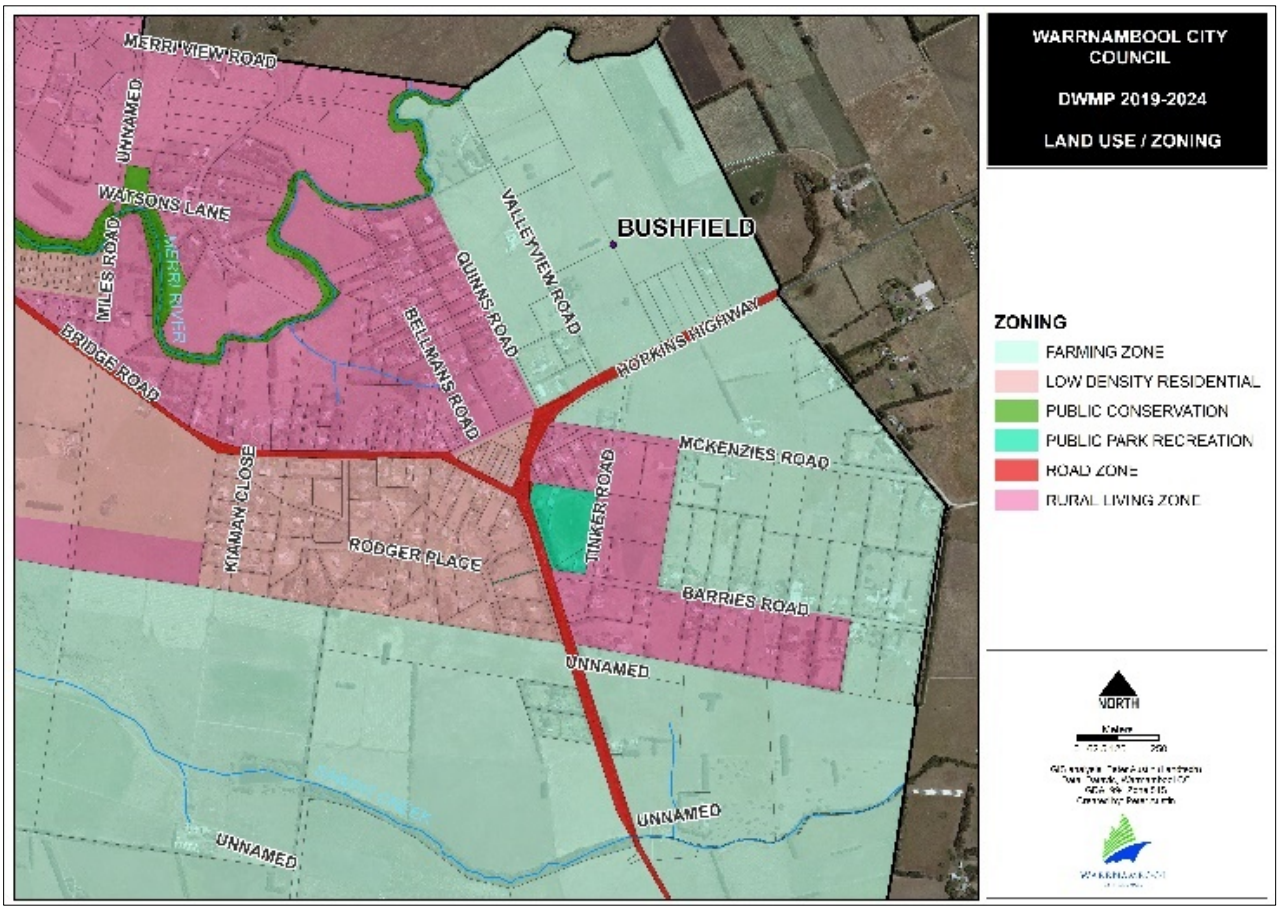


Figure 53 – Bushfield has some similarities to Woodford with Rural Living, Low Density Residential and Farming Zoned lots.

Risk mapping outcomes within this area reflects the varied constraints influencing such sites.

Risk-based wastewater performance monitoring is therefore suggested for the Bushfield area reflecting its relative high-risk rating.

Lot size, soil texture, slope, and watercourse setback constraints exist within the Bushfield study area that contains relatively level to sloping ex-dairy farm landscapes including compacted topsoil profiles. The Merri River environs area is covered by an Environmental Significance Overlay.

Figure 54 – Reduced lot sizes within the older part of Bushfield constrains effective onsite wastewater management.

The lack of services is constrained further by in particular the provision of a sewer service, inability of soils to carry further growth in septic services, influenced by the topography of the river environs.

Within the Low Density Residential Zone a minimum lot size of 0.4ha applies, compounding wastewater issues within the Bushfield study area.

The RHHS suggests[25] that 'given waste management issues it is questionable whether the purpose of the Low-Density Residential Zone can continue to be met' (in Bushfield, Woodford).

The RHHS suggests deferring growth pending early resolution of sewer servicing options which might include changing the minimum lot sizes in various parts of the settlement.

Figure 55 – Well-planned area within Bushfield although consisting of lots able to be subdivided to 0.4ha.

The same report suggests a 'do-nothing' approach is not a sustainable response to the planning issues presented by the combined settlements. They suggest that before facilitating infill and major growth that connection to sewer should be prioritised.

A balance needs to be struck between character/amenity protection issues and the growth and maturity of the combined settlements as they move towards a more sustainable community.

The objective should be to offer environmental protection and effective management of wastewater; a broader range of housing choices, while retaining the predominant character as a rural village.

Recommended improvement options

-Stormwater quality should be monitored to assess impacts to the adjacent waterways, including the Merri River by relevant authorities. This should be conducted in addition to audits of septic tank systems that will provide further information on the types of systems installed and their suitability.

-It is possible that in the future the community may support the development and implementation of a sewerage service to the township. The investigation of a sewerage scheme including a new Wastewater Management Treatment facility should be considered if evidence of significant risk is discovered and sufficient community interest is shown.

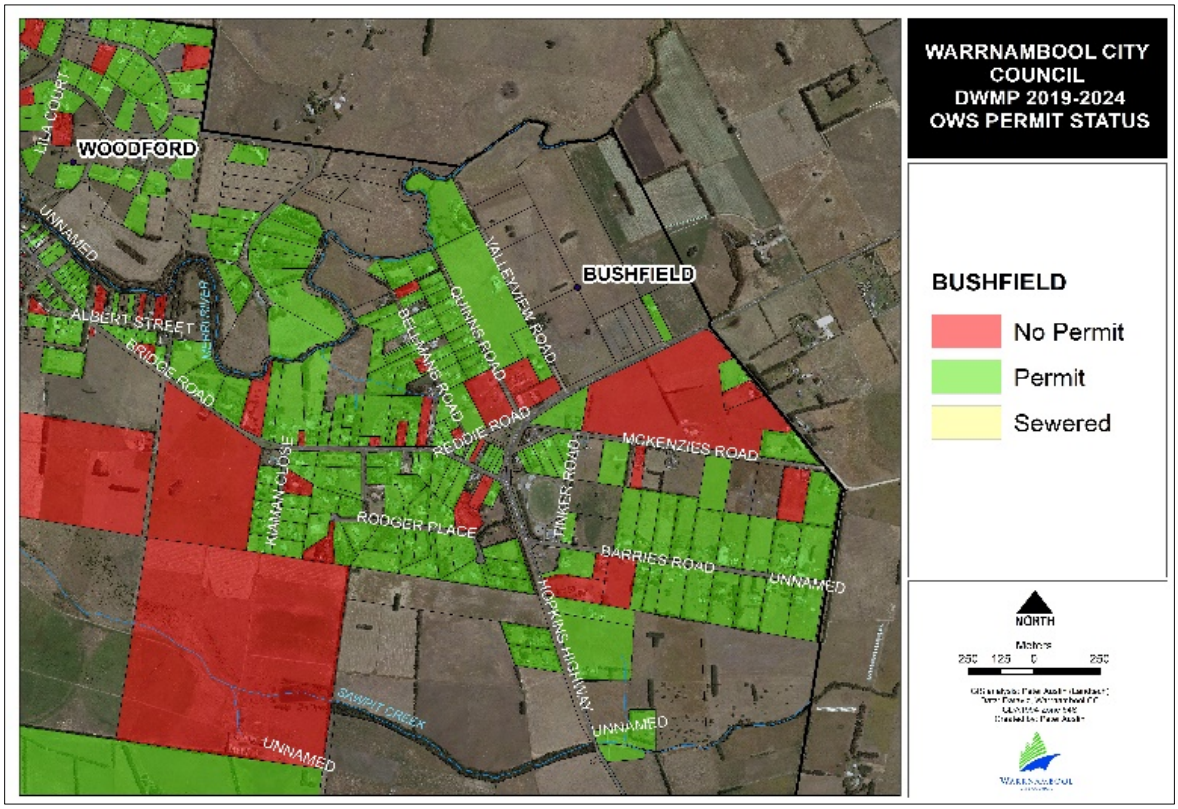


Figure 56 – The challenge ahead for WCC is to increase knowledge of systems throughout unsewered areas as is the case for Woodford/Bushfield.

7.3 Allansford

Located on the Princes Highway 15km to the east of Warrnambool, Allansford consists of floodplain and river-proximal sites, grading to larger rural-residential living within larger Farm-zoned lots.

Established in the 1860's the Allansford study area comprises the old town, rural living subdivisions, and Farm Zone areas surrounding the township. Sewer reticulation is provided for the central parts of the established township (see *Figure 57*).

The Hopkins River traverses the west of the site with some sandstone-based subsoils through the Tooram area constraining OWS's.

Allansford is identified in the Victorian Coastal Strategy as having moderate growth capacity with some pockets of heritage significance and areas of Environmental Significance adjacent to the Hopkins River.

Limestone geology of parts of the Allansford renders significant areas of land seemingly suitable for growth, but unsuitable for development, particularly to the south and east of the town. Issues exist such as flooding of the Hopkins River and the lack of drainage infrastructure and appropriate servicing.

