West Wimmera Shire Council
Onsite Wastewater Management Plan

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Prepared for: West Wimmera Shire Council

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Synopsis:	The Onsite Wastewater Management Plan (OWMP) has been developed to identify onsite wastewater management (OWM) issues within the Shire and recommend management actions to ensure potential risks are appropriately managed. A key component of the OWMP is wastewater management risk assessment and mapping that has been completed for the Shire. The assessment identifies prioritised areas that are in need of improved wastewater management practices.
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Acknowledgement of Country

The West Wimmera Shire Council acknowledges the Traditional Custodians of the land on which we meet, and pays respects to their elders, past, present, and emerging.

Disclaimer

The information contained in the OWMP is based on independent research undertaken by Whitehead & Associates Environmental Consultants Pty Ltd (W&A). To our knowledge, it does not contain any false, misleading or incomplete information. Information is based on an appraisal of the conditions subject to the limited scope and resources available for this project and follow relevant industry standards.

The work performed by W&A included a desktop assessment of the West Wimmera Shire, and the conclusions made in this report are based on the information gained and the assumptions as outlined. Under no circumstances can it be considered that these results represent the actual conditions throughout the entire Shire due to the regional scale of this study.

Copyright Note

Document Certification

The Onsite Wastewater Management Plan (OWMP) has been prepared following the standards and guidelines set out in the following documents, where applicable:

- Department of Energy, Environment and Climate Action (2022), *Risk Assessment Guidance Report (DEECA, 2022)*;
- EPA Victoria (2016), *Code of Practice – onsite wastewater management (publication 891.4)* (EPA, 2016);
- EPA Victoria (2024), *[DRAFT] Guidelines for Onsite Wastewater Effluent Dispersal and Recycling Systems* (EDRS, 2024);
- EPA Victoria (2024), *[DRAFT] Guideline for Onsite Wastewater Management* (GOWM. 2024);
- Municipal Association of Victoria & Department of Sustainability and Environment (2014), *Victoria Land Capability Assessment Framework, 2nd Ed* (MAV & DSE, 2014);
- Standards Australia / Standards New Zealand (2012), *Onsite Domestic Wastewater Management (AS/NZS 1547:2012)*; and
- Victoria Audit General's Office (2018), *Managing the Environmental Impacts of Domestic Wastewater* (VAGO, 2018).

Where a document has become superseded, the OWMP refers to the current guidance document.

Acronyms

AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
AHD	Australian Height Datum
AWTS	Aerated Wastewater Treatment System
CMA	Catchment Management Authority
CA	Certificate of Approval
DEM	Digital Elevation Model
DEECA	Department of Energy, Environment, and Climate Action
DELWP	Department of Environment, Land, Water, and Planning (now DEECA)
DIR	Design Irrigation Rate
DLR	Design Loading Rate
DSE	Department of Sustainability and the Environment (former)
DSM	Decentralised Sewage Model
DWMP	Domestic Wastewater Management Plan
DWSC	Declared Water Supply Catchment
EDA	Effluent Dispersal Area
EPA	Environment Protection Authority
GIS	Geographic Information System
GMA	Groundwater Management Area
HPO	Health Protection Officer
LCA	Land Capability Assessment
LGA	Local Government Area
LPED	Low-Pressure Effluent Distribution System
LRA	Land Resource Assessment
MAV	Municipal Association of Victoria
OMLI	Obligations for Managers of Land or Infrastructure
OWM	Onsite Wastewater Management
OWMP	Onsite Wastewater Management Plan
PIC	Plumbing Industry Commission
RAF	Risk Assessment Framework
SEPP	State Environment Protection Policy
SILO	Scientific Information for Land Owners
VCAT	Victorian Civil and Administrative Tribunal
VVG	Visualising Victoria’s Groundwater (Project)
WC	Water Corporation(s)
WMIS	Water Measurement Information System
WSPA	Water Supply Protection Area
WWSC	West Wimmera Shire Council

Executive Summary

West Wimmera Shire Council (WWSC, Council, or the Shire) previously developed an Onsite Wastewater Management Plan (OWMP) (previously a Domestic Wastewater Management Plan) in 2014 to assist with the efficient and effective regulation of onsite wastewater management (OWM) within the Shire in a way which will minimise the potential risk posed by effluent upon public health, the physical environment, and local receiving environments.

As the *Environment Protection Act 2017* (EP Act, 2017) replaced the *Environment Protection Act 1970*, a new framework has been established for environmental protection. The EP Act (2017) requires councils to develop an OWMP, under the Order for Obligations for Managers of Land or Infrastructure (OMLI).

The OWMP has been prepared to recognise, respond to, and link with Council policies and plans, current legislation and regulations and the relevant direction of State Regulatory Authorities. The OWMP also addresses recent changes in Codes of Practice, Australian Standards, and guidelines relating to OWM, and recent advances in technology and management practices.

The OWMP describes the current situation relating to OWM in the Shire and identifies a range of actions Council seeks to implement. The OWMP is to contain controls Council will put in place for OWM in the Shire as well as an Action Plan, with details of the methodology used for the Constraint Mapping, Risk Analysis, and Locality Reports. The OWMP provides the assessment of land ‘parcels’ within the Shire rather than ‘properties’ to provide assessment of potential future subdivided land. Throughout this document ‘parcels’ are referred to as ‘lots’.

A number of key issues for OWM in WWSC have been identified:

- Failing OWM systems having the potential to pollute the environment;
- Small lots and poorly draining clay soils limiting the effectiveness of OWM systems in townships;
- Many larger operations (pubs, restaurants, etc.) with insufficient area to treat and land apply wastewater within their property boundaries;
- Trend of split wastewater treatment with greywater treatment and discharge to street drainage or onsite irrigation; and
- Physical environments may limit the effectiveness of OWM systems within the Shire and therefore many systems may require a high level of design and management to ensure each OWM system is sustainable.

The fundamental purpose of any OWMP is the identification and management of the risk from OWM systems to public health and the environment. A comprehensive four (4) staged Risk Assessment Framework (RAF) was developed with the aim of quantitatively and qualitatively assessing the consequences of unsewered development. The stages are outlined as follows:

- Stage 1: Data Collection – background information, legislation / regulatory / planning controls, and data collection and pre-processing;
- Stage 2: Data Analysis and Review – development of individual constraint and informative maps for parameters that significantly impact on the degree of risk of any given lot;
- Stage 3: OWM Risk Analysis – weighted analysis of individual constraints which determine the final consolidated risk of the unsewered lots within the Shire, based on an algorithm that takes into account the interaction between the individual constraints;

- Stage 4: Land Capability Assessment (LCA) – application of Risk Rating to determine the level of information required as part of a LCA.

Taken together, all stages of the RAF have substantial value as a development assessment tool and provide defensible identification and justification for prioritisation of existing management issues within the Shire. The RAF aims to provide Council with a reasoned and justified tool to prioritise resourcing, oversight, and management for OWM systems within the Shire.

The OWMP has collated a substantial amount of information on the various environmental and built constraints that substantially impact on OWM outcomes. This information is presented as a series of constraint and thematic (informative and overlay) maps developed using Geographic Information Systems (GIS) which illustrate the significance of each element (soil type, slope, useable land area, and climate) to OWM within both the Shire as a whole and the targeted localities. The Appendices of the OWMP outline the basis on which the constraint mapping has been developed, presenting the individual constraint and thematic maps for the Shire.

Individual constraints have been considered in the light of current standards for OWM as outlined in the ‘Document Certification’ section (Page 3) of the OWMP

For unsewered lots, each constraint is considered on the basis of information supplied by Council or relevant State Government agencies. OWM risk is described as low, moderate, high, or very high depending on the degree of risk the lot presents to OWM.

This information will assist Council to prioritise actions including the need for and level of Land Capability Assessment (LCA), reporting required to support proposals for new OWM systems, and will provide guidance in identifying minimum standards of OWM servicing and appropriate technologies.

The OWMP presents a prioritised Action Plan for the Shire with proposed timeframes for completion of the various tasks. The Action Plan provides actions which will be implemented to improve the effectiveness of OWM within the Shire, to protect public health and the environment and to ensure that future development within the Shire is sustainable. The OWMP will also provide a valuable tool for the assessment of planning applications within all unsewered localities and associated townships, and guidance for owners on the requirements that will need to be met.

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1 Introduction

1.1 Overview and Objectives

West Wimmera Shire Council (WWSC, the Shire or Council) has an area of approximately 9,106km^2 and a population of approximately 3,810 people in 2021 (WWSC Community Vision, 2021-2041). The main townships are Edenhope and Kaniva, with smaller rural townships including Apsley, Harrow, Goroke, and Serviceton.

There are currently four (4) sewered areas within the Shire, consisting of Edenhope, Goroke Kaniva, and Serviceton. Wastewater in these areas is managed by Grampians Wimmera Mallee Water (GWM Water); however, it is noted that some lots within sewered areas are not connected to the reticulated system due to development limitations (capital cost, topography, etc.).

As of publishing the OWMP, there are a total of 1,512 sewered lots within the Shire, with 8,276 unsewered 'developable' lots. Developable lots are considered to be lots that are >400m^2 and are not mapped as parks and conservation, crown land, road reserve, or public land management. These excluded lots will be referenced as 'public land lots'. Unsewered developable lots are to be serviced by OWM systems.

Land use in the Shire is characterised by agriculture, rural residential development, small townships, national parks, and state forests. There are no Special Water Supply Catchments located within the Shire, with a reliance on groundwater and tank water for potable water supply. A majority of the Shire is mapped as Groundwater Management Area (GMA) or Water Supply Protection Area (WSPA).

The protection of surface waters, groundwater, and human health are all requirements of the EP Act 2017 (the Act). Under the provisions of the Act and other legislative guidelines, councils are required to prepare an OWMP. The OWMP has been developed in accordance with the legislation and policies outlined in Section 3.

The OWMP outlines how Council will manage OWM systems, including the permit application process, and work with system designers, installers, owners, and maintainers to minimise risk to public health and the environment. The Appendices of the OWMP provide detail on the methodology used to generate constraint mapping and corresponding Risk Analysis of the Shire and individual Locality Reports.

The key objectives of the OWMP are to provide:

- A strategic tool for development of long-term strategies for OWM system management;
- A guide for making decisions about individual OWM systems, enforcement and compliance options, resource management for proactive wastewater management, and cooperation between Council, the community, water corporations, and catchment management authorities; and
- Development of a Risk Assessment Framework designed to evaluate the level of risk associated with proposed and existing OWM systems and to help identify management strategies.

Figure 1: Sewered and Unsewered Lots

West Wimmera Shire Council OWMP 2024

Whitehead & Associates Environmental Consultants

0 20 40 60 km

(Approx Scale)

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Revision	001
Drawn	CM
Approved	MS

1.2 Development of the OWMP

All councils within Victoria are required to prepare a municipal OWMP under the EP Act (2017) by the ‘Order for Obligations for Managers of Land or Infrastructure’ (OMLI). An OWMP is a planning and management document that provides a mechanism for the development, implementation, and review of programs to protect public health, the local environment, and local amenity. The OWMP establishes Council’s policy on, and commitment, to sustainable wastewater management. The OWMP establishes processes to ensure early and comprehensive consideration of OWM in the planning cycle and Council’s responsibility for the monitoring and compliance of systems.

The OWMP assists landowners and Council staff to understand the requirements for development within the Shire in respect of OWM. With the information provided by the OWMP, Council staff will be able to assist landowners and developers to determine the level of assessment that is required for a proposed development. The detailed risk-based assessments of unsewered localities and townships included in the OWMP equips Council staff to assess existing and proposed OWM systems, with the overarching objective of improving OWM into the future. Council staff will also be able to assess the capacity of land to manage wastewater for future development using the RAF.

1.3 Previous Onsite Wastewater Management Plan

The OWMP is an update of the WWSC Domestic Wastewater Management Plan (2014). The WWSC DWMP (2014) reviewed and built on the earlier DWMP in 2006, focusing particularly on investigating OWM issues in the unsewered townships of Goroke, Apsley, Harrow, as well as OWM within the sewered areas of Edenhope, Kaniva, and Serviceton.

The DWMP found that a significant number of properties within these areas were serviced by ‘split’ OWM systems, with blackwater managed by septic tank and absorption systems, and greywater discharged to street drainage leading to community complaints in regard to odour and aesthetics.

In 2011, funding was provided by the State Government through the Small Town Water Quality Fund to upgrade the OWM systems to many properties within the assessed townships.

It was found that many townships consisted of small lot sizes with poorly drained clay soils, resulting in unsuitable conditions for the sustainable management of onsite wastewater.

Since publishing the DWMP in 2014, the township and surrounding area of Goroke has become sewered as a part of a three (3) stage reticulation scheme managed by GWM Water. It is understood that the first stage of the scheme has been completed at the time of the OWMP publication, with the final two (2) stages (northern and eastern Goroke) awaiting completion.