The study area more generally consists of ex-volcanic medium clay soil textures, compacted from past agricultural use, giving rise to winter-ponded clay-based soils within mostly flat sites.

Unsewered areas have historically included an industrial precinct to the north of the Allansford township managing wastewater on lots <2000m^2. The township area is mostly sewered however includes aged dwellings and related aged wastewater systems (legacy sites) on lot sizes in some cases <4000m^2.

Significantly for OWS management, land zoning/minimum lot size within the Allansford area includes Farm Zoned, Rural Living, Township, and Low Density Residential zoned lots.

More recent development includes Rural Living Zone lots that have ample land left for sustainable and long-term onsite wastewater treatment options.

The Allansford study area includes 'legacy sites'; properties without sewer connection after sewer connection became available. Such sites must connect to sewer unless they have a secondary treatment system that is serviced, maintained, and reported on to both Council and Wannon Water. Some legacy sites include small parcel industrial lots.

Figure 57 – Lots <0.5ha lacking an existing permit and therefore reduced means for WCC EH Unit to enforce permit conditions.

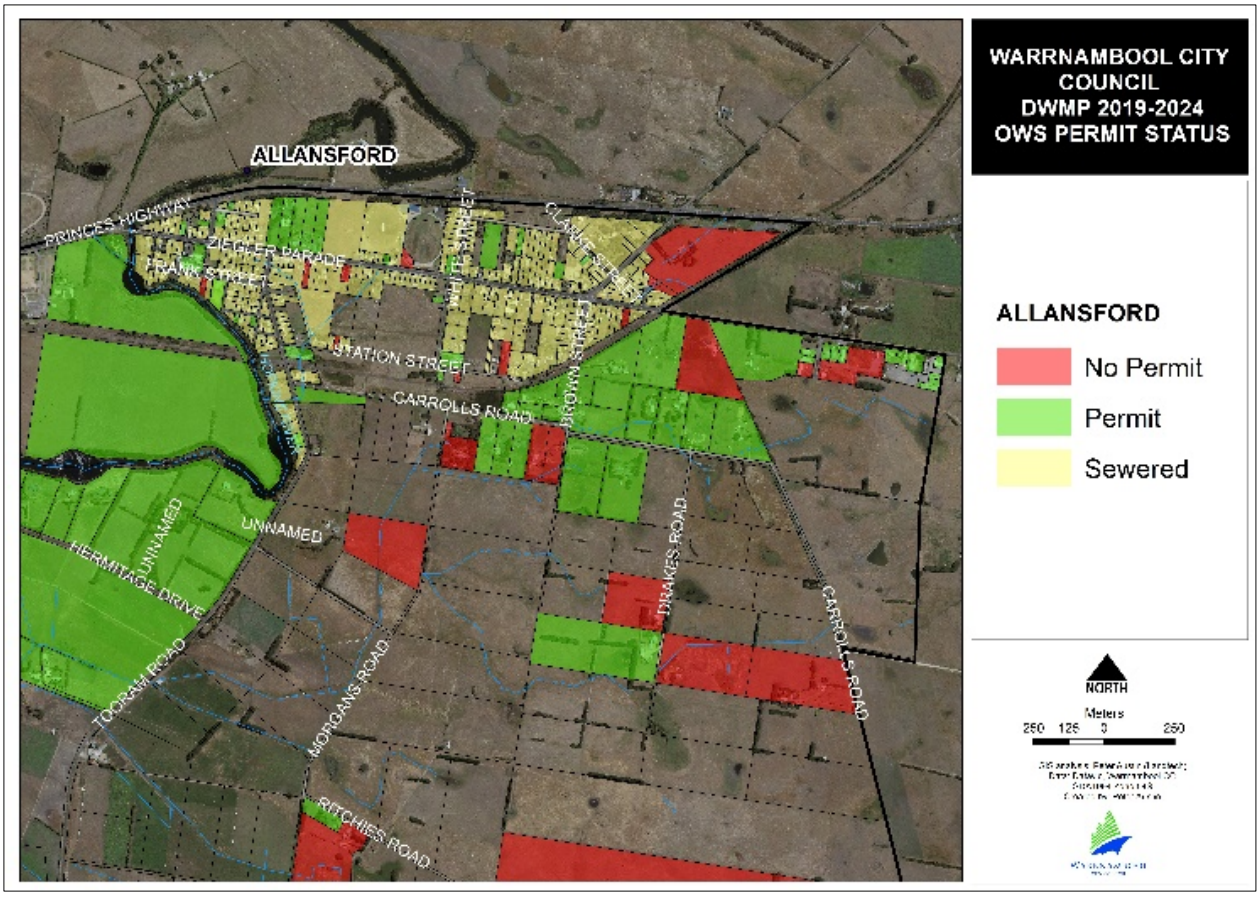


Figure 58 – Parcel-based permit vs no permit comparative map (Allansford).

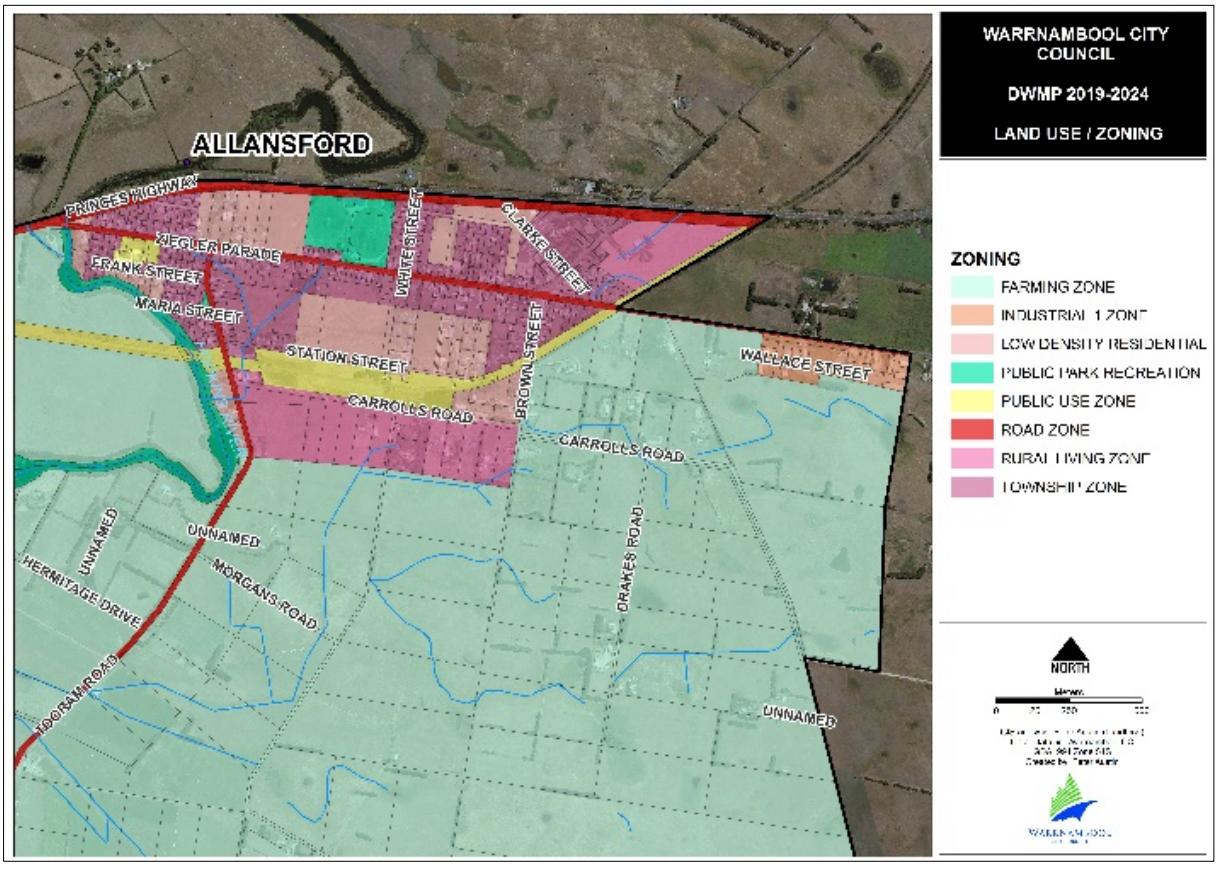


Figure 59 – Mixed lot sizes and zoning within the Allansford precinct.

Recommended improvement options

-Council will work with Wannon Water to ensure that all properties within the sewerage district that cannot adequately treat and contain wastewater within their boundaries are connected to sewer as soon as possible.

-All rezoning and subdivision in the township are to be provided with sewer.

7.4 Hopkins Point/Logan's Beach

The Hopkins Point/Logan's Beach (HPLB) study area includes the entire coastal strip of land south of the Hopkins River as it flows toward Allansford in the east.

Fortunately for wastewater provision, the HPLB area has retained large relative parcel sizes including Farm Zone (40ha minimum), Rural Living, and General Residential Zones recently sewered.

However, most farming zoned properties in the Hopkins Point area are below 40ha. The biggest allotment is 23 ha and the average would be less than 15ha. Under the Warrnambool Planning Scheme, lots of 15ha can be created in the Farming Zone. There is pressure in the Farming Zone area for house-lot excisions and boundary re-alignments to create opportunities for additional housing.

Small relative lot sizes in the Banksia Drive area, with minimum lot sizes (0.4ha), constrain wastewater disposal options in some instances within watercourse (Hopkins River) setbacks.

Soil types consist of ancient dune systems adjoining fertile lava flow areas resulting from recent volcanism. Sites within this area however are typically dominated by sandy loam soil textures, with soils increasing in clay fraction further east.

Rapid infiltration of effluent constrains wastewater application however mitigatory measures are used such as secondary treatment, use of water saving devices, use of subsurface irrigation and disposal area evapotranspiration techniques.