2 Overview of Onsite Wastewater Management

2.1 The Historical Context

Historically the management of OWM systems throughout Victoria has been difficult. Local councils are the regulatory authority for OWM up to 5,000L/day and have generally been limited by time and finances from implementing effective OWMPs. Many councils throughout Victoria and Australia have previously provided very limited programs for OWM, focusing on approvals for new systems and basic system monitoring, as time permits.

There are limited cost recovery options for councils to monitor increasingly complex and larger numbers of systems as the peri-urban areas experience rapid growth throughout Victoria. There is increasing pressure on all councils within Victoria to improve OWM so that existing and future development does not impact on public health and the environment.

2.2 What is Wastewater?

Wastewater is water-borne waste material and includes all normal wastes from residences, as well as many forms of waste matter from other establishments. Wastewater is derived from household waste streams: kitchen; bathroom (basin, bath, and shower); laundry; and toilet. Industrial and commercial wastewater varies widely in character and often requires specialised treatment processes as it may contain substances that are harmful to the biological processes utilised for treatment processes. Domestic wastewater is commonly described in these three (3) forms:

- Blackwater – "water grossly contaminated with human excreta" e.g. toilet water, composting toilet leachate;
- Greywater – "water that is contaminated by but does not contain human excreta" e.g. kitchen, bath, and laundry water; and
- Combined – "a combination of both black and grey water".

Wastewater quality can vary greatly due to numerous factors; however, Table 1 outlines typical values for domestic wastewater quality parameters. Once wastewater has undergone treatment, it is known as effluent.

Table 1: Typical Domestic Wastewater and Septic Effluent Quality[1]

Parameter (mg/L)	Untreated Wastewater	Septic Effluent
Biological Oxygen Demand (BOD_5)	150-300	100-200
Total Suspended Solids (TSS)	150-300	20-100
Ammonium (NH^{4+})	~10	~40
Organic Nitrogen	~30	~15
Ammonia (NO^{3-})	4-13	<1
Ortho Phosphate	6-10	10-15
Organic Phosphorus	4-15	<4

[1] Information collated from a range of sources including AS1546.1:2008, AS1547:2012, EPA Publication 760 (2002), NRMMC (2006) and NSW DLG (1998). Note all concentrations are highly variable.

2.3 Wastewater Treatment

Wastewater is typically managed in urban environments in a community sewerage system, 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 onsite at each individual lot. Onsite wastewater is managed by a variety of treatment systems, including but not limited to:

- Septic tanks;
- Aerated Wastewater Treatment Systems (AWTS / ATU);
- Aerobic biological filter systems (wet composting, vermiculture);
- Membrane filtration;
- Ozonation;
- Reed beds;
- Sand filters;
- Textile (fabric) filters;
- Trickling aerobic filters; and
- Greywater Treatment Systems.

The current Standards and EPA Guidelines provide detailed information about wastewater treatment systems.

Following treatment, effluent is then either dispersed or reused within the boundaries of the lot. The type of dispersal or reuse system depends on the quality of effluent (primary or secondary).

Current best-practice is for effluent to be treated to a secondary standard or better. Any variations to this must be provided with detailed evidence and explanations to demonstrate its suitability. Most systems apply effluent within the soil profile in a dedicated area on the lot via a land application system, often referred to as the Effluent Dispersal Area (EDA). All land application systems will be referred to as EDA throughout the OWMP.

Highly treated and disinfected greywater can be used internally for toilet flushing and cold water supply to the laundry; however such systems are not common due to relatively high costs. Further details on EDAs are provided in the following section.

2.4 Effluent Dispersal Areas

There are a range of EDAs that apply effluent to the soil profile. EDAs that are suitable for primary-treated effluent (septic tanks and most wet composting systems) include:

- Conventional absorption trenches and beds;
- Evapotranspiration-absorption (ETA) trenches and beds;
- Modified ETA trenches and beds – such as 'Wick Trenches' and modified pipe systems;
- Wisconsin or sand mounds; and
- Low Pressure Effluent Distribution (LPED).

EDAs that are suitable for secondary-treated and disinfected effluent (from accredited secondary treatment systems only) include:

- All of the previously mentioned systems suitable for primary effluent;
- Surface spray or drip irrigation; and
- Subsurface or covered surface drip irrigation.

The current Standards and EPA Guidelines provides detailed information about EDAs.

2.5 Risks Associated with Wastewater

Wastewater can be highly variable in quantity and quality, which can impact on the performance of OWM treatment systems. Primary treatment in a septic tank relies on the anaerobic breakdown of organic matter by microbes and solids settling. Shock loads or biocide (e.g. antibacterial product) use within the dwelling can impact on the ability of these microbes to treat the wastewater and solids passing through the first treatment stage, resulting in poor quality of effluent being discharged to the environment.

OWM system failures are most often a result of poor system design, poor installation practices, inadequate maintenance, and sometimes insufficient land area. These factors contribute to potential public health and environmental impacts and are discussed in the following sections.

2.5.1 Public Health

Exposure to any of the following, via direct or indirect contact with wastewater, poses a public health risk.

The principal groups of organisms found in natural waters and wastewater include: bacteria, fungi, protozoa, rotifers, algae, and viruses. Not all of these pose public health risks. Organisms with the potential to pose health risks to humans are known as "pathogenic" organisms and may be classified into three (3) broad categories, as follows.

- **Bacteria –** Wastewater contains a wide variety and concentration of pathogenic and non-pathogenic bacteria. There are many waterborne infectious diseases such as typhoid and cholera. Infectious doses of disease causing bacteria in wastewater can lead to illness. Testing for pathogens is difficult and expensive, therefore indicator bacteria from the intestinal tract of humans and warm blooded animals are used; for example, coliform bacteria such as Escherichia coli (E. coli) are used as an indicator of potential pathogenic / faecal contamination in water.
- **Parasites** – (Protozoa and Helminths). The two (2) dominant protozoan parasites of concern in the treatment of wastewater are Cryptosporidium and Giardia. These are both resistant to standard disinfection methods and pose considerable risk to susceptible members of the community, such as children, elderly, and immunocompromised.

  Helminths or intestinal worms, e.g. tapeworms and roundworms, are also commonly found in wastewater. These release millions of environmentally resilient eggs throughout their lifespan.
- **Viruses –** Contamination of wastewater by viruses may lead to major outbreaks, such as Hepatitis A (referred to as infectious hepatitis), which is the most dominant waterborne virus. Polio Virus is also transmitted in wastewater. Viruses can cause widespread illness in epidemic patterns. Viruses are more common and diverse than bacteria in the aquatic environment.

The ability of pathogens to survive in the environment varies substantially, depending on environmental conditions and the type and life-stage of the organism. Some organisms produce highly resilient spores which can persist in unfavourable conditions for long time periods and can be transported great distances in surface water and groundwater.

Nitrogen in the form of nitrate is highly mobile in the soil / water environment and can also be a potential public health risk if exposure is high. However, this has not been identified as a particular risk for the relatively low-density towns of regional Australia.

2.5.2 Environmental

Nutrients, along with trace quantities of other elements, are essential for biological growth. Phosphorus (P) and Nitrogen (N) are the principal nutrients of concern with regard to OWM systems and are present in a range of compounds in raw wastewater and effluent.

In excess, phosphate and nitrate encourage vigorous growth of algae and aquatic plants in surface water systems, which can lead to ecological disruptions and reduced water quality. Poor quality raw supply water is more difficult and costly to treat for drinking water purposes, compared to water taken from catchments where pollution inputs are reduced.

2.5.3 Social

The poor management of OWM systems has potential financial implications where it may adversely impact on drinking water supplies by contamination. Where OWM systems cause pollution from effluent discharge to waterways or groundwater, there is a requirement for a higher level of treatment of drinking water prior to distribution.

Where failing OWM systems cause odours or discharge into adjoining properties, there is an adverse impact on public amenity, and this may cause a nuisance. There are financial implications for owners who have a failing OWM system and are required to complete upgrade works. New systems can be expensive, and some owners may not have the finances to undertake works immediately, resulting in continuing system failure.

2.5.4 Summary

Table 2 summarises the risks common to all OWM systems (treatment and EDA). The operation of a high density of OWM systems may have long term negative and cumulative impacts on that particular area and on downstream water bodies. However, where systems are correctly designed, installed and managed (including upgrades to existing systems where necessary), the risks of cumulative impacts to the downstream environment are substantially reduced.

As such, the sustainable density of OWM systems is higher when systems are operating optimally, compared to when a proportion (or all) systems are underperforming or failing in some way.

Table 2: Health and Environmental Risk of OWM Systems

Risk	Typical Cause	Potential Impacts
Ineffective regulation	Lack of staff / time	Environmental, Health, and Social
Off-site discharge	Failing / poorly managed / damaged / unapproved treatment and / or EDA(s) / previous approved practices for off-site discharges	Environmental, Health, and Social
Disinfection failure	No disinfection / poor upstream treatment	Health

Risk	Typical Cause	Potential Impacts
Failure of treatment system	Lack of maintenance / poor installation / age of system	Environmental, Health, and Social
Surcharge from EDA	Peak loads / overload of system / failure of EDA / undersized or poorly designed system / shallow groundwater	Environmental, Health, and Social
Failure of EDA	Clogging layer in trenches or beds / broken pipes / inappropriate hydraulics / shallow groundwater	Environmental, Health, and Social
Human contact with effluent	Poor OH&S in maintenance / inappropriate disposal methods	Health and Social
Owner mismanagement	Lack of knowledge of system or regulations / cost avoidance	Environmental, Health and Social
Damage to EDA	Access by vehicles or stock / inappropriate boundaries or protection	Health and Social
Odour	Poor maintenance / toxins in influent / inadequate treatment / mechanical fault	Social
Groundwater contamination	EDA overloaded (undersized or failing) / shallow groundwater / poor design	Environmental, Health, and Social
Surface water contamination	Surface runoff of effluent in EDA / inadequate setback distance / recharge from contaminated groundwater	Environmental, Health, and Social
Human or animal disease outbreak	Direct or indirect pathogen exposure due to any of previously mentioned causes	Health and Social
Degradation of soils	Undersized or failing EDA / usually high strength effluent	Environmental and Social
Increased algae growth	Excess nitrate and phosphate in surface waters from runoff	Environmental, Health, and Social
Degradation of native vegetation	Excess nitrate and phosphate in soils and / or surface waters / unsuitable design	Environmental and Social

3 Legislation and Policies

3.1 Council's Plans and Policies

The OWMP has been developed to fit with Council's other policies and plans through actions identified in the Action Plan. The following Council plans have been included in the OWMP:

- Community Vision 2021 – 2041;
- Council Plan 2021 – 2025;
- Municipal Public Health & Wellbeing Plan 2021 – 2025 (incorporated in the Council Plan 2021 -2025; and
- Planning Scheme.

3.2 Legislation

The legislation relevant to OWM systems in Victoria are as follows:

- *Local Government Act 2020;*
- *Environment Protection Act 2017;*
- *Environment Protection Regulation 2021;*
- *Water Act 1989;*
- *Planning and Environment Act 1987;*
- *Public Health and Wellbeing Act 2008; and*
- *Victorian Building Regulations 2018.*

3.3 Regulatory and Legislative Authorities

OWM involves, to varying degrees, a number of regulatory agencies as follows:

- Council (West Wimmera Shire Council);
- Victorian Building Authority (VBA);
- Municipal Association of Victoria (MAV);
- Water Corporations (WC);
- Department of Energy, Environment, and Climate Cation (DEECA); and
- Catchment Management Authorities (CMA) (Wimmera and Glenelg Hopkins CMA).

3.4 Administrative Authorities

Victorian Civil and Administrative Tribunal (VCAT) deals with civil disputes, administrative decisions and appeals that are heard before a Judge or Tribunal member. It provides a dispute resolution service for both government and individuals within Victoria.

3.5 Standards and Guidelines

The design, operation, and management of OWM systems are supported by a number of standards and guidelines, as follows:

- DELWP (2022), *Risk Assessment Guidance Final Report*;
- EPA Victoria (2016), *Code of Practice – Onsite Wastewater Management, Publication 891.4*;

- EPA Victoria (2024), *[DRAFT] Guideline for Onsite Wastewater Management*;
- EPA Victoria (2024), *[DRAFT] Guideline for Onsite Wastewater Effluent Dispersal and Recycling Systems*;
- MAV (2014), *Victorian Land Capability Assessment Framework 2nd Edition*;
- Standards Australia / New Zealand (2012), *Onsite Domestic Wastewater Management* (*AS/NZS 1547:2012*);
- Standards Australia / New Zealand (2012), *Onsite Domestic Treatment Units* (AS/NZS 1546.1-4);
    - AS/NZS 1546.1:2008 – Part 1: Septic tanks;
    - AS/NZS 1546.2:2008 – Part 2: Waterless composting toilets;
    - AS 1546.3:2017 – Part 3: Secondary treatment systems;
    - AS 1546.4:2016 – Part 4: Domestic greywater treatment systems;
- Standards Australia / New Zealand (2012), *Plumbing and Drainage* (AS/NZS 3500.1-4:2021); and
- Victorian Auditor General's Office (2018), *Managing the Environmental Impacts of Domestic Wastewater*.

Where a document has become superseded, the OWMP refers to the current guidance document.

4 Risk Assessment Framework

The fundamental purpose of any OWMP is the identification and management of risk from OWM systems to public health and the environment. A means of addressing the OWM issues in unsewered areas is to prepare a risk assessment tool that scientifically measures possible impacts of OWM systems on public health and the environment. A comprehensive Risk Assessment Framework (RAF) has been developed for the OWMP to assist Council in analysing risk at variable scales.

The RAF has substantial value as a development assessment tool and provides a defensible method for identification, justification and prioritisation of management issues. It incorporates tools that assess the bio-geophysical capability for OWM in existing unsewered areas, recently developed unsewered subdivisions, and undeveloped unsewered land. It will be primarily used:

- To determine the level of technical investigation required to be undertaken as part of a development application in an unsewered area;
- To identify existing priority unsewered areas that require more detailed investigations to determine OWM needs (i.e. improvement actions or plans); and
- As a guide to Council for strategic planning of future unsewered development.

The RAF aims to provide Council with a reasoned and justified tool to prioritise future development by highlighting regions with elevated OWM risk profiles (e.g. townships with large numbers of small lots and poorly draining clay soils). Consideration of both individual (lot) and cumulative (regional) OWM risk provides a versatile tool for:

- Examining changes from an accepted 'baseline' condition (i.e. water quality or environmental indicators);
- Preparing cost / benefit analyses for upgrade / improvement options (i.e. OWM vs. sewerage); and
- Comparing alternate land use / development scenarios (i.e. development density).

4.1 OWM Risk Analysis

4.1.1 Methodology and Rationale

The primary objective of the OWMP is to assess all unsewered developable lots within the Shire to determine their suitability to sustainably manage wastewater on site in compliance with legislative and regulatory requirements.

The interaction of a wide range of individual constraints and variables affect the specific land capability and associated limitations for sustainable OWM. Understanding these interactions can be difficult, particularly in terms of assessing the relative contributions of individual constraints in a broad-scale evaluation.

The OWM Risk Analysis involved assessing the cumulative effect of the individual constraints such as: soil type; topography (slope); useable land area; and climate for all of the unsewered lots within the Shire. Each lot was assigned a rating class for each of the individual constraints, which has been based on the criteria detailed in Appendix A.

The following algorithm was developed using professional judgement and reviews of current literature. The algorithm generally follows the rationale developed for the Mansfield Domestic Wastewater Management Plan Pilot Project (Mansfield Shire Council, 2014); with adaptation by

W&A to reflect specific concerns within the Shire. It details how the individual constraints were combined to determine the final Risk Rating for each unsewered developable lot within the Shire:

((Soil Suitability + Slope) x ((2 x Lot Size) + Climate)) ÷ 10

The algorithm incorporates the constraints imposed by landform and soil type, as well as the local climate, which will impact on the selection and sizing of OWM systems for any given location.

The final risk value (number) derived from the algorithm for each lot was assessed to determine the appropriate Risk Rating ranges. Further information on the development of the Risk Rating classification is provided in Appendix A. The following outlines the respective ranges and associated final Risk Rating classes:

- Very High: > 5.5;
- High: ≥ 4 to ≤ 5.5;
- Moderate: ≥ 2 to < 4; and
- Low: < 2.

The criteria used to determine the Risk Rating categories were based on the constraints as presented in the DELWP Risk Assessment Guidance Report (2022). Table 3 provides a rationale for the risk ratings, which is also discussed in Appendix A. The final Risk Ratings give guidance towards the OWM requirements as stipulated by Council.

Table 3: Risk Rating Description

Risk Rating	Description
Very High	Constraints are present at a very high level and this significantly restricts opportunities for sustainable OWM. Traditional systems (i.e. septic tanks and trenches) are typically not appropriate. A detailed site and soil evaluation is required to determine if OWM is achievable at all. If achievable, specialised advanced treatment and EDAs may be required to overcome the constraints.
High	Constraints are present at a high level and this substantially restricts opportunities for sustainable OWM. Traditional systems are typically not appropriate. A detailed site and soil evaluation would be required to determine if traditional systems are supported. Otherwise, specialised advanced treatment and EDAs may be required to overcome the constraints.
Moderate	Constraints are present at a moderate level and this limits the range of OWM options that are appropriate for the site. A detailed site and soil evaluation is required to identify the most appropriate OWM system and mitigation measures to be employed.
Low	Constraints are present at a low level and are unlikely to substantially limit opportunities for OWM. In most cases appropriately designed and managed traditional systems will be accepted.

The terms relate to the underlying level of risk to OWM posed by the lot. These factors are used to direct management (planning) decisions and subsequently, the level or intensity of site-specific investigation (LCA) required.

4.1.2 Risk Analysis Mapping

The final Risk Rating for each individual unsewered lot within the Shire is shown in Figure 14 and Table 4. These detail the results of the Risk Analysis for the Shire, as well as areas of concern, which were highlighted as priority regions of investigation by Council.

The localities assessed in the OWMP are: Apsley; Harrow; Goroke; Edenhope; Kaniva; and Serviceton. The lots within each locality include both commercial and domestic use without distinction. Locality boundaries on occasion transect a given lot. When this occurs and a majority of the lot is located within the locality boundary, it has been considered for assessment.

Council maintains a database of the calculated Risk Ratings for all the unsewered lots within the Shire. A lot owner can contact Council to obtain the data for the final Risk Rating of their lot. Whilst every effort is made to consider all relevant factors in the risk mapping, information used may not account for relevant features present on the lot.

Table 4: Final Risk Rating Summary

	Total Unsewered Developable Lots	Total Number in Final Risk Rating			
		Very High	High	Moderate	Low
Shire (Overall)	8,276	55	1,018	1,899	5,304
Apsley	610	0	143	164	303
Harrow	516	1	141	160	214
Goroke	383	0	100	97	186
Edenhope	585	0	11	200	374
Kaniva	804	0	3	148	653
Serviceton	337	0	49	33	255

4.1.3 Evaluation of Risk Analysis

The Risk Analysis resulted in the lots throughout the majority of the Shire being assigned a Low Risk Rating. The final Risk Analysis map highlights the inherent relationship that results in only one (1) or two (2) individual constraints generally affecting any given lot. The Risk Analysis identifies approximately:

- 64.1% of lots with a Low Risk Rating;
- 22.9% of lots with a Moderate Risk Rating;
- 12.3% of lots with a High Risk Rating; and
- 0.7% of lots with a Very High Risk Rating.

The parameters contributing the greatest limitation to OWM within the Shire are soil type (slowly permeable clay subsoils), lot size (small lots within townships), and greater ground surface slopes (lots in proximity to the Glenelg River and its tributaries). The spatial distribution of higher levels of risk are influenced by proximity to townships and in the south of the Shire, slopes relating to the tributaries of the Glenelg River.

It is essential that the limitations of the data used to compile these maps are recognised when using the Risk Analysis map. Whilst individual lots have been assigned a Risk Rating, it is not sufficiently detailed to allow determination of individual system performance or land capability for individual lots. This is why the term Risk Assessment is used to describe the methodology and resultant outputs. A lot categorised as having a Very High Risk Rating will not necessarily be totally unsuitable for OWM or currently be experiencing poor system performance; however, it is likely to contain a number of significant limitations to the operation of OWM systems.

Overall Risk Ratings should be used to justify the requirement for more detailed individual lot LCAs and more rigorous assessment of development proposals rather than to define system performance or land capability.

4.2 Risk Analysis Summary

The recognised limitations emphasise that the Risk Analysis should only be used as a guide to distinguish regions within the Shire with relatively higher levels of OWM risk. The results can be used to target more detailed investigations, including appropriate individual assessment and design, which can potentially mitigate or overcome constraints.

As a general rule, the smaller the lot, the less land that will be available for effluent management after allowing for other development of the land. It is difficult to define the minimum lot size that would be required throughout the Shire to ensure long-term OWM without further detailed study. This will vary depending on the constraints of the lot and the nature of the development as well as the type of treatment and EDA used.

Further detailed studies into the performance of existing OWM systems within each of the targeted unsewered localities may be used to verify the findings of this broad-scale assessment, to provide a more detailed assessment on maximum lot development density, and hence minimum lot size in proposed development areas. This will aid Council in ensuring future development will not adversely impact public health and the environment.

4.3 Limitations of the Risk Assessment Framework

There are several limitations inherent in the methodology adopted for the RAF. Briefly, these are due to:

- The use of broad-scale mapping and desktop analysis;
- A lack of digital data in some areas;
- The present level of scientific understanding and uncertainties relating to the physical and chemical processes and their implications for sustainable OWM. Current best practice derived from wide experience in Australia, New Zealand, and the United States was used in this assessment;
- The limited availability, quality, and accuracy of attribute data; and
- Limitations in the method of assessing the inter-relationship and cumulative effect of individual attributes and constraints.

The Risk Analysis mapping should only be used as a preliminary tool to distinguish regions within the Shire with relatively higher levels of risk to public health and / or the environment and with the objective of determining preliminary priority for future reticulated wastewater servicing.

5 Locality Reports

This section of the OWMP presents an assessment of highlighted priority regions of investigation by Council. A summary of the locality and township and applicable soil units has been provided, as well as the topography, slope, lot size, climate, and a risk summary provided for each unsewered developable lot within each locality and township.

5.1 Apsley

5.1.1 Background

The locality of Apsley is 332.2km^2, is located to the west of Edenhope, with the township ~7kms east of the South Australia border. The locality has a total population of 329 people, with 193 total private dwellings as per the Australia Bureau of Statistics (2021) (ABS, 2021).

A total of 68 public land lots are located within the locality. No reticulated sewer services are currently available. There are 612 unsewered developable lots within the locality, with 181 of these lots located within the township boundary.

Land use within the locality largely consists of farmland, nature reserves, and state forest, with Apsley Golf Course located ~1km southeast of the township. Development within the township includes a post office, café, RSL hall, recreation reserve, town hall, pub, and police station.

5.1.2 Soil Type

The locality is mapped under the Wimmera Land Resource Assessment (LRA) (2005), and consists of the following soil landform groups: Apsley plains; Benayeo gilgai plains; Kowree undulating sand plains & ridges; and West Wimmera wetlands.

5.1.3 Topography and Lot Size

The locality consists of undulating plains, with a slight westerly aspect, with the township located on top of a ridgeline at ~110m AHD.

Lots within the locality have a median slope 0.6%, with slopes ranging from 0.1 to 5.7%. The township has a median slope 0.9%, ranging in slope from 0.1% – 5.6%. The locality has a median lot size of 10.8ha, ranging from 425m^2 to 393.1ha. The township has a median lot size of 1.2ha, ranging from 425m^2 to 9.2ha.

5.1.4 Climate

Climate data for the locality has been provided by SILO Point Data (Apsley (Post Office) (-36.97, 141.08)).

The locality has a median annual rainfall of 510.7mm, with a monthly minimum of 13.9mm (February) and maximum of 80.0mm (August). The area experiences a mean annual potential evaporation of 1,436.2mm. Rainfall exceeds potential evaporation for three (3) months of the year (June – August).

5.1.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in Table 5.

Table 5: Apsley Risk Summary

Risk Rating	Locality	Township
Very High	0 (0%)	0 (0%)
High	143 (23.4%)	71 (39.2%)
Moderate	164 (26.9%)	110 (60.8%)
Low	303 (49.7%)	0 (0%)

A majority of the locality is classified as a Low Risk, with most of the township being classified as Moderate Risk. The elevated risk associated with lots within the township is attributed to useable land limitations.