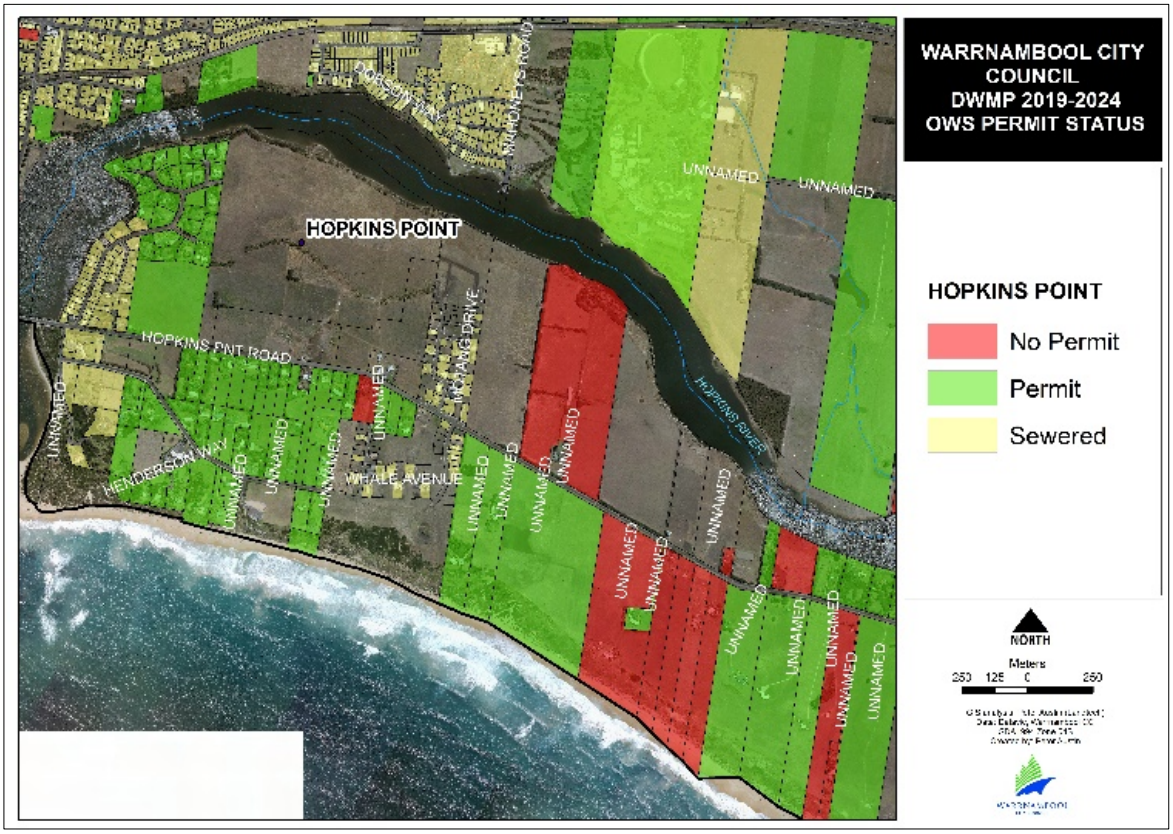


Figure 60 – Large coastal lots to the east of the Hopkins River mouth with many sites elevated and optimum sandy loam soil textures; some with permits, some not.

In the most part, distance to groundwater is not a constraining thus reducing restrictive OWS mitigatory measures required.

A Significant Landscape (SLO) and Environmental Significance Overlay (ESO) forms much of the area requiring the retention of as much effluent transpiring vegetation as possible. Coastal Acid Sulphate soils, not amenable to onsite wastewater systems are restricted to the eastern part of the study area, adjoining in the west, the Hopkins River.

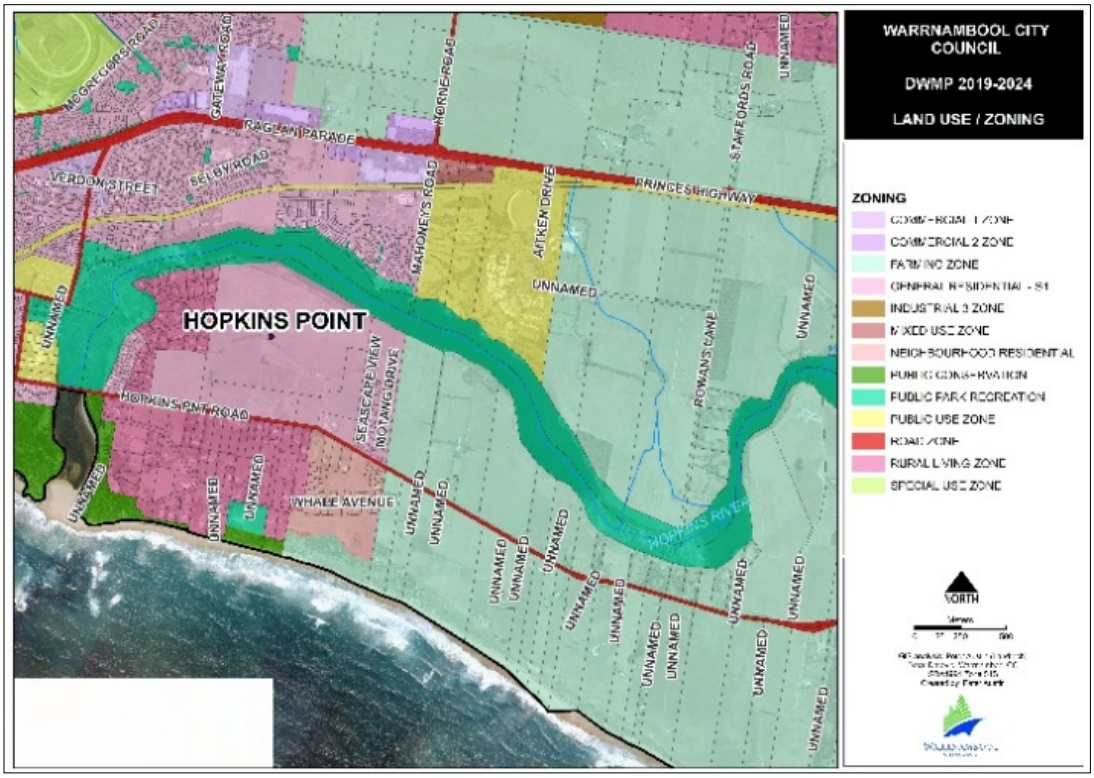


Figure 61 - The Hopkins Point and Logan's Beach area dominated by Farm Zoned, Rural Living, and Low Density Residential zoned lots.

With increased lot sizes and the incremental distribution of sewer, much of this area includes existing sustainable wastewater patterns. This may not however remain the case due to future owner subdivision intentions.

Lot size is however the key to all contexts and maximum default lot size should support future sustainable outcomes in areas such as HPLB.

7.5 Dennington/Illowa

The western Dennington/Illowa study area takes in urban/rural land parcels predominantly west of the Merri River where sewer extension has not reached, and includes ex-intensive agricultural soil influences, in addition to reduced areas further south on shallow sandstone-based soil types

A cluster of Farming Zone lots south of the Princess Highway and west of the Merri River on shallow fast-draining sandstone soils provide key wastewater challenges for the EH Unit.

Sandstone-based parcels include high infiltration rates, however conducive sandy loam soil textures, and in few cases groundwater proximity. This requires increased system surveillance and specific design considerations when approving new wastewater systems.

Figure 62 - West Dennington; an area identified for infill growth and where sewer should follow.

The larger proportion of the study area includes volcanic-based, medium to light-clay soils, with reduced permeability in winter. More optimum light-clay soil textures dominate areas of historic deposition within watercourse and floodplain areas to the east of the Merri River.

Parcels within the Dennington/Illowa area vary in size based on zoning, some within 30-60m watercourse setbacks, and the 1 in 100 and critically 1 in 20-year flood cycles.

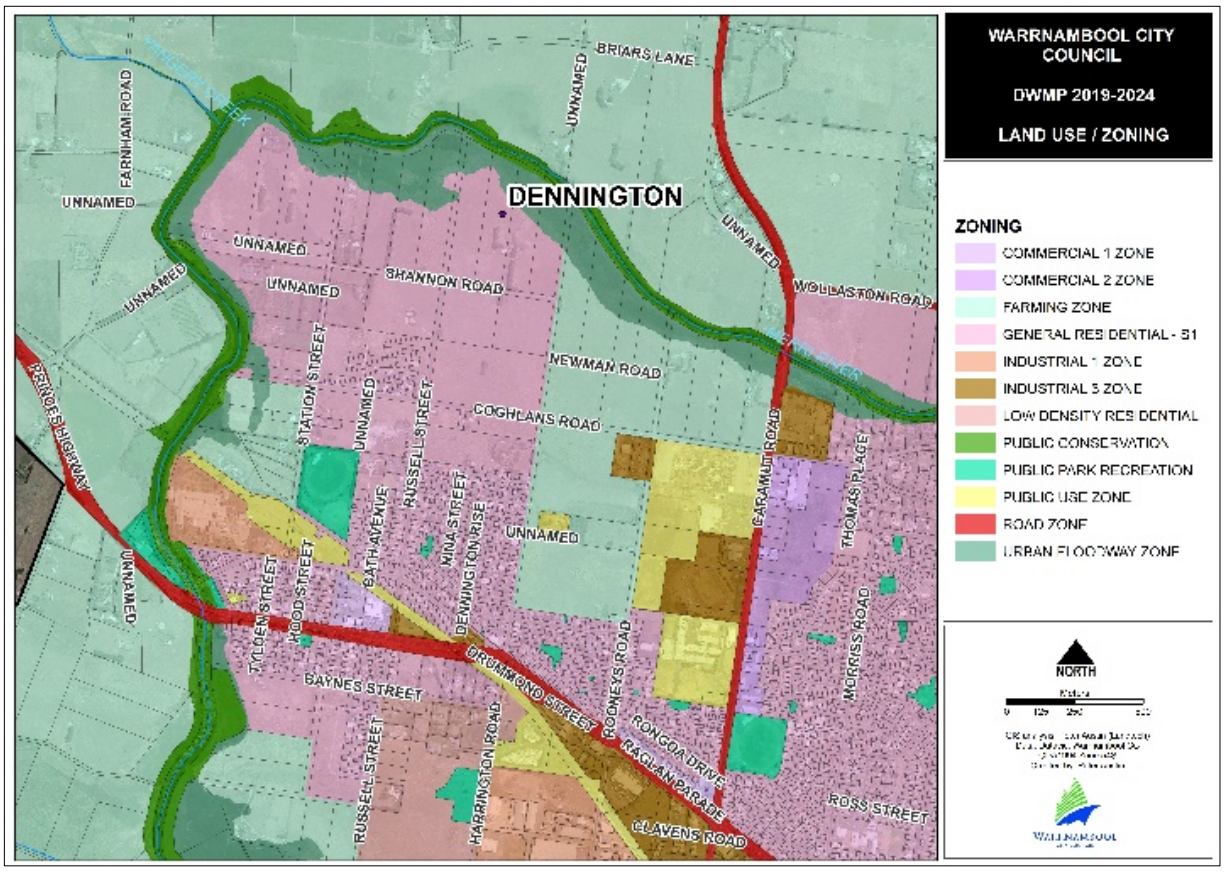


Figure 63 – Residential Zone 1 and Farm Zone dominate the Dennington area.