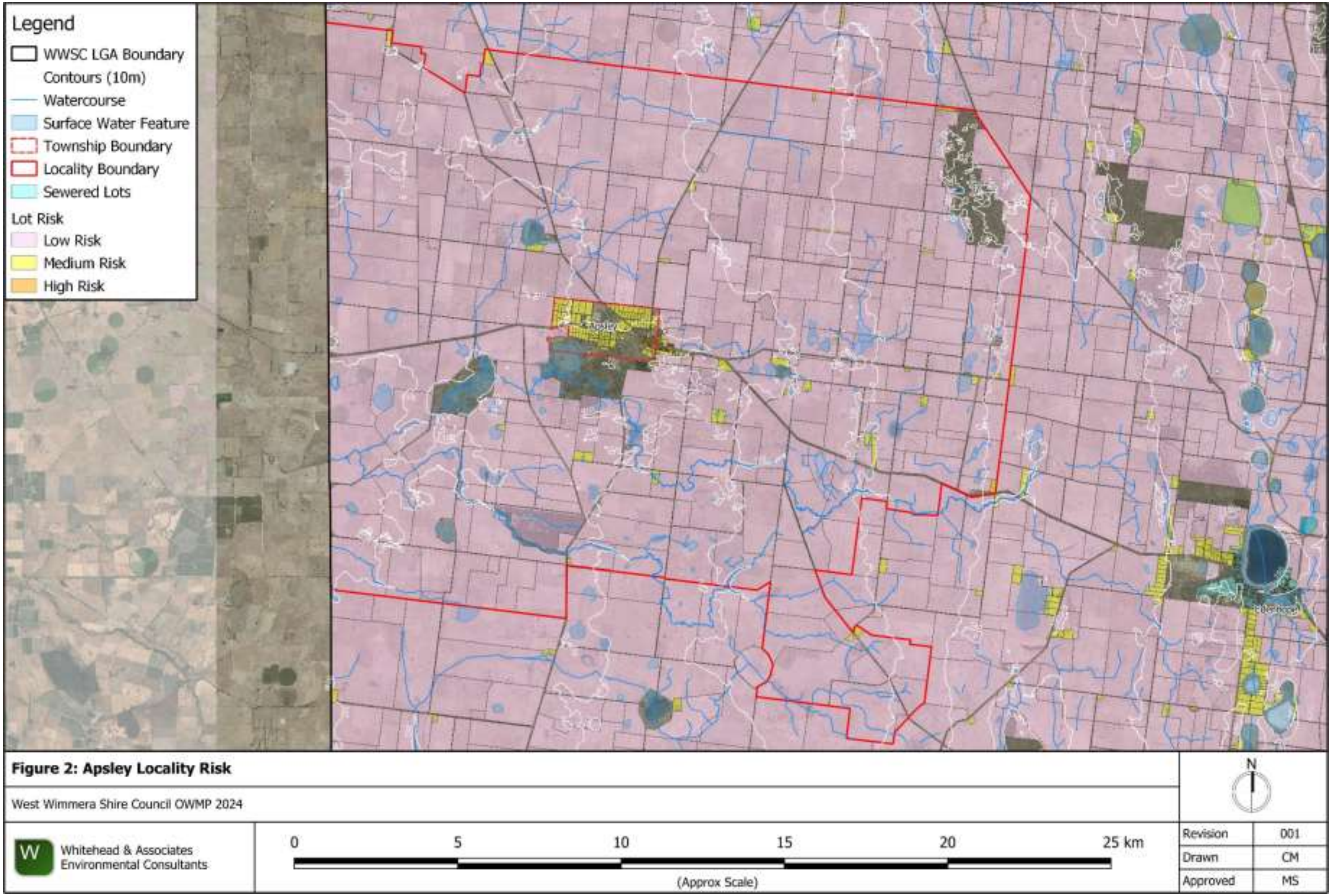

Figure 2: Apsley Locality Risk

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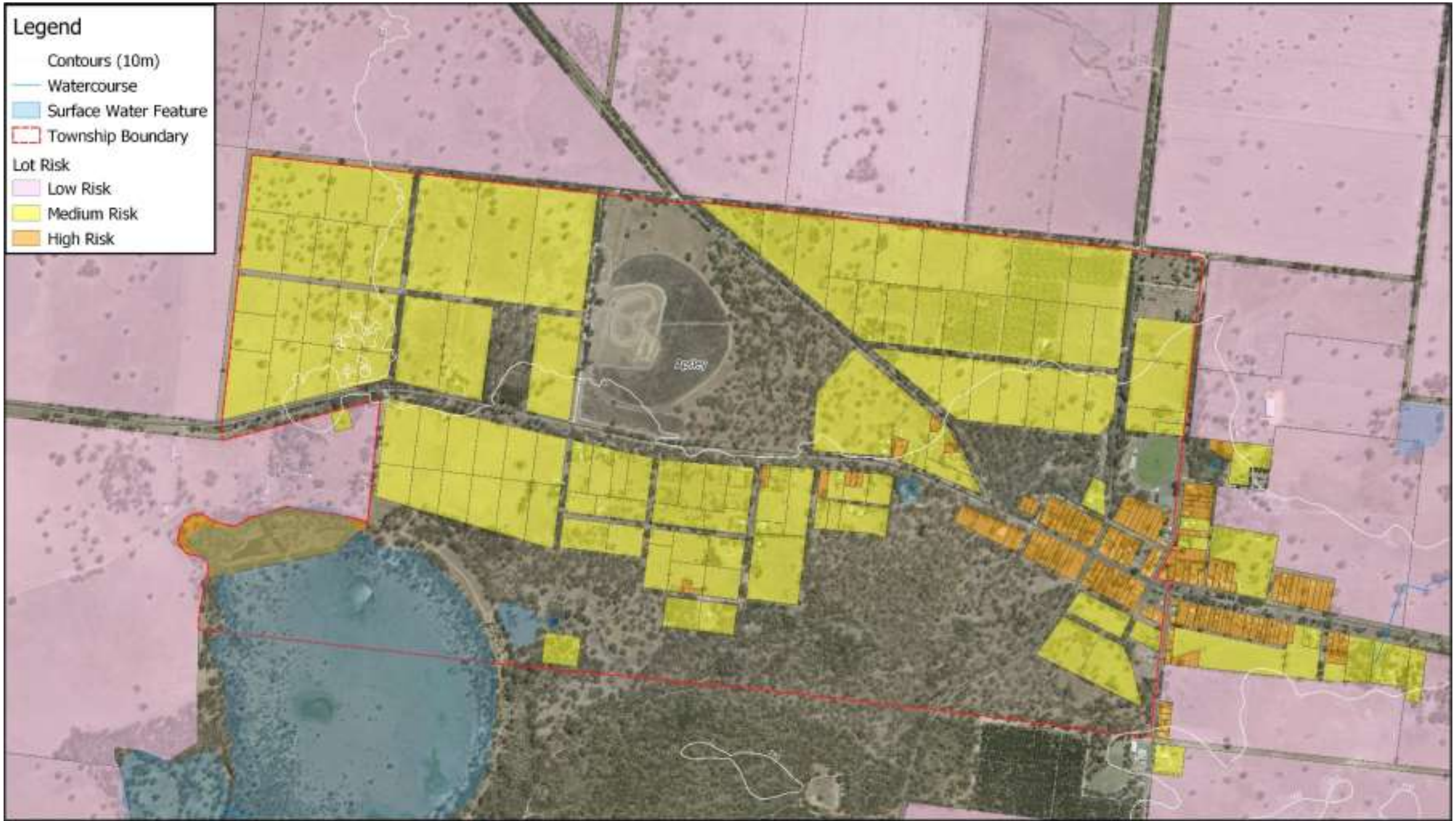

Figure 3: Apsley Township Risk

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0 0.5 1 1.5 2 2.5 3 km

(Approx Scale)

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5.2 Harrow

5.2.1 Background

The locality of Harrow is 283.3km^2, is located to the east of Edenhope with the township adjacent the Glenelg River at the Shires southern border. The locality has a total population of 184 people, with 110 total private dwellings (ABS, 2021).

A total of 97 public land lots are located within the locality. No reticulated sewer services are currently available. There are 516 unsewered developable lots within the locality, with 221 of these lots located within the township. There are 39 lots that are identified within land subject to inundation.

Land use within the locality largely consists of farmland, nature reserves, and state forest. Development within the township includes a community medical centre, garage museum, pub, recreation reserve, post office, general store, and café.

5.2.2 Soil Type

The locality is mapped under of the Wimmera LRA (2005) in the northwest, with the remaining area mapped under the Glenelg Hopkins LRA (2001).

Soils within the locality mapped under the Wimmera LRA (2005) consist of the following soil landform groups: Kowree undulating sand plains & ridges; Edenhope undulating plains; Ullswater plains & rises; and West Wimmera wetlands in the northwest.

Soil within the locality mapped under the Glenelg Hopkins LRA (2001) consist of the following soil landform groups: Sand plains and rises; Dundas Sedimentary; Glenelg river granites; Wannon alluvial; Red Gum plains and rises; Glenelg river Schists; Rocklands Rhyolite; and Glenthompson Metasediments.

5.2.3 Topography and Lot Size

A majority of the locality consists of plains, ridges, and rises, with a south-eastern aspect towards the Glenelg River. Area in proximity to the Glenelg River consists of tributaries and steep slopes (20% – 30%). The township consists of steep terraced terrain (5% – 30%) with a southeast aspect. There are five (5) drainage channels located throughout the township, discharging to the Glenelg River.

Lots within the locality have a median slope 5.3%, with slopes ranging from 0.0% to 36.6%. The township has a median slope 14.4%, ranging in slope from 0.6% – 36.6%. A majority of the lots with steeper terrain are adjacent or within proximity the Glenelg River. The locality has a median lot size of 5.3ha, ranging from 401m^2 to 738.3ha. The township has a median lot size of 0.4ha, ranging from 401m^2 to 4.0ha.

5.2.4 Climate

Climate data for the locality has been provided by SILO Point Data (-37.15, 141.60).

The locality has a median annual rainfall of 499.0mm, with a monthly minimum of 14.5mm (February) and maximum of 74.5mm (August). The area experiences a mean annual potential evaporation of 1,383.0mm. Rainfall exceeds potential evaporation for three (3) months of the year (June – August).

5.2.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in the following table.

Table 6: Harrow Risk Summary

Risk Rating	Locality	Township
Very High	1 (0.2%)	0 (0%)
High	141 (27.3%)	136 (61.5%)
Moderate	160 (31.0%)	66 (29.9%)
Low	214 (41.2%)	19 (8.6%)

A majority of the locality is classified as a Low Risk, with most of the township being classified as High Risk. The elevated risk associated with lots within the township is attributed to useable land and slope limitations.