A recent audit of high-risk sites within setbacks confirms an awareness of homeowners of the risk of their systems, which in most cases have been designed away from critical watercourse setbacks.

Figure 64 - The LGA consists of many dwellings within both 30m and 60m setback requirements with many having to pump higher to effluent fields due to choice of dwelling location.

The Dennington study area includes reduced numbers of legacy sites; current OWS requiring connection to sewer. Such sites will form part of WCC's priority strategy to connect all legacy sites to the reticulated sewer network.

Again, as in other study areas selected, Dennington generally includes large relative lot sizes, and improved soil textures for sustainable OWS management. This may however change with future planning intentions.

7.6 Wangoom

The Wangoom area is typical of many urban-rural edge type settlements where reticulated sewer has generally not been made available, and which therefore requires careful planning of future onsite wastewater management.

The North Wangoom site lies 3km north-north-east of the Warrnambool CBD. The study area includes a history of intensive agricultural activities reflected in the lack of indigenous vegetation and compacted soil profiles.

The study area includes 51ha of both Farm Zone and *Rural Living Zone* lots. The question of current and future zoning proposals must take into consideration minimum lot sizes for sustainable future domestic wastewater practice.

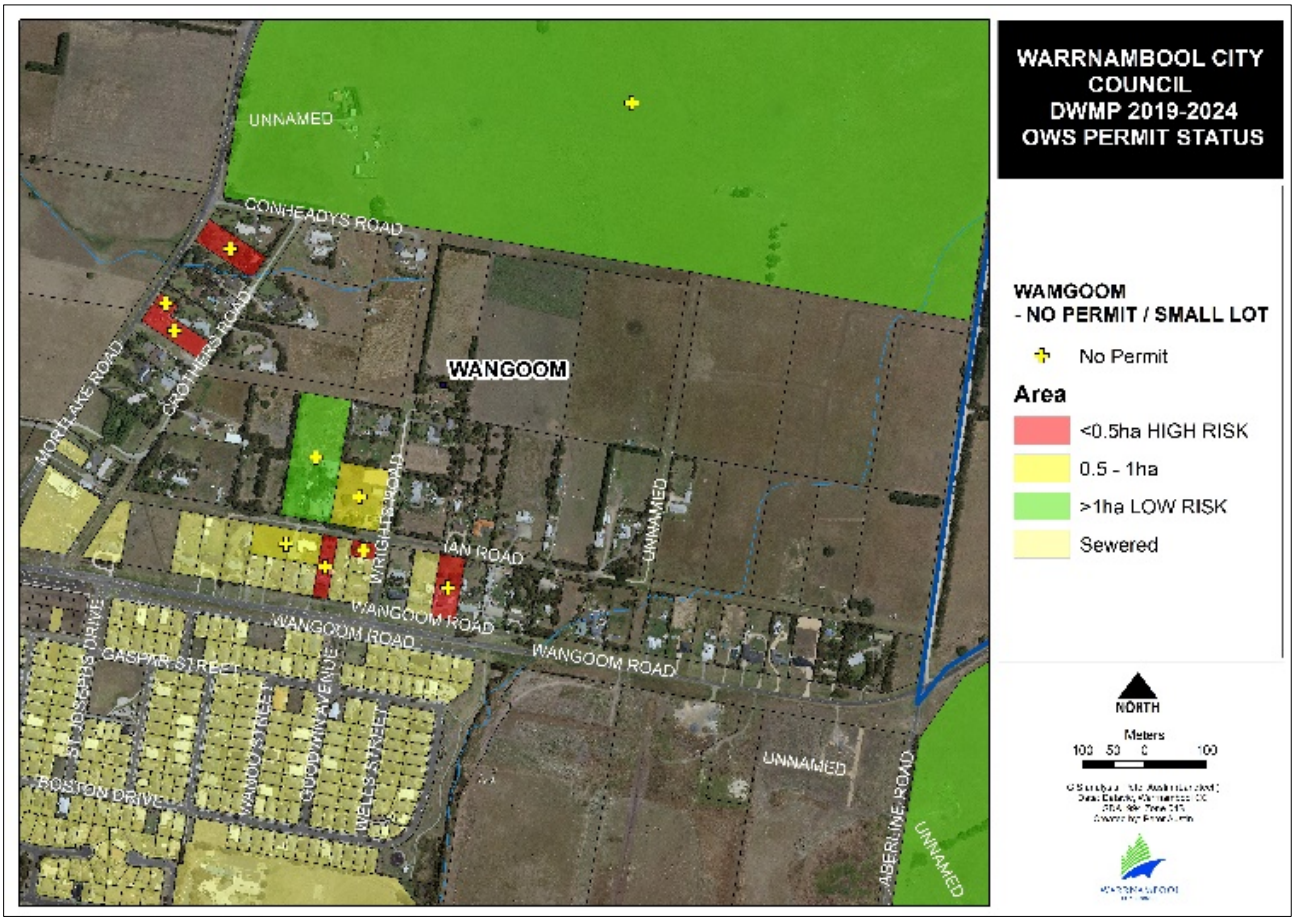


Figure 65 – The north Wangoom study are displays a high number of both constraining small lots and a lack of permit coverage.

Soil texture, permeability, and depth are critical factors required at optimum parameters to support sustainable domestic wastewater management.

From a land use and development perspective the study area consists of lightly-sloping terrain and uniform shallow-topsoils over heavy expansive and poorly-draining medium-clay soils (Category 5/6; *EPA CoP 891.4*).

The study area drains to both the Merri River (north-west of site) and Russell's Creek (east of site), becoming significant in terms of wastewater during and after intense rainfall events. The site has a number of lots within watercourse setbacks (Farm Zone), and where future lots may also be within such setbacks.

Drainage stormwater assets remain significantly limited. Wangoom Road is sealed and has kerb and channel while minor roads are unsealed. There are no underground drains, while the main open drains fall to the Russell's Creek tributary in the south, and to a land depression in the north.

The site includes an area surrounding the Merri River tributary in the north-west of the study area, which is locally steep (to 12%).

This provides an unmanaged drainage site in high intensity rainfall events, discharging into properties below (Hopkins Highway to the west of study area).

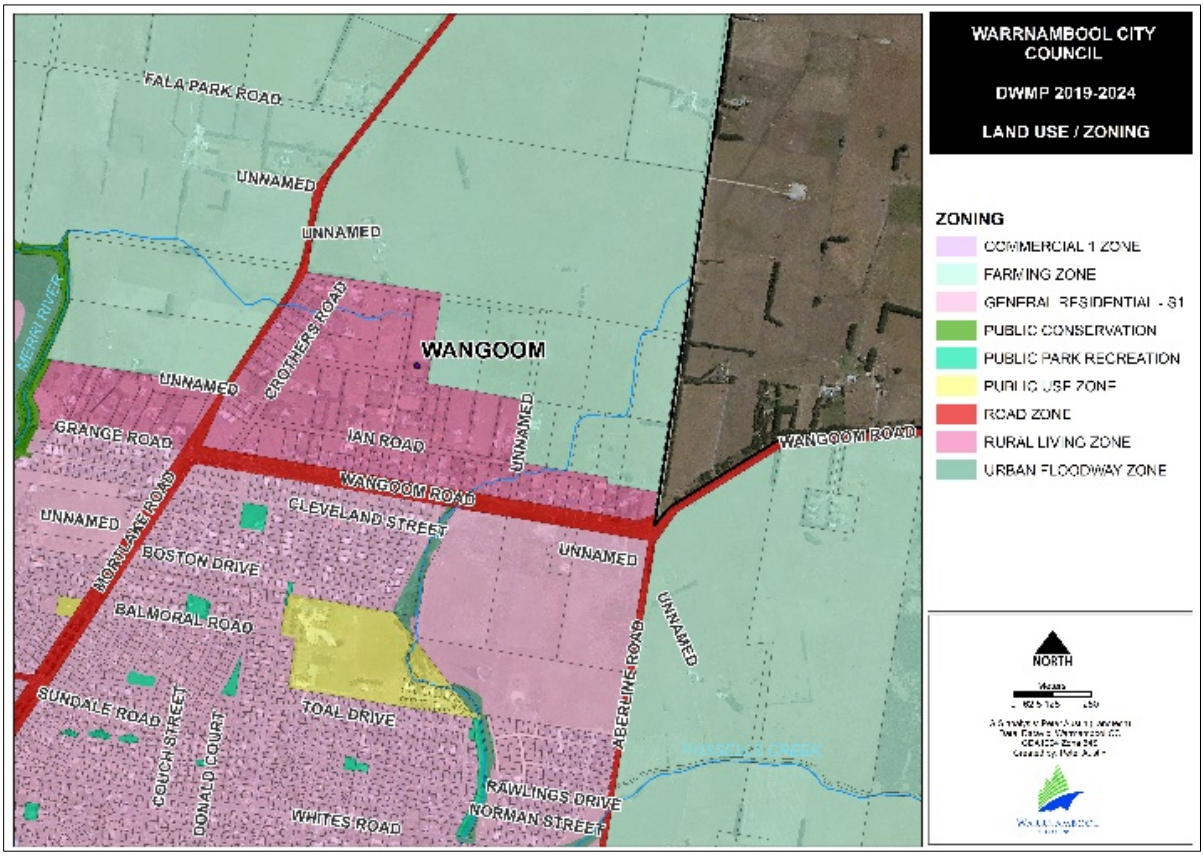


Figure 66 – Rural Living and Farming Zone dominates the Wangoom unsewered areas.