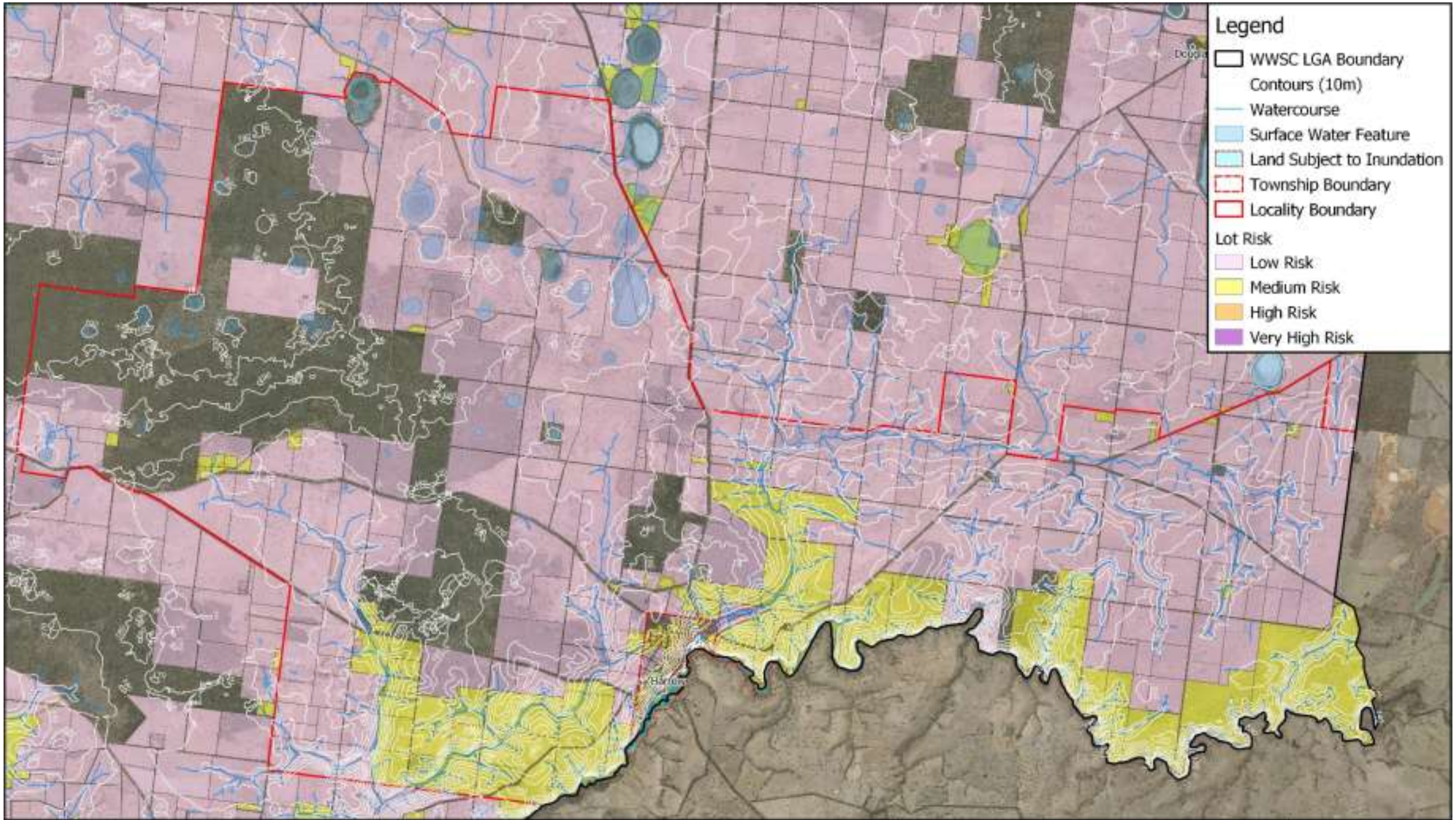

Figure 4: Harrow Locality Risk

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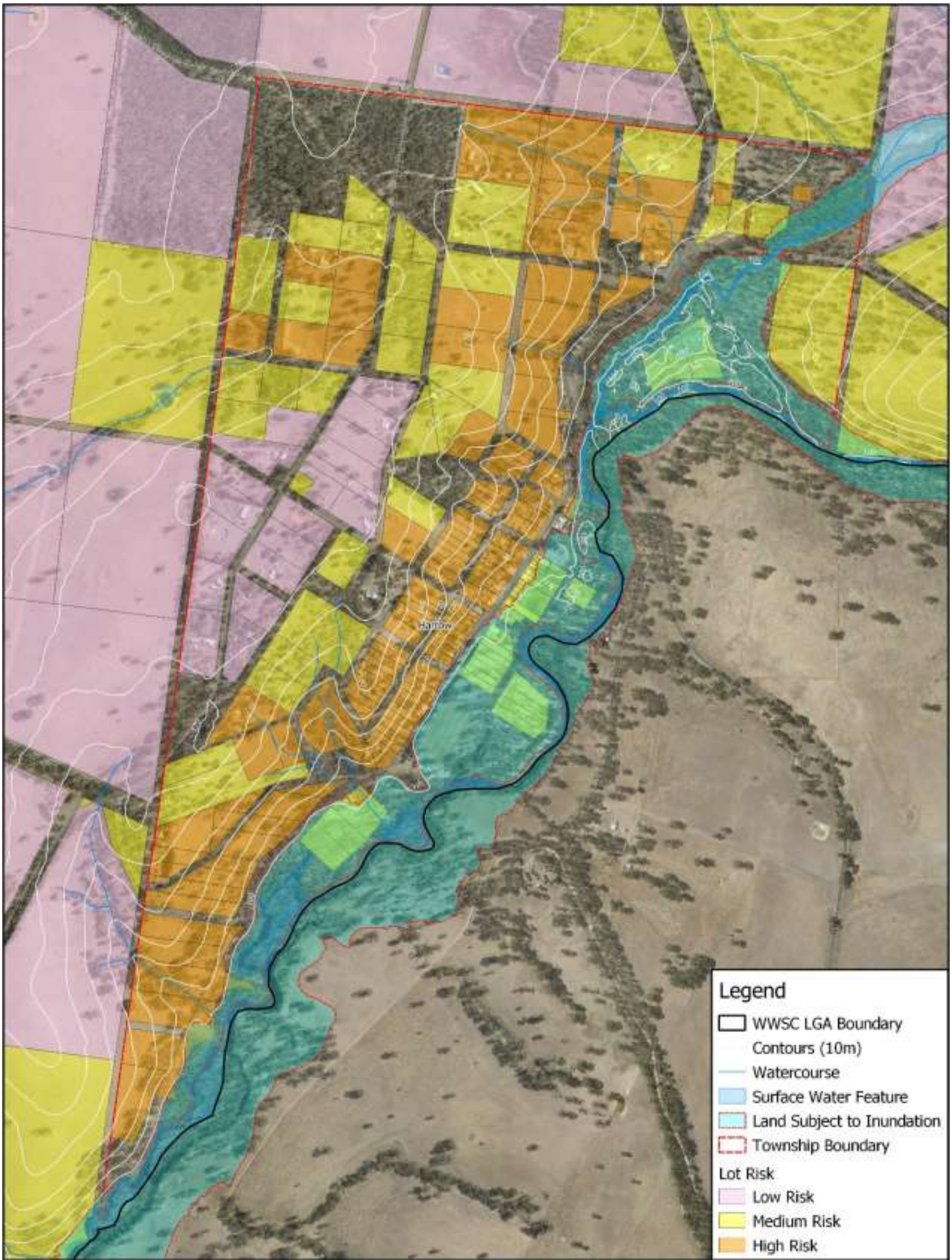

Figure 5: Harrow Township Risk

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0 0.25 0.5 0.75 1 km (Approx Scale)

Revision	001
Drawn	CM
Approved	MS

5.3 Goroke

5.3.1 Background

The locality of Goroke is 323.5km^2, is located to the south of and partially within the Little Desert National Park. The locality has a total population of 295 people, with 163 total private dwellings (ABS, 2021).

A total of 73 public land lots are located within the locality. There are 159 sewered lots in the locality, with 113 of these lots within the township boundary. There are 383 unsewered developable lots assessed within the locality, with 16 of these lots within the east of the township.

All wastewater generated within sewered lots is managed within a single reticulation network, with treatment occurring in maturation and evaporation ponds to the north of the township.

Land use within the locality largely consists of farmland, nature reserves, and national park. Development within the township includes a supermarket, post office, pub, school, and healthcare centre.

5.3.2 Soil Type

The locality is mapped under of the Wimmera LRA (2005), and consists of the following soil landform groups: Goroke plains & rises; Little desert parabolic dunes; Kowree undulating sand plains & ridges; Diapur ridge; Nurcoung plains; West Wimmera wetlands; Ullswater plains & rises; and Minimay plains.

5.3.3 Topography and Lot Size

A majority of the locality consists of plains, with ridges and rises orientated from southeast to northwest.

Lots within the locality have a median slope 1.3%, with slopes ranging from 0.1% to 6.8%. The township has a median slope 1.0%, ranging in slope from 0.7% – 2.0%. The locality has a median lot size of 9.2ha, ranging from 465m^2 to 651.5ha. The township has a median lot size of 0.1ha, ranging from 480m^2 to 0.15ha.

5.3.4 Climate

Climate data for the locality has been provided by SILO Point Data (Goroke (Post Office) (-36.72, 141.47)).

The locality has a median annual rainfall of 404.2mm, with a monthly minimum of 14.8mm (February) and maximum of 57.8mm (August). The area experiences a mean annual potential evaporation of 1,468.5mm. Rainfall exceeds potential evaporation for two (2) months of the year (June – July).

5.3.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in the following table.

Table 7: Goroke Risk Summary

Risk Rating	Locality	Township
Very High	0 (0%)	0 (0%)
High	100 (26.1%)	16 (100%)
Moderate	97 (25.3%)	0 (0%)
Low	186 (48.6%)	0 (0%)

A majority of the locality is classified as a Low Risk, with unsewered developable lots within the township being classified as High Risk. The elevated risk associated with lots within the township is attributed to useable land limitations.

As a majority of the township is sewered, there are only 16 unsewered developable lots in the northeast. It is noted there are a number of unsewered developable lots with elevated risk in close proximity to the township, consisting of Moderate to High Risk. It is understood that a majority of these lots will become sewered under the Goroke Sewerage Scheme carried out by GWMW.

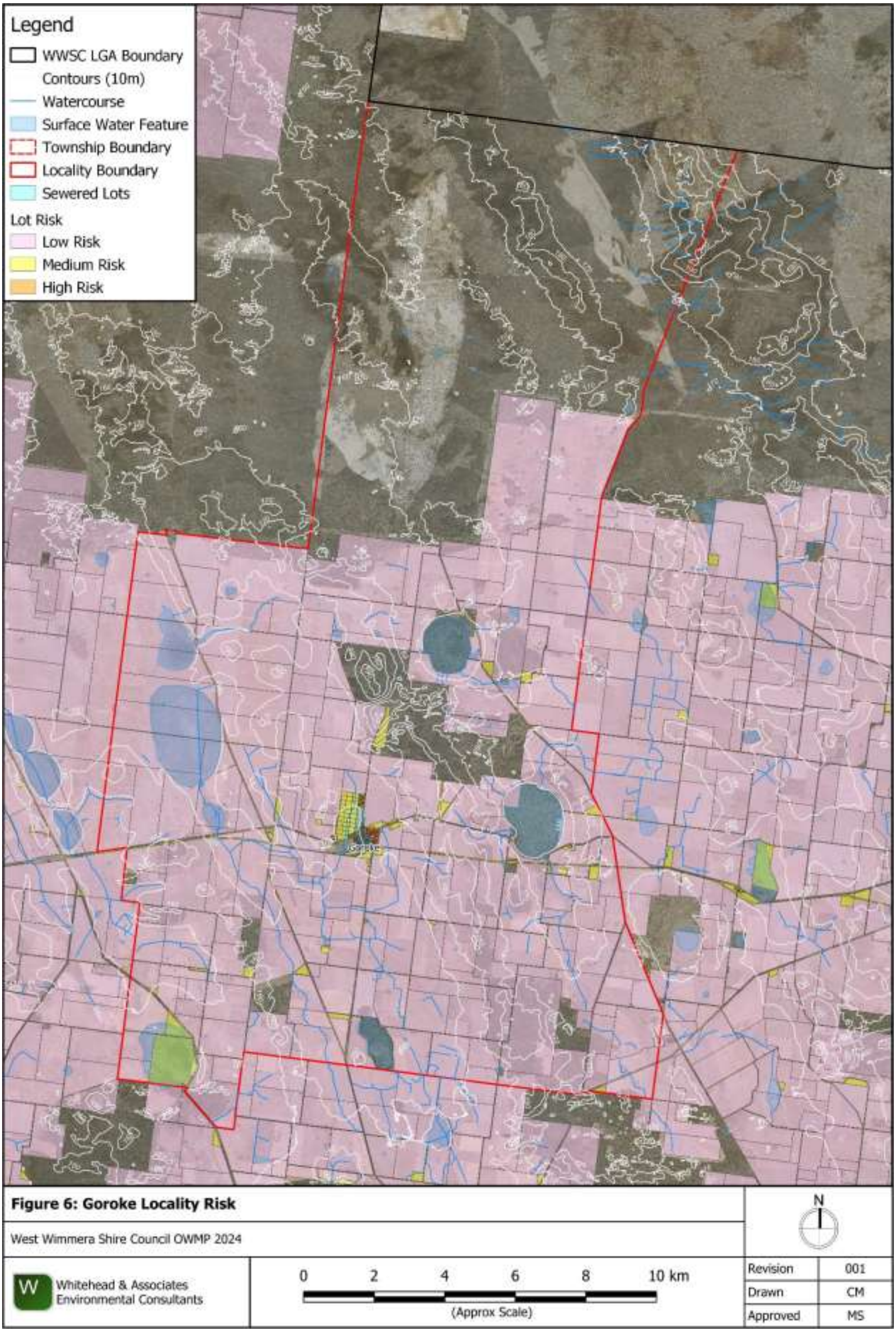

Figure 6: Goroke Locality Risk

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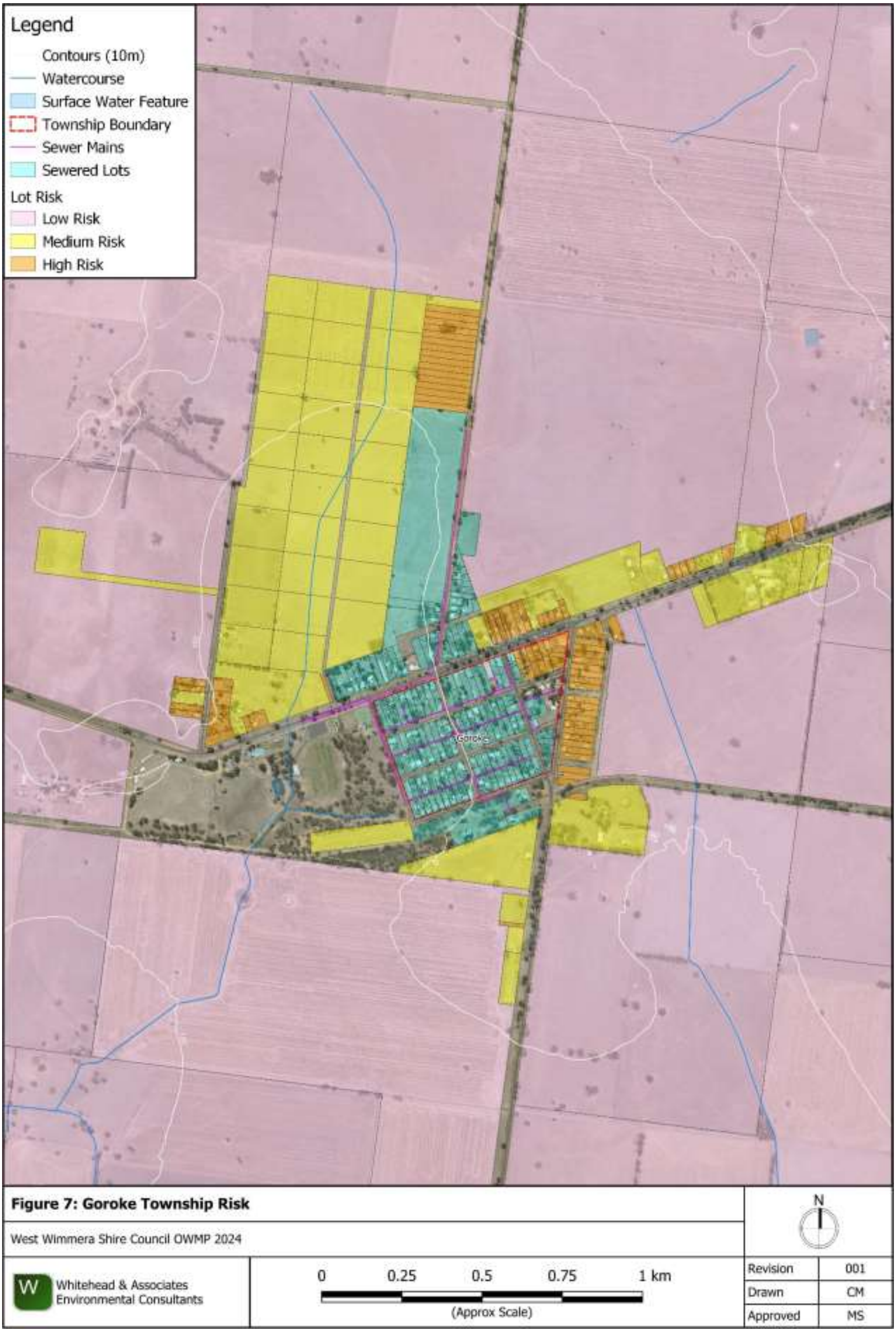

Figure 7: Goroke Township Risk

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5.4 Edenhope

5.4.1 Background

The locality of Edenhope is 498.7km^2, and is located between the localities of Apsley to the west and Harrow to the east. The township is located on the southern banks of Lake Wallace, with Back Swamp within the east of the township. The locality has a total population of 937 people, with 541 total private dwellings (ABS, 2021).

A total of 119 public land lots are located within the locality. There are 623 sewered lots in the locality, with 582 of these lots within the township boundary. There are 585 unsewered developable lots within the locality, with 10 of these lots within the west of the township.

All wastewater generated within sewered lots is managed within a single reticulated network consisting of gravity and pressurised mains transferring wastewater to a series of maturation and evaporation ponds to the north of the township.

Land use in the locality consists of farmland, state forest, and nature reserves. Development within the township includes a supermarket, food outlets, post office, pharmacy, bank, hospital, and golf course.

5.4.2 Soil Type

A majority of the locality is mapped under of the Wimmera LRA (2005), with a small portion in the south mapped under the Glenelg Hopkins LRA (2001).

Soils within the locality mapped under the Wimmera LRA (2005) consist of the following soil landform groups: Apsley plains; Kowree undulating sand plains & ridges; Ullswater plains & rises; Edenhope undulating plains; Powers Creek sand plains; Mosquito Creek swampy sand plains; West Wimmera wetlands; and Harrow valley.

Soil within the locality mapped under the Glenelg Hopkins LRA (2001) consist of the following soil landform groups: Red Hum plains and rises; Sand plains and rises; and Dundas Sedimentary landforms.

5.4.3 Topography and Lot Size

A majority of the locality consists of plains, with ridges and rises orientated from north to south throughout.

Lots within the locality have a median slope of 0.9%, with slopes ranging from 0.1% to 3.9%. Lots within the township have a median slope of 0.9%, with slopes ranging from 0.2% to 1.3%. The locality has a median lot size of 1.4ha, ranging from 117m^2 to 866.2ha. The township has a median lot size of 0.1ha, ranging from 117m^2 to 13.9ha.

5.4.4 Climate

Climate data for the locality has been provided by SILO Point Data (-37.05, 141.30).

The locality has a median annual rainfall of 508.6mm, with a monthly minimum of 11.3mm (February) and maximum of 79.8mm (August). The area experiences a mean annual potential evaporation of 1,398.0mm. Rainfall exceeds potential evaporation for three (3) months of the year (June – August).

5.4.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in the following table.

Table 8: Edenhope Risk Summary

Risk Rating	Locality	Township
Very High	0 (0%)	0 (0%)
High	11 (1.9%)	4 (40%)
Moderate	200 (34.2%)	5 (50%)
Low	374 (63.9%)	1 (10%)

A majority of the locality is classified as a Low Risk, with most of the unsewered undevelopable lots within the township being classified as Moderate Risk. The elevated risk associated with lots within the township is attributed to useable land limitations.

There are 10 unsewered lots located within the western portion of the township. There are also many lots of Moderate Risk in close proximity to the township, with a majority of these lots currently undeveloped. There is a large 42 lot subdivision located ~6.5km east of the township, with all lots presenting a Moderate Risk.

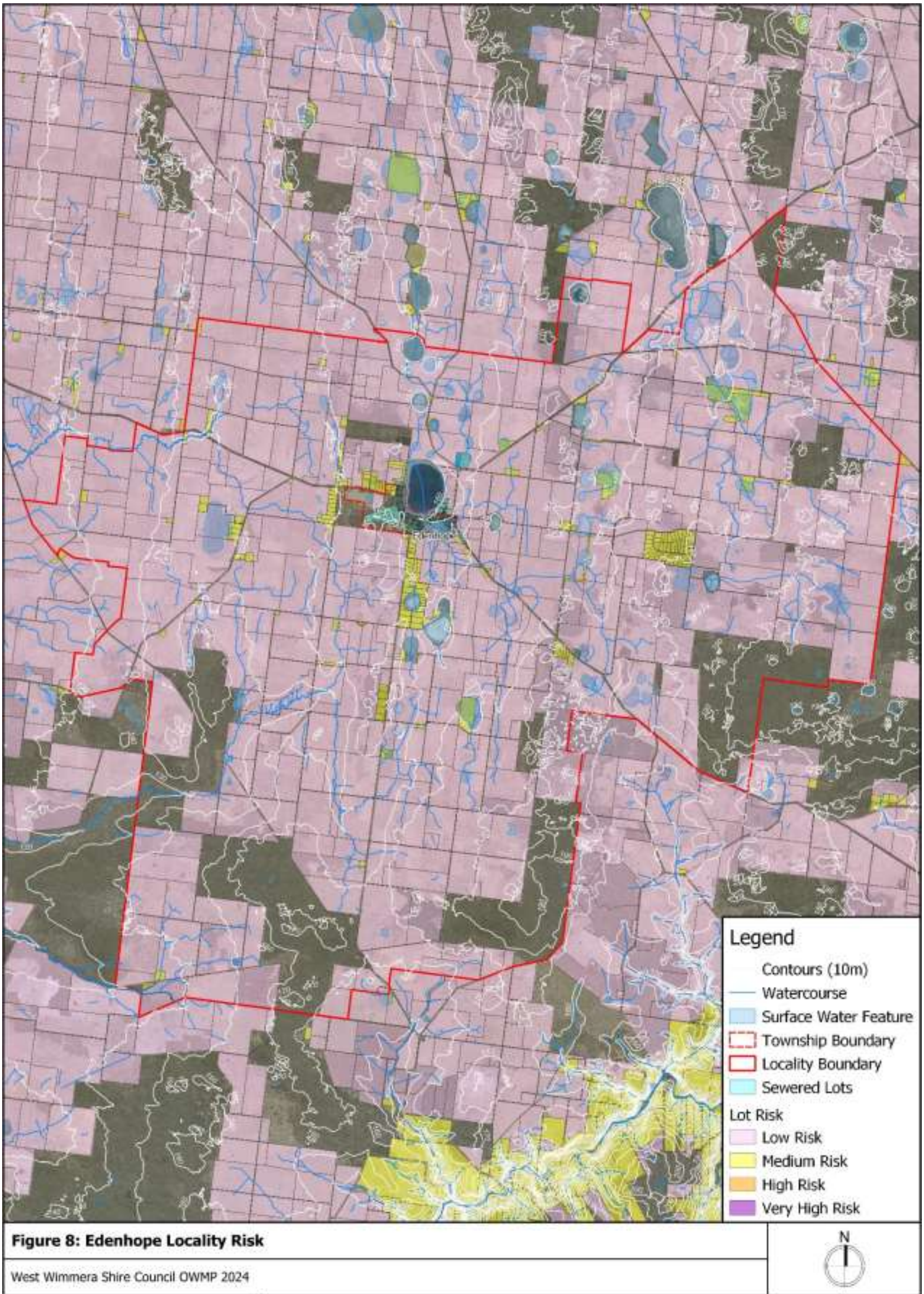

Figure 8: Edenhope Locality Risk

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0 4 8 12 km (Approx Scale)

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Figure 9: Edenhope Township Risk

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0 0.5 1 1.5 2 2.5 3 km (Approx Scale)

N

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Drawn	CM
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5.5 Kaniva

5.5.1 Background

The locality of Kaniva is the largest within the Shire at 1,025.3km^2, and is located to the north of and partially within Little Desert National Park. The locality has a total population of 891 people, with 472 total private dwellings (ABS, 2021).

A total of 140 public land lots are located within the locality. There are 659 sewered lots in the locality, with 555 of these lots within the township boundary. There are 809 unsewered developable lots within the locality, with none located within the township boundary.

Wastewater generated within the sewered lots is managed within two (2) gravity reticulation networks, with a majority of lots in the southeast and northwest draining to the northeast, and the remaining lots within the west draining to the southwest. Both networks drain to a series of maturation and evaporation ponds.

The land use of the locality consists mostly of farmland, with minor stands of nature reserves and a portion of the Little Desert National Park in the south. Development within the township includes food outlets, public amenities, supermarkets, pharmacy, post office, and hospital.

5.5.2 Soil Type

The locality is mapped under the Wimmera LRA (2005), and consists of the following soil landform groups: Diapur ridge; Little desert parabolic dunes; Lorquon undulating plains; Big Desert jumbled dunes; Woorak clay plains; Big Desert dense dunes; Perenna undulating sand plains & rises; Kiata rises; Nhill lake & lunettes; and Lillimur South clay plains.

5.5.3 Topography and Lot Size

A majority of the locality consists of plains, with ridges and rises orientated from north to south throughout.

Lots within the locality have a median slope 1.3%, with slopes ranging from 0.1 to 5.4%. The locality has a median lot size of 72.2ha, ranging from 0.1ha to 794.7ha.

5.5.4 Climate

Climate data for the locality has been provided by SILO Point Data (-36.40, 141.25).

The locality has a median annual rainfall of 365.0mm, with a monthly minimum of 11.6mm (March) and maximum of 51.5mm (August). The area experiences a mean annual potential evaporation of 1,536.2mm. Rainfall exceeds potential evaporation for two (2) months of the year (June – July).

5.5.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in the following table.

Table 9: Kaniva Risk Summary

Risk Rating	Locality	Township
Very High	0 (0%)	0 (0%)
High	3 (0.4%)	0 (0%)
Moderate	148 (18.4%)	0 (0%)
Low	653 (81.2%)	0 (0%)

A majority of the locality is classified as a Low Risk, with no unsewered lots within the township.