The study area has a high relative number of smaller lots (<0.5ha and potential for creation of further lots to 0.4ha) and significantly already has a high septic system density of 25-60 systems compared to accepted thresholds (25-40 per km²) for the relatively young age of the subdivision.

Figure 67 – Older section of the north Wangoom precinct, although on larger lots, are constrained by shallow medium clay soil textures, not optimal for effluent disposal.

A small portion of the study area is currently serviced by a sewerage pump station that discharges to the reticulated system south of Wangoom Road.

Wannon Water has expressed the view that sewering lots larger than 2000m² to be economically not feasible, therefore onsite wastewater systems are used and required in all other study area sites.

7.7 Drylakes Road

Low elevation areas on medium-heavy clay soils typifies the Drylakes Road area. Waterlogging of this and adjoining areas in winter is a feature of this area.

Therefore planning for future subdivision must address this and additional critical wastewater issues discussed below.

In addition to clay-based soils is the lack of topsoil depth, often the optimum soil texture to treat and evaporate wastewater. OWS's in areas such as this must raise effluent disposal areas if in winter waterlogging zones for effective treatment and mitigation of wastewater to the environment.

Such water-logged parcels should be mapped in winter to assist future land parcel unsewered development proposals.

This area should be the focus of moderate to high-risk actions due to the relatively high number of systems without a permit (as seen below). Many of these same land parcels shown in red also exist in winter waterlogged zones.

Figure 68 – Properties lacking OWS permits although on currently moderate risk-sized lots for effective treatment and disposal.

The entire area is part of low elevation landscapes and wetland basins with increase d fragility due to information regarding the area including subterranean sandstone/limestone cave and spring system linked to Maam Reserve. Until the recent decade, some properties along Drylakes Road used Maam Reserve for primary treated disposal of effluent.

Future subdivision intentions must take into account the three key area issues; poor soil drainage, winter waterlogging, and potential reduced lot size (as can be seen from *Figure 73*).

The Drylakes Road area would therefore benefit from being sewer or the development of a centralised system of some kind. There may be some future potential for extension to sewer from Arborline Road or Allansford.

All 50 land parcels are zoned Rural Living Zone with most lots between 1-3ha in size, with lots from 0.8ha to 19.6ha in size.

Figure 69 – Maam Water Reserve with key vegetation areas shown for significant fauna species such as the White-footed Dunnart.

The current septic density is at threshold of accepted 15-25 septics per square kilometre, therefore future planning must take such data into consideration.

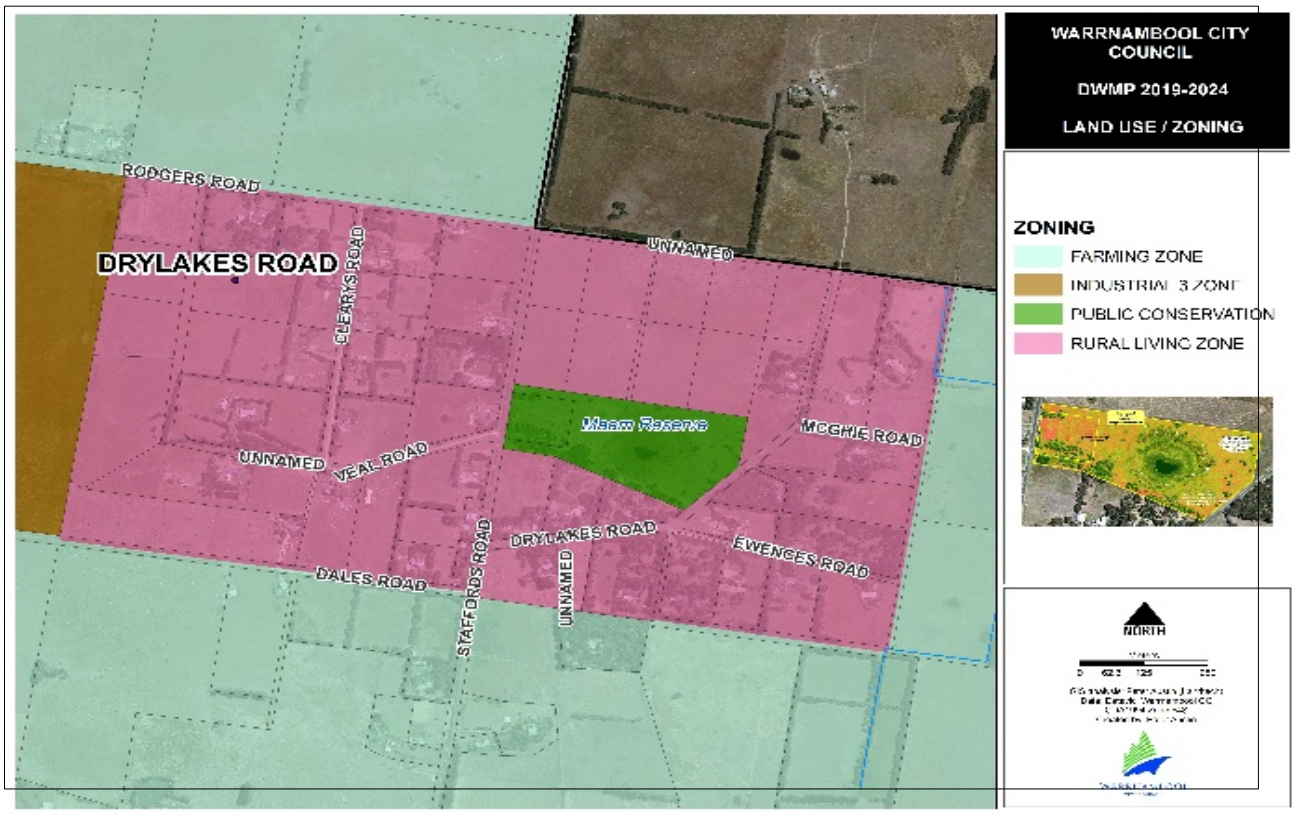


Figure 70 – All lots apart from Maam Reserve zoned Rural Living.

Recommended improvement options

- Effluent disposal areas should be raised in low elevation, Winter waterlogged sites;
- Lot sizes should remain above 1ha for optimum and reduced risk OWS treatment and disposal;
- Drylakes area should be case study focus due to water-logging and high non-permit status with inspections encouraged;
- Improved flood data must be collected for this site to assist future planning.

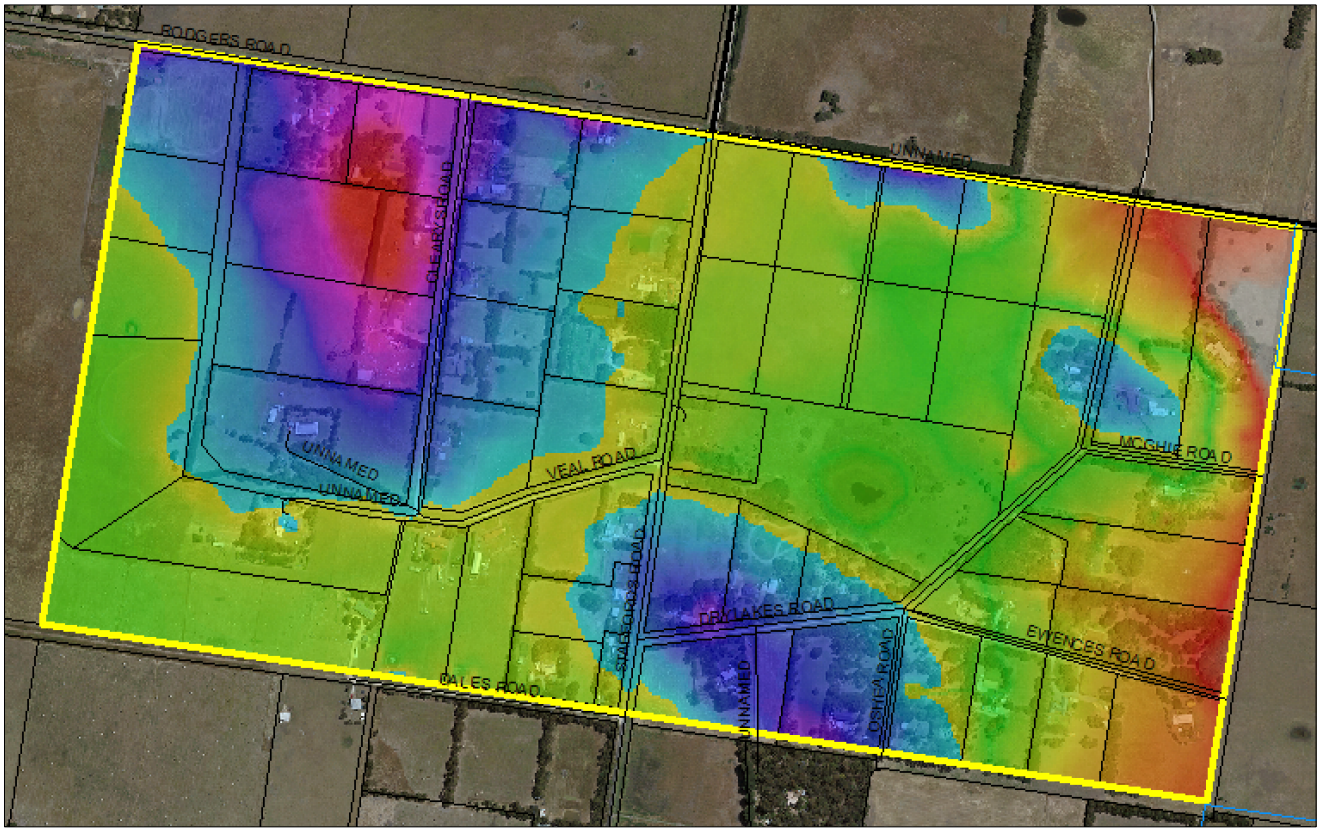


Figure 71 – Lower elevation areas in green impacted most by winter waterlogging.

8. Implementation of priorities for DWMP

Previously, the effectiveness of wastewater management in the City has been limited due to lack of resources, staffing, and recent overarching financial restrictions such as rate-capping. However there are a number of priorities which have been identified during review of the former 2013 DWMP which should be addressed in this *Action Plan*.

Key strategies/priorities include:

Strategy 1: Address data gaps, audit high-risk sites, and connect legacy sites to sewer

Strategy 2: Increase owner knowledge and maintenance of their onsite wastewater systems

Strategy 3: Develop policies and procedures

Strategy 4: Investigate enhanced Permit Conditions to increase maintenance compliance

Strategy 5: Source funding for DWMP implementation and/or wastewater management officer

Strategy 6: Performance Review and Risk Management

Strategy 7: Work with Planning Unit and Risk Mapping outputs to enhance unsewered growth development

Strategy 8: Enhance data collection and reporting systems

Strategy 9: Increase engagement with Wannon Water to enhance OWS management across the LGA

8.1. DWMP implementation

Implementation will be undertaken by Council's Environmental Health Unit in accordance with the level of resourcing available. Without resourcing, the DWMP will be a strategic document outlining Council's intentions. Potential funding options are detailed in *Strategy 5.*

8.2. DWMP audit and review

The implementation of the DWMP will include progress reporting. The key stakeholder Wannon Water will receive a copy of these progress reports. Other stakeholders will be provided reporting where interest is shown to do so.

In accordance with *Clause 29 (6) of the SEPP Waters 2018*, Council will conduct an audit to assess progress of the DWMP at least every three years and publish the report on its website.

Council will review this DWMP at least every five years per the requirements of *Clause 29.*

8.3. DWMP stakeholder engagement

Council (Landtech Consulting) produced a draft DWMP (2020-2025) for dissemination amongst stakeholders who were invited to provide feedback during a four-week consultation process.

The key stakeholder is Wannon Water who are responsible for the management of sewer infrastructure. Other stakeholders include:

- Owners or users of OWS's;
- Glenelg Hopkins Catchment Management Authority;
- Environment Protection Authority;
- Department Environment, Land, Water & Planning (DELWP);
- Land Developers, Building Designers, Town Planners, Surveyors, and Civil Engineers; and
- Plumbers.

8.4. Existing OWS management in WCC

Making decisions about wastewater system selection, sizing and siting, needs to be based on site-context and localised environmental conditions, rather than adopting a 'one-size-fits-all approach' to minimum lot size or wastewater land application type and sizing. This DWMP advocates an approach whereby all wastewater systems are designed to match intrinsic site conditions.

This approach should ensure that future unsewered rural residential development within each study area only proceeds on land that has an acceptable capacity for on-site wastewater assimilation and management.

The current situation with domestic wastewater in Warrnambool City is summarised below.

- The existing onsite wastewater situation in WCC mirrors that of surrounding rural and coastal/hinterland LGA's in Victoria. However WCC has performed well with 80.6% of systems including a current permit. With suggested actions in this Plan the EH Unit could aim for >95% database coverage into the future and increased OWS management effectiveness.
- Compliance with *ISO 30001 Risk Management* is possible notwithstanding minor data gaps, and therefore increased future effective management of the environmental and public health impacts of OWS's.
- Unsewered areas within the LGA include west south-west fringes of the city such as Dennington and Yarpturk, with Woodford, Bushfield, and Wangoom to the north, Allansford to the east, and Hopkins Point to the south. Warrnambool is fortunate not to exist within potable water supply catchments where OWS prescriptions and regulatory measures are typically increased.

Figure 72 – Skeletal sandy loam soils within watercourse setbacks require careful monitoring of such systems within the Banksia Drive area.

- Currently 998 OWS's exist within Council boundaries and require both EH Unit-based management and enhanced system maintenance, system monitoring and performance for effective OWS outcomes.
- There are 196 non-permit OWS's (no compliant permit in place) in key constraint areas such as Bushfield, Woodford, Allansford etc., with many on reduced size lots (<2000m^2), within watercourse setbacks, and with aged systems (>25 years old))(see *Figure 73* for unsewered area lot size summary).
- A further 802 systems have permits, again a proportion of these have similar constraints listed above. Jago (2018)[26] and others highlight the importance of maximising knowledge of existing system location, age, maintenance history, and performance. The compilation of high-coverage system data is a key requirement of this Plan and detailed in *Strategies 1 and 8*.
- Sewerage planning should take into account the existing stock of OWS's, particularly within and on the boundary of regional cities. These zones often contain higher population densities and small (reduced <0.5ha) parcel sizes, amplifying health risks from wastewater systems.
- Approximately 42 'legacy systems' (dwellings within sewer network not connected to sewer) within sewered areas exist such as Allansford, Dennington, and Warrnambool; a key issue requiring attention due to the potential impact of failing OWS's within the reticulated water coverage area.
- Anecdotal evidence suggests that a key barrier to building sewer infrastructure is distributing capital cost obligations in an equitable manner. It is usually impossible to broker voluntary agreements between the mix of existing households with OWS's of varying levels of performance and time since installation, and the property developer who is typically seeking to minimise construction costs.
- What has been observed in practice is that each party act in their own economic interest and often seek to avoid making payment if legally able to do so, even when they gain benefit from the group provision of sewer. The other parties then understandably do not wish, or are simply not able, to pay for the entire sewer scheme and the proposal does not progress further.[27]

[26] Victorian Government 2018, Victorian Attorney General's Department. Managing Impacts from Domestic Wastewater. Accessed from: https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf

[27] Ballarat City Council 2018. Ballarat City Council Domestic Wastewater Management Plan; Accessed from: https://mysay.ballarat.vic.gov.au/43478/documents/98324

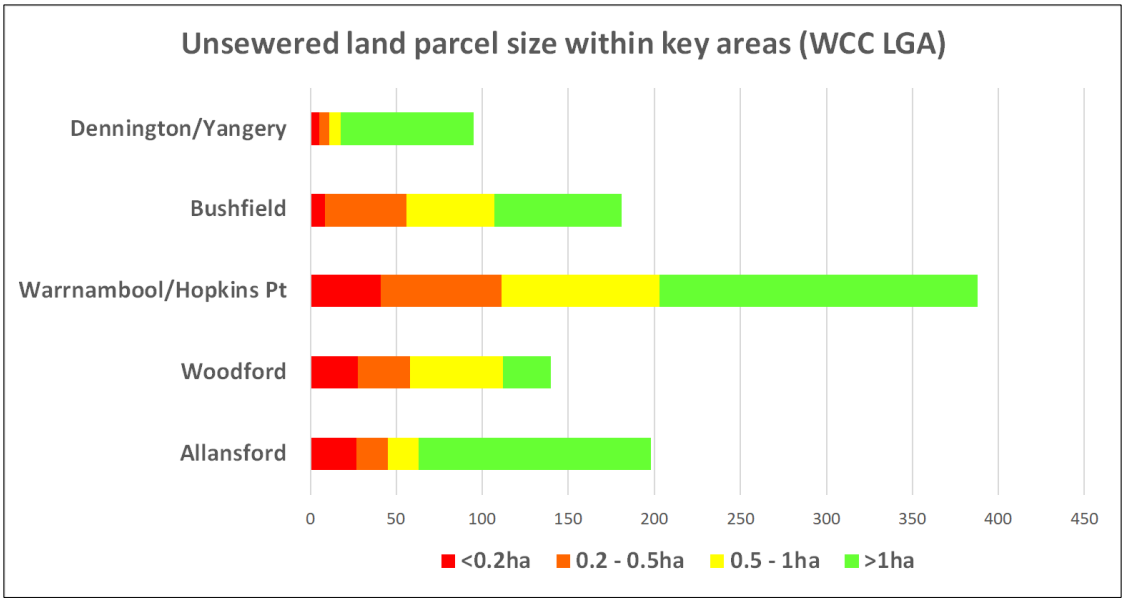


Figure 73 – As with most unsewered areas in Victoria, optimising lot size for effective wastewater treatment is a key aim for sustainable onsite wastewater management.

9. ACTION PLAN

9.1. DWMP Strategies

This Plan has identified 9 key strategies for the management of onsite wastewater.

Strategy 1: Address data gaps, audit high-risk sites, and connect legacy sites to sewer

A comprehensive assessment of onsite wastewater systems within the LGA would establish the basis for a coherent, efficient, and cost-effective approach to planning and the provision of sewer infrastructure for a growing regional coastal city.

A complete OWS dataset would support Environmental Health Unit (EH Unit) efficiency and has the potential to improve collective system management, reduce the time and cost of complex septic installations, provide efficient system location data to owners (plumbers, and builders), and supporting components of *ISO 30001 (Risk Management)*.[28]

The aim should be to increase logged and mapped location and operational performance information of the approximate 226 OWS's with no permit, of unknown age, operational risk, and maintenance history. The end goal is to have all 998 OWS's accurately mapped, and with a known operational risk (OR) status logged into the system database.

The wastewater database will be enhanced by transfer of archived permits, increased location and performance data, and requiring minor modifications to the wastewater component of the *TechOne* system to achieve this.

Table 9 – Strategy 1.