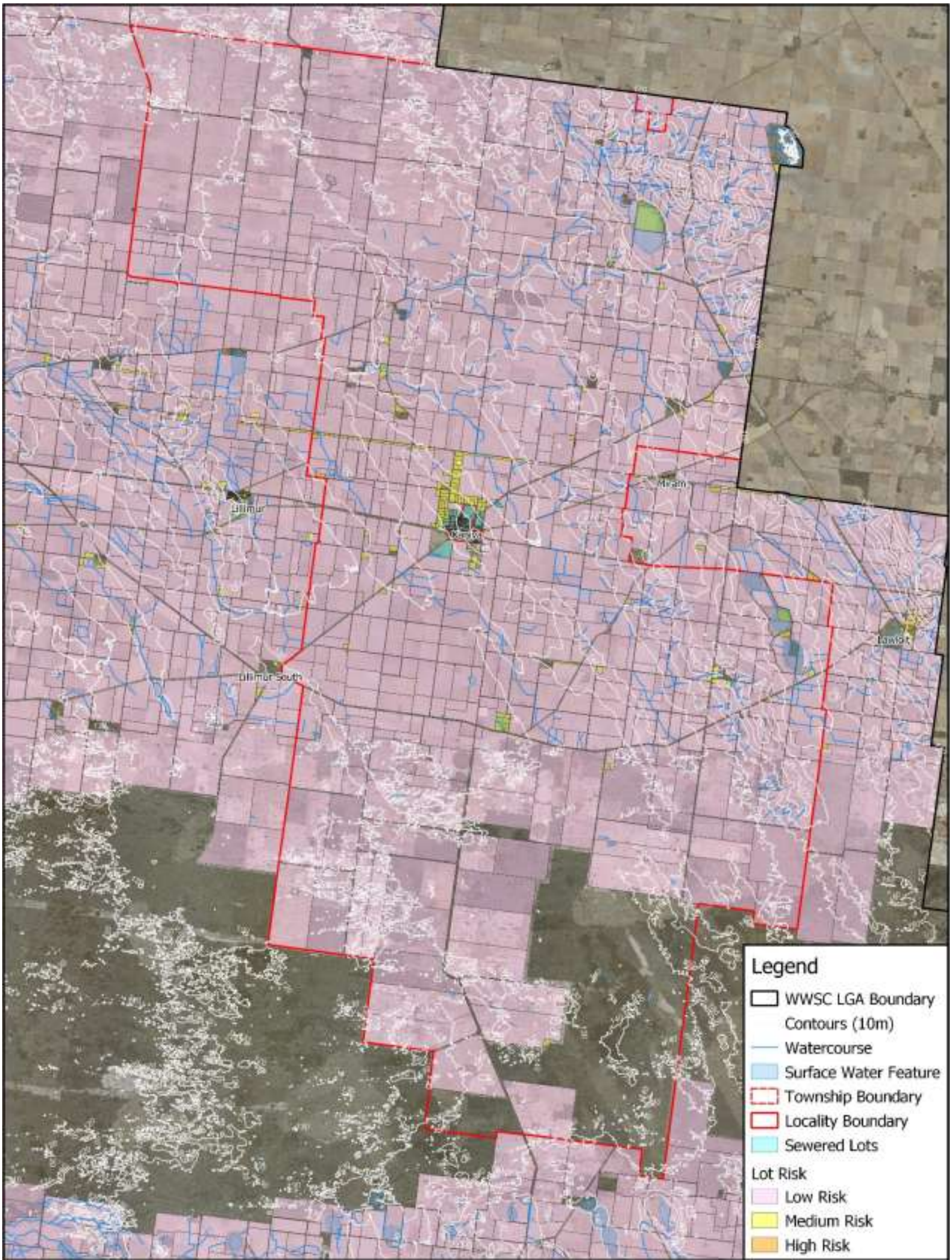

Figure 10: Kaniva Locality Risk

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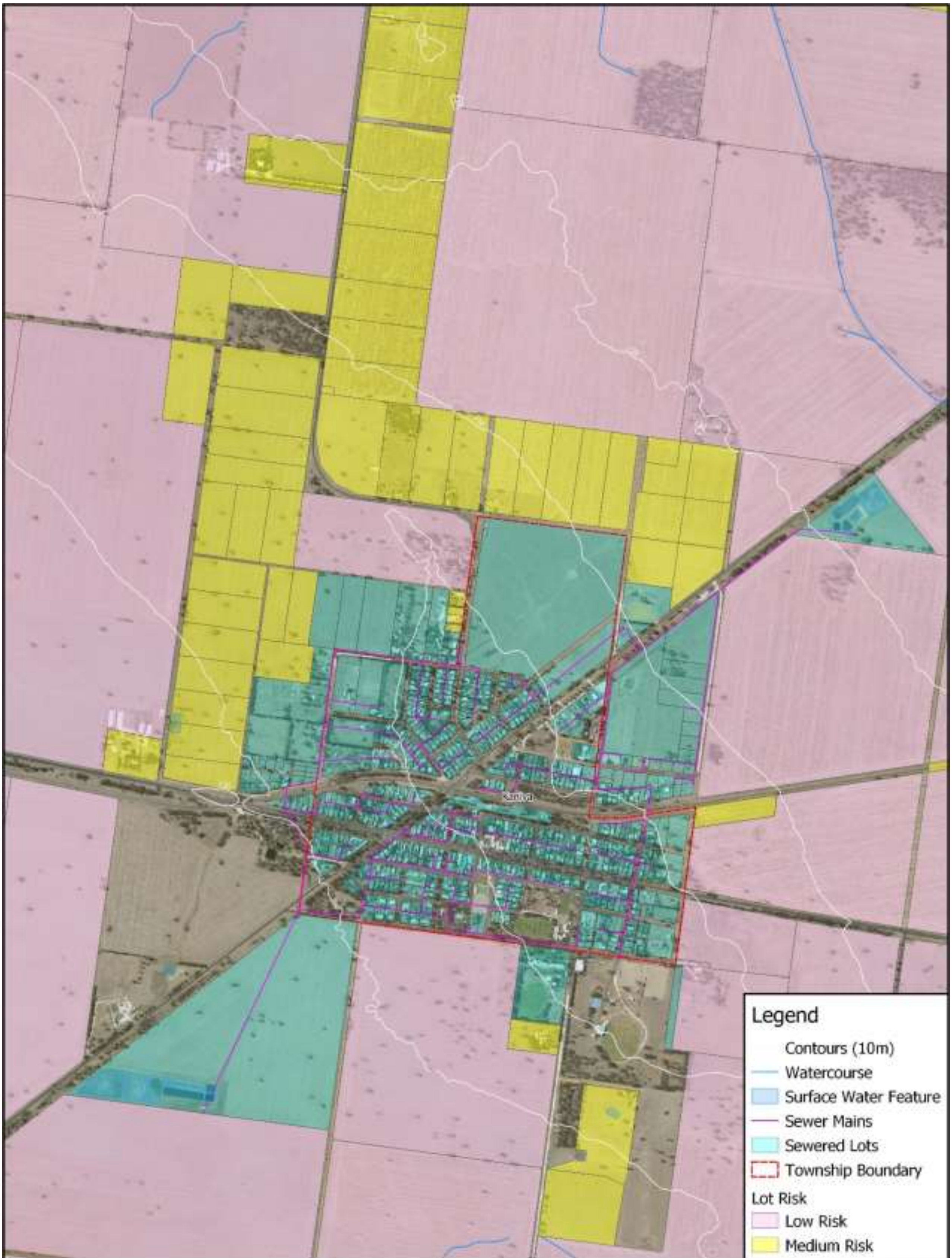

Figure 11: Kaniva Township Risk

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5.6 Serviceton

5.6.1 Background

The locality of Serviceton is 430.2km^2, and is located to the west of Kaniva, with the township ~1.2km east of the South Australian border. The locality has a total population of 129 people, with 67 total private dwellings (ABS, 2021).

A total of 60 public land lots are located within the locality. There are 67 sewered lots in the locality, with 65 of these lots within the township boundary. There are 337 unsewered developable lots within the locality, with 48 of these lots within the township boundary.

Wastewater generated within sewered lots is managed within a single reticulation network, consisting of both gravity and pressurised mains, with treatment occurring in maturation and evaporation ponds to the northeast of the township.

The land use of the locality mostly consists of farmland, with a portion of the Little Desert National Park in the south. Development within the township includes public amenities, post office, bowling club, and historical train station.

5.6.2 Soil Type

The locality is mapped under the Wimmera LRA (2005), and consists of the following soil landform groups: Little desert parabolic dunes; Lillimur South clay plains; Lorquon undulating plains; Big Desert jumbled dunes; Big Desert dense dunes; Kiata rises; Woorak clay plains; Servicetown North limestone rises; and Diapur ridge.

5.6.3 Topography and Lot Size

A majority of the locality consists of plains, with ridges and rises orientated from northwest to southeast throughout.

Lots within the locality have a median slope 0.8%, with slopes ranging from 0.1% to 6.4%. The township has a median slope 0.5%, ranging in slope from 0.1% – 1.1%. The locality has a median lot size of 57.8ha, ranging from 600m^2 to 1,062.1ha. The township has a median lot size of 0.1ha, ranging from 600m^2 to 16.5ha.

5.6.4 Climate

Climate data for the locality has been provided by SILO Point Data (-36.40, 141.00).

The locality has a median annual rainfall of 399.1mm, with a monthly minimum of 13.4mm (March) and maximum of 60.0mm (August). The area experiences a mean annual potential evaporation of 1,532.4mm. Rainfall exceeds potential evaporation for two (2) months of the year (June – July).

5.6.5 Lot Risk

A summary for the lot risk for the entire locality and township are provided in the following table.

Table 10: Serviceton Risk Summary

Risk Rating	Locality	Township
Very High	0 (0%)	0 (0%)
High	49 (14.5%)	45 (93.8%)
Moderate	33 (9.8%)	2 (4.2%)
Low	255 (75.7%)	1 (2.1%)

A majority of the locality is classified as a Low Risk, with most of the unsewered township being classified as High Risk. The elevated risk associated with lots within the township is attributed to useable land limitations.

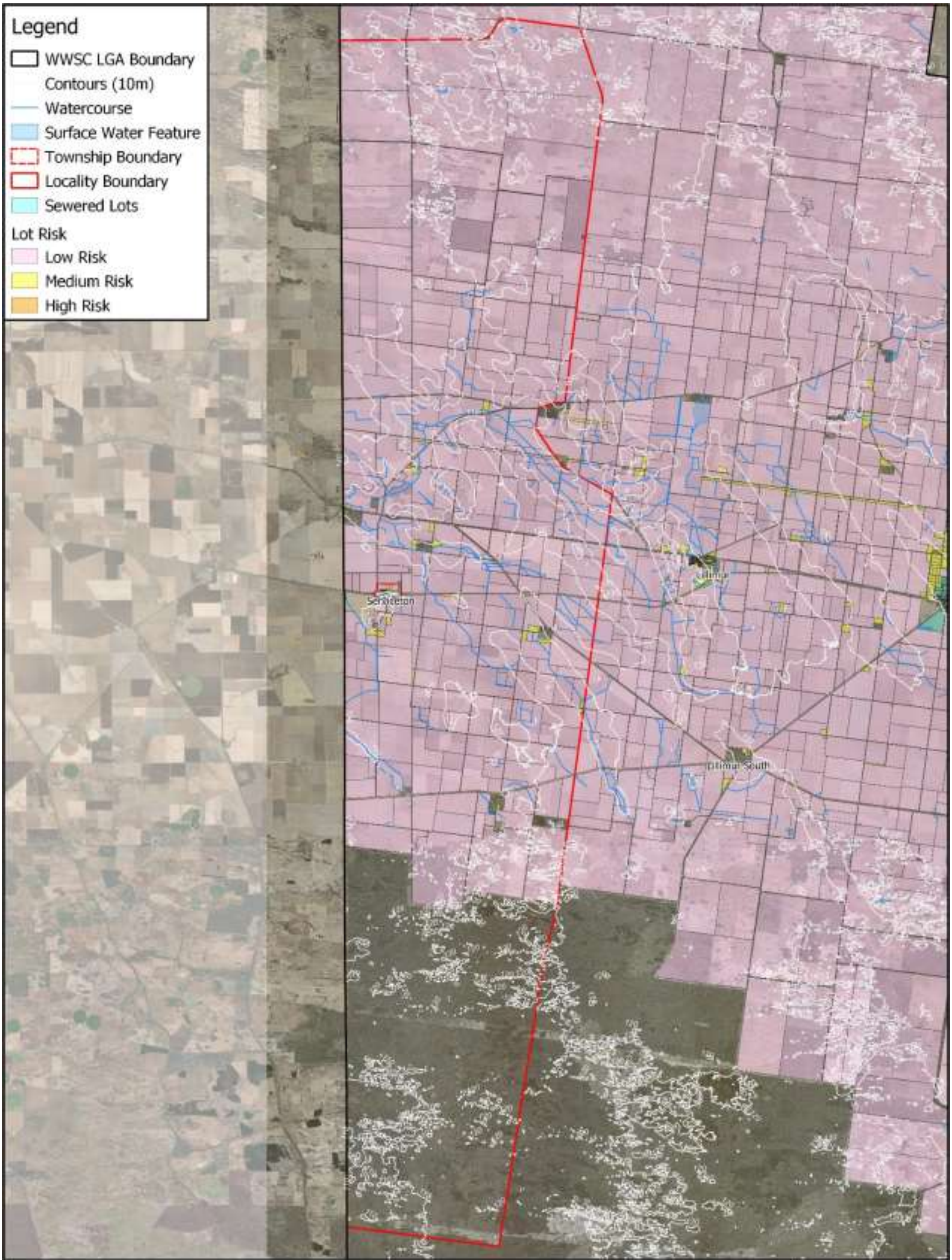

Figure 12: Serviceton Locality Risk

West Wimmera Shire Council OWMP 2024

Whitehead & Associates Environmental Consultants

0 3 6 9 12 15 km

(Approx Scale)