Strategy 1	Actions	Delivery date	Person responsible	How measured
Address data gaps (non-permit systems)	-Collate existing archived data sources to locate and determine non-permit system type and age (for follow-up inspection/permit creation/and/or upgrade); -Aim for entire coverage of wastewater systems, their locations, land capability (LC risk) and operational risk* required to support ISO 30001.	Dec 2024	EHO IT GIS Officer Admin staff	Increase in database coverage Operational Risk ratings

[28] Towong Shire Council 2015. TSC Domestic Wastewater Management Plan; Accessed from: https://www.towong.vic.gov.au/planning-rules-payments/planning-building/planning/images/DWMP_Working_Draft_September_2016(2).pdf

	-Implement permits for located/mapped non-permit systems; -Apply/upgrade Operational Risk rating to inspected systems;			logged
Audit high-risk sites	-Audit/Inspect high-risk sites to locate, map, assess risk, and determine maintenance/upgrade requirements: Lots <2,000m² with no permit, inside watercourse setbacks; Lots <2,000m² with permit, inside watercourse setbacks; Lots 2,000m² to 5,000m² with no permit, inside watercourse setbacks; Lots 2,000m² to 5,000m² with permit, inside watercourse setbacks; Lots 2,000m² to 5,000m² with no permit, outside watercourse setbacks;	Dec 2024	EHO IT GIS Officer	Numbers of systems without permits located, upgraded, and issued permit Number high risk sites inspected, and risk mitigated
Connect (82) legacy sites to sewer	-Utilise connect to sewer options process created within this DWMP; -Negotiate with Wannon Water regarding inspection and resourcing a connect to sewer program (see *Strategy 9*);	Dec 2023	EHO IT GIS Officer Wannon Water	Number legacy sites connected to sewer

*Operational Risk generated using key parameters.

Strategy 2: Increase owner knowledge and maintenance of their onsite wastewater systems

Regular maintenance of OWS's often does not occur due to lack of owner knowledge. Ensuring owners (and occupiers/renters) of unsewered properties have the education to better understand their responsibilities in the operation and maintenance of their systems, is key to reducing impacts from OWS's.

Meetings with owners to explain current regulations and requirements for maintenance is identified to be a powerful way of raising awareness, increasing maintenance, and educating system owners around system function, however is resource intensive.

Low AWTS maintenance throughout Victoria must be addressed, however current system warranty and EPA maintenance requirements (quarterly – approx. $90-$300 per service) become cost prohibitive for most owners, and where the EPA should be lobbied to accept twice-yearly service to increase 'real' levels of maintenance compliance and desired performance outcomes.

As the database of OWS increases in coverage and becomes more accurate and refined, relevant messaging will become easier and more effective to deliver to system owners.[29] Reports can be auto-generated from *TechOne* targeting specific user groups, locations, system types, and maintenance requirements, providing simple tools to actively manage communications.

Table 10 – Strategy 2.

Strategy 2	Actions	Delivery date	Person responsible	How measured
Increase owner knowledge and their maintenance of OWS's	Targeted communication actions to increase owner's system maintenance (to understand system requirements, location, type, and owner maintenance responsibilities); Utilise *manual & automated reporting* from TechOne for targeted mail-out/bulk email/phone/site meetings etc., to communicate education information and maintenance alerts (enforced) based on priority OWS's such as:	Dec 2023	EHO Admin support IT	Number systems maintained above 2019 background level Number education

[29] Victorian Government 2018, Victorian Attorney General's Department. Managing Impacts from Domestic Wastewater. Accessed from: https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf

Utilise enhanced wastewater database for automated maintenance and education communication alerts for system owners, transferred properties	• Non-permit property owners (system details, promote inspection, deliver education resources); • Permit-based primary systems within setbacks on lots (<5,000m²); • All AWTS, secondary systems to encourage regular system maintenance; • All other primary systems regarding general system operation, problems with septic systems, pump-out frequency, basic maintenance actions; and • New owners, persons moving into unsewered dwelling, estate agents, owners of unsewered dwellings with tenants, owners upgrading systems etc.			packs sent to property owners, stakeholders Number systems upgraded as result of increased education
	Amend WCC vendor statements to include wastewater status.	Dec 2023		Number workshops and community wastewater forums held annually for plumbers and community
	Enhance Council OWS resources to include website, factsheets, installation guide, DWMP, approvals process, connect to sewer information, community-based workshops, short-video, guest plumber video, articles in local media, social-media, other community engagement platforms etc;	Ongoing		
	Plumber information provision should be increased (enhance knowledge of alternative system install techniques and operation and changed legislation/guidelines) via information dissemination; and,	Ongoing		
	Complete Onsite Wastewater Installation/Maintenance Guide.	Dec 2022	EHO Admin support	Guide completed and numbers posted / viewed

Strategy 3: Develop policies and procedures

Effectively-considered *policies and procedures* should be prepared to provide a framework from which to guide OWS management within the City, including techniques for managing non-compliance. This includes a procedure for effective internal maintenance and management of WCC-operated systems in sewered areas at risk of causing environmental impact.

Most procedures are required to be developed such as but not limited to non-permit to permit process, new system approvals procedure, and upgrade approvals processes for aged and failing systems. The development of a strategy to prioritise sewer connection is required with input from Wannon Water to connect legacy sites to sewer.[30]

Table 11 – Strategy 3.

Strategy 3	Actions	Delivery date	Person responsible	How measured
Develop policies and procedures (to include permit conditions, new system approvals, and upgrade of aged/failing systems)	Develop the following procedures to become policy: • New system approvals process; • Upgrade approvals process; • Connect to sewer process; • Permit condition changes; • Non-permit to permit process;	June 2021	EHO Admin support	Number procedures completed and implemented Systems upgraded through utilising upgrade and enforcement procedures
	• LCA assessment process; • Approved LCA assessors list/process; • Audit/Inspection process; • System location data collection/transfer process; • Operational Risk ranking process;	June 2023		

[30] Mansfield Shire Council 2014. Mansfield Shire Council Domestic Wastewater Management Plan, Accessed from: https://www.mansfield.vic.gov.au/residents/building-and-planning/septic-tanks/domestic-wastewater-management-plan

	• Enforcement (failing/aged/non-maintained systems) process; • EHO training procedure; • Domestic Wastewater process (policy); • Transferring OWS permits when property subdivided process; • Develop process for cancelling permits when sewer is connected via a link with Wannon Water.	June 2024		

Strategy 4: Investigate enhanced Permit Conditions to increase maintenance compliance

Currently OWS permit conditions restrict the ability of Council to enforce non-compliance of system maintenance and upgrade (30+years old systems). The permit system (via the EP Act 1970) is the key method of enforcement and must be a focus of this DWMP (currently under legislative review with information expected from the Victorian EPA by June 2020).

Permit conditions must be strengthened to both assist with increased system maintenance, upgrade, and compliance with permit conditions.

The EH Unit should seek advice from DELWP, EPA, and WCC legal sources regarding the opportunity to retrospectively amend existing permits, issue new permits, or introduce a local law to add conditions requiring regular maintenance and replacement of systems after 30 years on all permits etc. This should concur with outcomes of the updated EP Act in 2020.

Table 12 – Strategy 4.

Strategy 4	Actions	Delivery date	Person responsible	How measured
Investigate enhanced Permit Conditions to increase maintenance compliance	Seek legal advice (and liaise with EPA) as to current *Permit to Install/Use* conditions to assist in increased maintenance compliance and enforcement processes such as: • Requirements to service (maintenance frequency based on system type and risk); • Connect to sewer; • Retrospective Permit conditions (systems currently without permits, current permit holding systems); • Upgrade requirements stated; • *Enforcement process* (failing/aged/unmaintained systems) (detailed in Permit conditions); • Establish permit conditions for retrofitting septic tanks to achieve improved treatment efficacy in upgrade situations; • Consider introduction of 2-yearly owner-instigated OWS 'condition report' requirement (on a timed or EHO-directed basis); • Annual secondary treatment effluent quality sampling and reporting conditions; • A requirement for activated alarms to be fitted to pumps and operable and monitored at all times; • A requirement that risers be fitted to all system components and all access openings brought to ground level for permanent system location;	June 2022	EHO Senior WCC management Legal sources	Number properties increase in maintenance Number properties connect to sewer Number properties upgraded Number permit conditions changed, positive OWS outcomes
	• Permit conditions included for commercial-sized activities to have pre-treatment (e.g. grease trap) as per Wannon Water trade waste requirements.	Dec 2022		Change in permit conditions
	• Consider waiving 'alter' fee for self-identified upgrades.	June 2022		Action accepted

Strategy 5: Source funding for DWMP implementation and/or wastewater management officer

The income derived from existing statutory fees and charges for OWS management within WCC EH Unit will not adequately resource a DWMP inspection or implementation program. The sourcing of funding for the implementation of, for example, a connect to sewer project, high-risk inspection program, retrospective permit issue program, could fund a part-time OWS management officer to complete such actions.

A large regional Council recently (2018) suggested[31] that the approximate cost for a full-time authorised officer is in the order of $80-90,000 per annum (400-600 inspections). This equates to an ongoing cost per septic tank of less than $91 per annum for the 998 operational systems within the LGA.

The case for DWMP implementation may be more achievable if the officer was employed part time (0.4 EFT etc.) to audit high-risk OWS's, perform strategic education activities, and improved data recording.

Consideration of innovative funding and resourcing measures are required and may include application to varied-level government agency funding sources and by using programs such as the EPA OPLE (Officer for Protection of the Local Environment) program or Swinburne/Flinders University Environmental Health student or contract options could be considered for implementation of parts of this Plan.

Table 13 – Strategy 5.

Strategy 5	Action	Delivery date	Person responsible	How measured
Sourcing funding for wastewater audit/enforcement officer	Investigate options for funding for audit/enforcement officer from the options explored: Option 1: Septic tank fee for service Option 2: Joint funding from key stakeholders Option 3: Pump out levy model Option 4: Funding through the general rate base Option 5: Government licencing programs	Ongoing	EHO Wannon Water GHCMA WCC EPA Vic Govt. Legal sources Wastewater system inspection contractor	Funding options considered and enacted Funding raised each financial year Time-fraction OWS management officer employed
	Investigate resource options such as EPA OPLE program, EHO Technician, wastewater contractor, or student placement options.	Dec 2022		

Strategy 6: Performance Review and Risk Management

Managing the risk posed by OWS's and understanding performance outcomes resulting from such actions will support efficacious OWS management within the LGA.

Targeted system inspections must be risk assessment-based and coupled with compliance action in accordance with the *Enforcement Procedure* (see *Strategy 3*). The development of an *Operational Risk* (OR) profile should provide ongoing data for strategically targeting future wastewater inspection, education, and upgrade actions.

Based on the requirement for this DWMP to address ISO30001 Risk Management Standard, Council should quantify gains in environmental outcomes as a result of actions within this plan.[32] The Victorian Auditor General's Office (VAGO) Audit (2018) recommended[33] key improvements to OWS management within Victoria which guide this Plan.

Reporting, audit, and review of this Plan are detailed in *Appendix 3 and* support iterative and effective enhancements to this Plan.

[31] Ballarat City Council 2018. Ballarat City Council Domestic Wastewater Management Plan; Accessed from: https://mysay.ballarat.vic.gov.au/43478/documents/98324
[32] International Organization for Standardization, ISO 30001 Risk Management. Accessed from: https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100426.pdf
[33] Victorian Government 2018, Victorian Attorney General's Department. Managing Impacts from Domestic Wastewater. Accessed from: https://www.audit.vic.gov.au/sites/default/files/2018-09/20180919-Managing-the-EnvironmentalImpacts-of-Domestic-Wastewater.pdf

Table 14 – Strategy 6.

Strategy 6	Actions	Delivery date	Person responsible	How measured
Performance Review and Risk Management	Generate data and analyse performance of OWS's through quantitative means such as reporting the number of: • Policies/procedures completed and implemented; • Systems upgraded utilising education and enforcement; • Systems maintained above 2019 background level; • Education packs sent to property owners; • Workshops and community forums held annually; • Legacy sites connected to sewer; • High-risk systems inspected; • Systems without permits located/upgraded/issued permit; • Catchment-based sampling process instigated (GHCMA, WW); • Improvement in stormwater quality standards (from background level) within high risk areas;	Ongoing	EHO Wannon Water GHCMA Community groups	Trends showing wastewater management outcomes increasing within the City Operational Risk reduction trends across the system 'fleet'
	Conduct EH Unit strategic sampling of various type OWS's (AWTS, Sand Filters – 20:30:10 & 10:10:10) to assess compliance with EPA treatment standards and inform OWS management direction.	Annual		
	Design and implement environmental monitoring strategy in collaboration with EPA, WW, GHCMA, to include industrial areas, high-risk localities, stormwater and groundwater etc. for environmental contaminants (e.g. nutrients and pathogens), including seeking funding sources for such activities.	2023		
	Identify and collate relevant existing environmental data for the WCC LGA to quantify wastewater impacts on waterways, groundwater, public health, and climate change (add data to Exponaire framework where possible).	2023		
	Engage with agencies and community groups for a shared online portal for collection, storage, analysis, and sharing of environmental data results for monitoring impacts of OWS's.	2023		

Strategy 7: Work with Planning Unit and Risk Mapping outputs to enhance unsewered growth development.

The EH Unit and Wannon Water should actively engage with the WCC planning unit to ensure land capability and wastewater constraints are considered at the earliest possible planning stage within unsewered developments.

Integrated actions such as those listed below should be supported by land capability risk data, maps, and overlays generated for this Plan. Such data will require periodic update by WCC's GIS officer.

Table 15 – Strategy 7.

Strategy 7	Action	Delivery date	Person responsible	How measured
Work with Planning Unit and Risk Mapping outputs to	Integrate with Planning Unit at strategic planning and subdivision developmental stages to ensure sustainable OWS options are planned into future unsewered growth areas and continued referral to EH Unit continues;	Ongoing	EHO Planning Unit Engineering Unit GIS Officer (support)	Input into sustainable wastewater growth outcomes, outcomes

enhance unsewered growth development	Approvals processes and alternative OWS prescriptions, minimum standards workshops with Planning staff, to increase system awareness and suggest changes to the approvals process;	6-monthly		achieved
	Meet with Planning Unit and Wannon Water annually to discuss sewer programs, future unsewered planning proposals, updates to EPA Codes, legislative and regulatory change regarding OWS's;	6-monthly		
	Provide LC risk map and Exponaire (wastewater) page training to EH and Planning staff;	Annual		
	The EH Unit should support transparent approvals, upgrade, connect to sewer, and strategic education approaches and a reduced need to obtain LCAs. This reduces processing time and cost of obtaining an OWS permit.	Ongoing		
	In instances where the proposed site has identified constraints or other complexities, Council reserves the right to require an LCA at the EH Unit's discretion.	Ongoing		
	It is proposed that the EH Unit develop a wastewater installation guide with approvals, upgrade, and system maintenance guidelines, to assist in reducing the cost of installing and operating an OWS, and providing planners, owners, plumbers, and additional stakeholders key OWS information.	June 2022		
	Investigate sewer option for these settlements.	June 2022		

Strategy 8: Enhance data collection and reporting systems

The current wastewater database is in the process of being migrated from *Health Manager to TechOne* which is an opportune time to revamp database use and function to support key priorities of this Plan such as increased education and system maintenance actions.

The aim of an effective wastewater database is to enhance customer service, provide rapid access to system information for EHOs/stakeholders, provide a repeatable data collection and system location process, and providing a specific wastewater *Exponaire* platform, supported by risk mapping and land capability risk assessment data.

Table 16 – Strategy 8.

Strategy 8	Action	Delivery date	Person responsible	How measured
Enhance data collection system to include new system location and digitisation process, dedicated OWS Exponaire	Utilise actions in *Strategy 1* to aim for complete database coverage and integration of archival paper-based and non-permit records;	Dec 2024	EHO Plumbers Service agents Admin support IT	Numbers of service reports lodged on online system Number service reports above background level 2019
	New and upgraded TechOne interface for enhanced system information, system location, maintenance actions, transfer of data process etc.;	Dec 2023		
	Develop Exponaire wastewater page/platform to include all land capability (LC) risk layers, including total risk layer for EH, Planning, and Assets department use;	June 2022		

platform, online service reports from plumbers and system owners.	Automated system reporting (and mail-merge) as in *Strategy 2* to be created for time-interval and risk-based system communications not limited to: • Transfer report – new owners, tenants of unsewered properties; • AWTS quarterly maintenance, 3-year septic pump-out, Sand Filter/Worm Farm annual maintenance (email where possible); • Plumbers annual workshop regarding changed approvals, alternative system install and EPA regulatory processes; • Connect to sewer compliance information; • Service/maintenance completed annually across LGA; • Specific system types (for audit); • High-risk, within setback, small lot, aged system reports for targeted inspection and education; • Owners of rental properties within unsewered areas.	June 2022		
	Implement modifications to *TechOne* to record inspections, service events, system maps, pump-outs, building age, upgrade history etc;	June 2022		
	Develop system component GPS location process including added *TechOne* field via *Mapit GIS* or other mobile data collection process to include key attribute data during new, alter, upgrade, or inspection stage;	Dec 2022		
	Develop simple online maintenance/service reporting system such as *Google Forms*, *Intramaps, Crisisworks*, or *SepticTrack* integrated with *TechOne* for plumbers and owners;	Dec 2022		
	EHO's to receive training using *Google Earth* (or other simple) GIS program to digitise final location of system components using *MapIT GIS* data and enter LC and OR risk data (requires GIS Officer to periodically update/upload to *Exponaire*);	Dec 2022		
	Ensure 'legacy system' Wannon Water sewer connection data is updated regularly on GIS / Exponaire;	Dec 2022 (then ongoing)		

Strategy 9: Increase engagement with Wannon Water to enhance OWS management across the LGA

Council will continue to engage with Wannon Water (WW) regarding planning of sewerage services and to encourage the community to connect to reticulated sewer where available.

WCC should establish an agreed-criteria with Wannon Water to assess risk and drive feasibility assessment of alternatives to OWS, including whole of community costs.

Table 17 – Strategy 9.

Strategy 9	Actions	Delivery date	Person responsible	How measured
Increase engagement with Wannon Water to enhance WCC OWS management across the LGA.	Engage with Wannon Water regarding their ongoing and future planning of sewerage services.	Twice year	EHO Wannon Water GHCMA	MOU's signed Funding arrangements developed Workshops staged and attended
	Both WCC and WW to support and encourage the community to connect to sewer via education, inspection, and enforcement processes.	Ongoing		
	Collaborate with Wannon Water, DELWP, and GHCMA to establish an evidence base for measuring the impact of domestic wastewater within the City's catchments.	Annual meeting		

				Information shared between agencies
	Liaise with industry associations, WW, and State (EPA/DEWLP) agencies to fund and develop materials (e.g. You Tube videos) for generic on-site wastewater education, annual newsletter, school education, fact sheets for wastewater industry etc.	Dec 2023		
	Review outcomes of EP Act review/changes due in June 2020 regarding enhanced permit wording, renewal processes, and introducing/enforcing fees.	Dec 2022		
	Develop process/procedure to review Commercial properties (<5000L/day in unsewered areas) (restaurants, cafes, bowling clubs, schools) regularly to ensure ongoing compliance. This could be addressed by integrating the monitoring of these systems into other EH Unit inspections (e.g. Food Act inspections).	June 2022		
	Commercial properties in unsewered areas with EPA Works Approval (systems >5000L/day) systems. Establish information exchange process between the EH Unit and the EPA to have an awareness of commercial systems operating within the LGA.	Dec 2022		

9.2. Conclusion

Warrnambool City Council plans to improve its regulation of key issues relating to domestic wastewater management via the implementation of its 2020-25 DWMP. This Plan builds upon the work achieved by the previous DWMP released in 2013 and has 9 strategies designed to address these issues.

Various options are provided within this Plan to sustainably fund its implementation over the next five years. Much needed modifications to policies, procedures, and enhanced permit conditions, will provide a framework for key strategies to increase whole-of-LGA OWS maintenance.

The Plan is intended to deliver a coherent approach to increasing coverage of the OWS database, educating stakeholders and engaging with the community, supporting increased system maintenance, and improving the process by which OWS permits are issued.

Council and Wannon Water should work closely to develop a transparent, equitable, and efficient process to maximise connect to sewer, and increase collective system maintenance via application of ISO30001-related risk management, to support future sustainable growth of Warrnambool's unsewered areas.

Figure 74 – Rural Living/Farm-zoned land-use with OWS's in the foreground within watercourse setbacks (Hopkins River)