N

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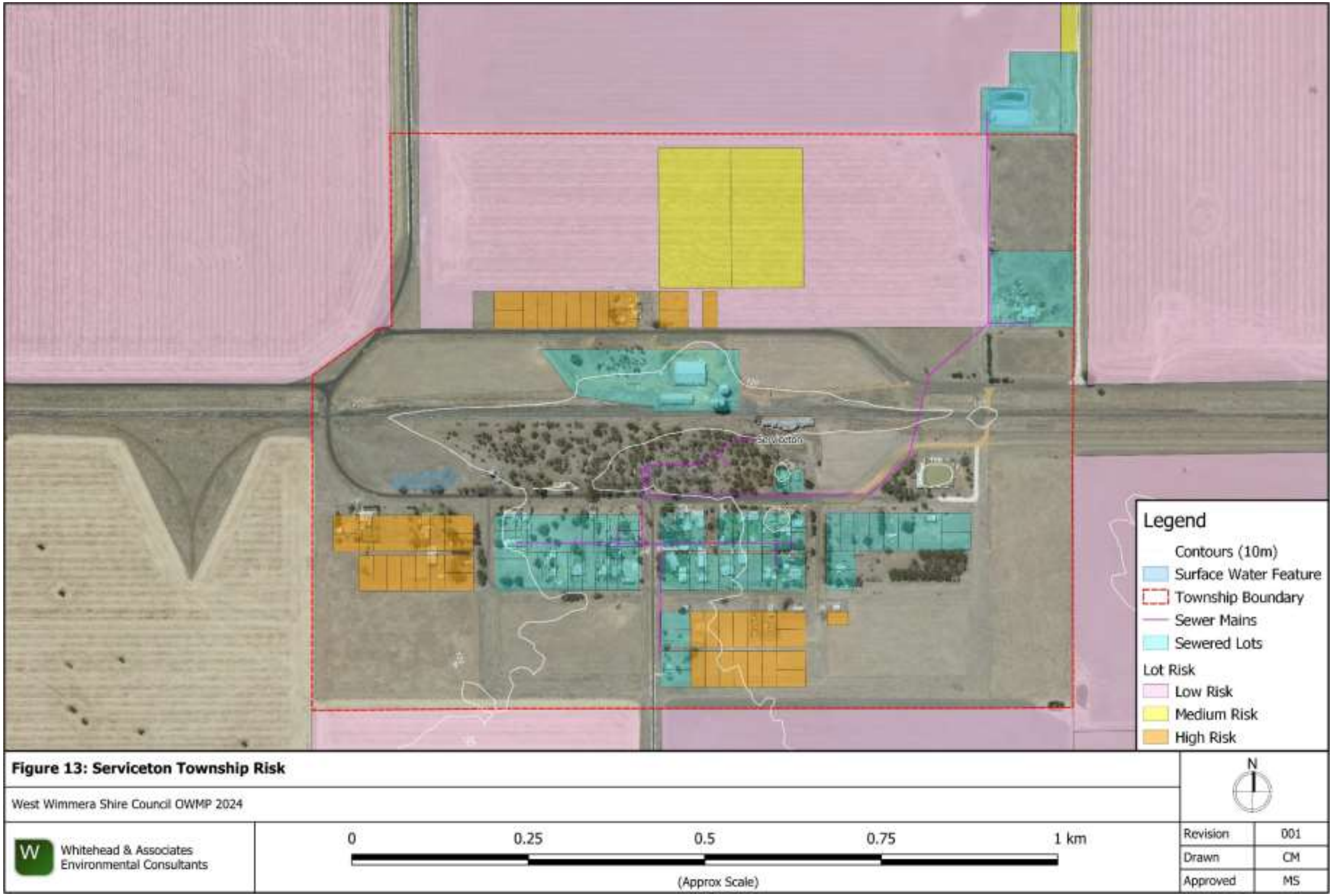

Figure 13: Serviceton Township Risk

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6 Overall Shire Risk

As stated in Section 4 of the OWMP, the overall OWM risk of the Shire is Low, with increasing risk in proximity to townships and the tributaries of the Glenelg River in the south. Figure 14 presents the overall Risk Assessment mapping of the entire Shire.

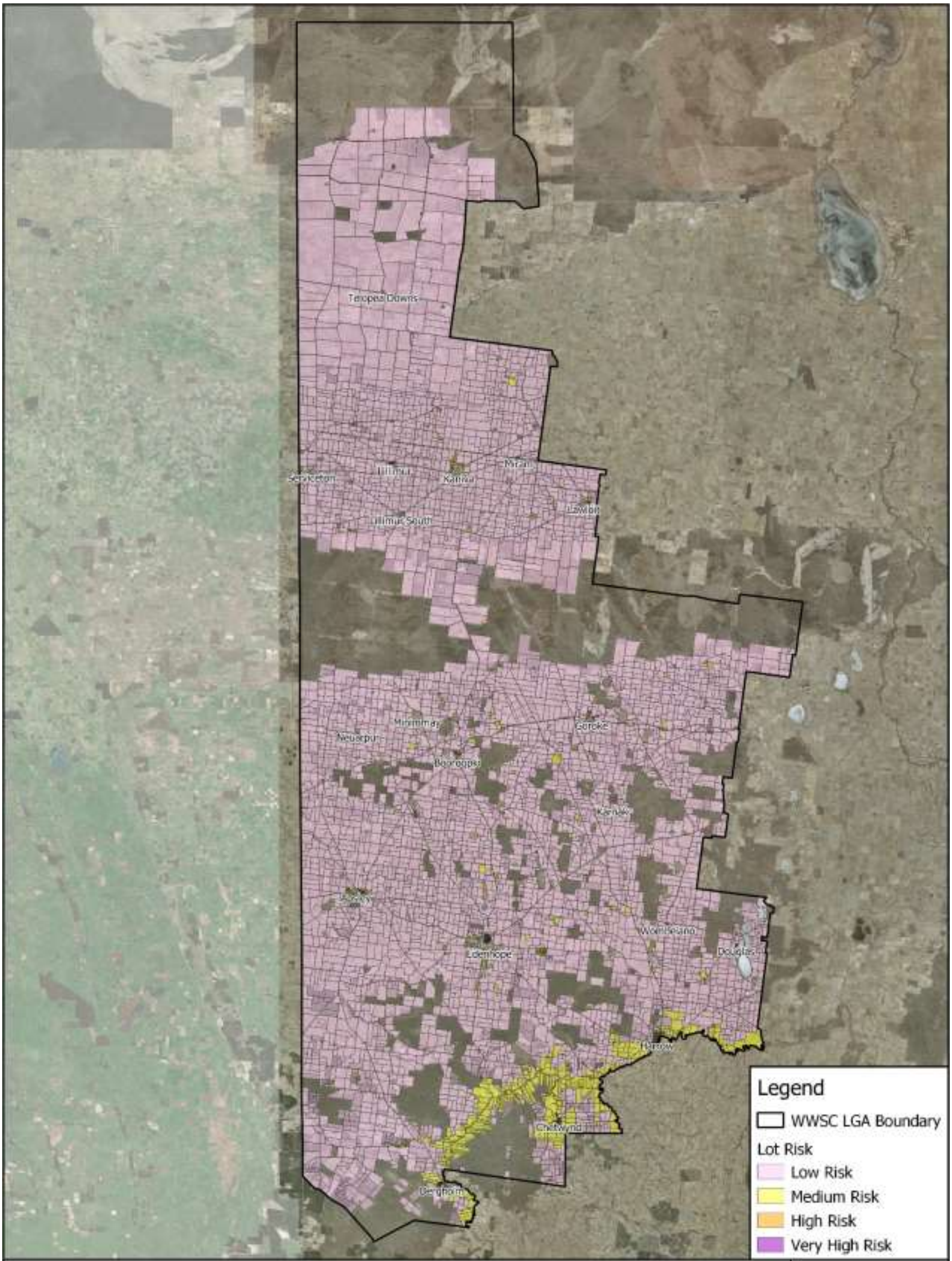

Figure 14: Entire Shire Risk

West Wimmera Shrie Council OWMP 2024

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0 20 40 60 km (Approx Scale)

N

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Approved	MS

7 Locality OWM System Requirements

For all lots classified as Low and Medium Risk, predetermined treatment system quality and EDAs are provided. All applications for OWM systems on lots that are classified as High to Very High Risk must be determined by a LCA and Wastewater Management Report (WMR), as outlined in Appendix B of this OWMP.

Based on the limiting soil texture throughout the Shire (Category 6 subsoil), a minimum effluent quality of secondary standard with disinfection is required, with effluent reused via an evapotranspiration (ETA) bed or (subsurface or surface) irrigation area.

Water balance modelling was undertaken to determine the minimum basal areas for the applicable effluent dispersal systems, as presented in the Tables 11 and 12. Water balance modelling and climate data used can be found in Appendix C of the OWMP. The soil loading rate has been based on the values as presented in Table 9 of EPA Victoria Code of Practice or Table 4-9 of the GOWM (2024).

Any application for the installation of an OWM system that does not comply with the predetermined requirements is required to be determined by a LCA and WMR.

Table 11: Subsurface Irrigation Sizing Table

Locality	1 – 3 Bedrooms (720L/day)	4 Bedrooms (900L/day)	5 Bedrooms (1,080L/day)
Apsley (m^2)	730	910	1,090
Benayeo (m^2)	550	680	820
Bringalbert (m^2)	560	710	850
Broughton (m^2)	400	500	600
Charam (m^2)	570	710	850
Chetwynd (m^2)	1,110	1,390	1,670
Connewirricoo (m^2)	850	1,060	1,270
Dergholm (m^2)	1,070	1,330	1,600
Dorodong (m^2)	970	1,210	1,460
Douglas (m^2)	550	680	820
Edenhope (m^2)	550	690	830
Goroke (m^2)	500	620	740
Grass Flat (m^2)	410	510	610
Gymbowen (m^2)	480	600	720
Harrow (m^2)	650	820	980
Kadnook (m^2)	790	990	1,180

Locality	1 – 3 Bedrooms (720L/day)	4 Bedrooms (900L/day)	5 Bedrooms (1,080L/day)
Kaniva (m^2)	430	540	650
Karnak (m^2)	480	600	720
Langkoop (m^2)	810	1,010	1,210
Lawloit (m^2)	430	540	650
Lillimur (m^2)	430	530	640
Miga Lake (m^2)	510	630	760
Minimay (m^2)	490	610	730
Miram (m^2)	410	520	620
Mitre (m^2)	470	580	700
Neuarpurr (m^2)	520	650	780
Nurcoung (m^2)	440	550	660
Ozenkadnook (m^2)	510	640	770
Patyah (m^2)	550	690	820
Poolaijelo (m^2)	1,010	1,260	1,510
Peronne (m^2)	470	590	710
Powers Creek (m^2)	1,000	1,260	1,510
Serviceton (m^2)	470	590	710
Tarrayoukyan (m^2)	1,030	1,280	1,540
Telopea Downs (m^2)	410	520	620
Ullswater (m^2)	580	730	870
Wombelano (m^2)	570	710	850

Table 12: ETA Bed Sizing Table

Locality	1 – 3 Bedrooms (720L/day)	4 Bedrooms (900L/day)	5 Bedrooms (1,080L/day)
Apsley (m^2)	180	230	270
Benayeo (m^2)	170	210	250
Bringalbert (m^2)	170	210	250
Broughton (m^2)	150	190	230
Charam (m^2)	170	210	250
Chetwynd (m^2)	200	250	300
Connewirricoo (m^2)	190	230	280
Dergholm (m^2)	200	240	290
Dorodong (m^2)	190	240	290
Douglas (m^2)	170	210	250
Edenhope (m^2)	170	210	250
Goroke (m^2)	160	200	240
Grass Flat (m^2)	150	190	230
Gymbowen (m^2)	160	200	240
Harrow (m^2)	180	220	260
Kadnook (m^2)	180	230	280
Kaniva (m^2)	150	190	230
Karnak (m^2)	160	200	240
Langkoop (m^2)	180	230	280
Lawloit (m^2)	150	190	230
Lillimur (m^2)	150	190	230
Miga Lake (m^2)	160	200	240
Minimay (m^2)	160	200	240
Miram (m^2)	150	190	230
Mitre (m^2)	160	200	240
Neuarpurr (m^2)	160	200	250
Nurcoung (m^2)	160	190	230

Locality	1 – 3 Bedrooms (720L/day)	4 Bedrooms (900L/day)	5 Bedrooms (1,080L/day)
Ozenkadnook (m^2)	160	200	240
Patyah (m^2)	170	210	250
Poolaijelo (m^2)	190	240	290
Peronne (m^2)	160	200	240
Powers Creek (m^2)	190	240	290
Serviceton (m^2)	160	200	240
Tarrayoukyan (m^2)	190	240	290
Telopea Downs (m^2)	150	190	230
Ullswater (m^2)	170	210	250
Wombelano (m^2)	170	210	250

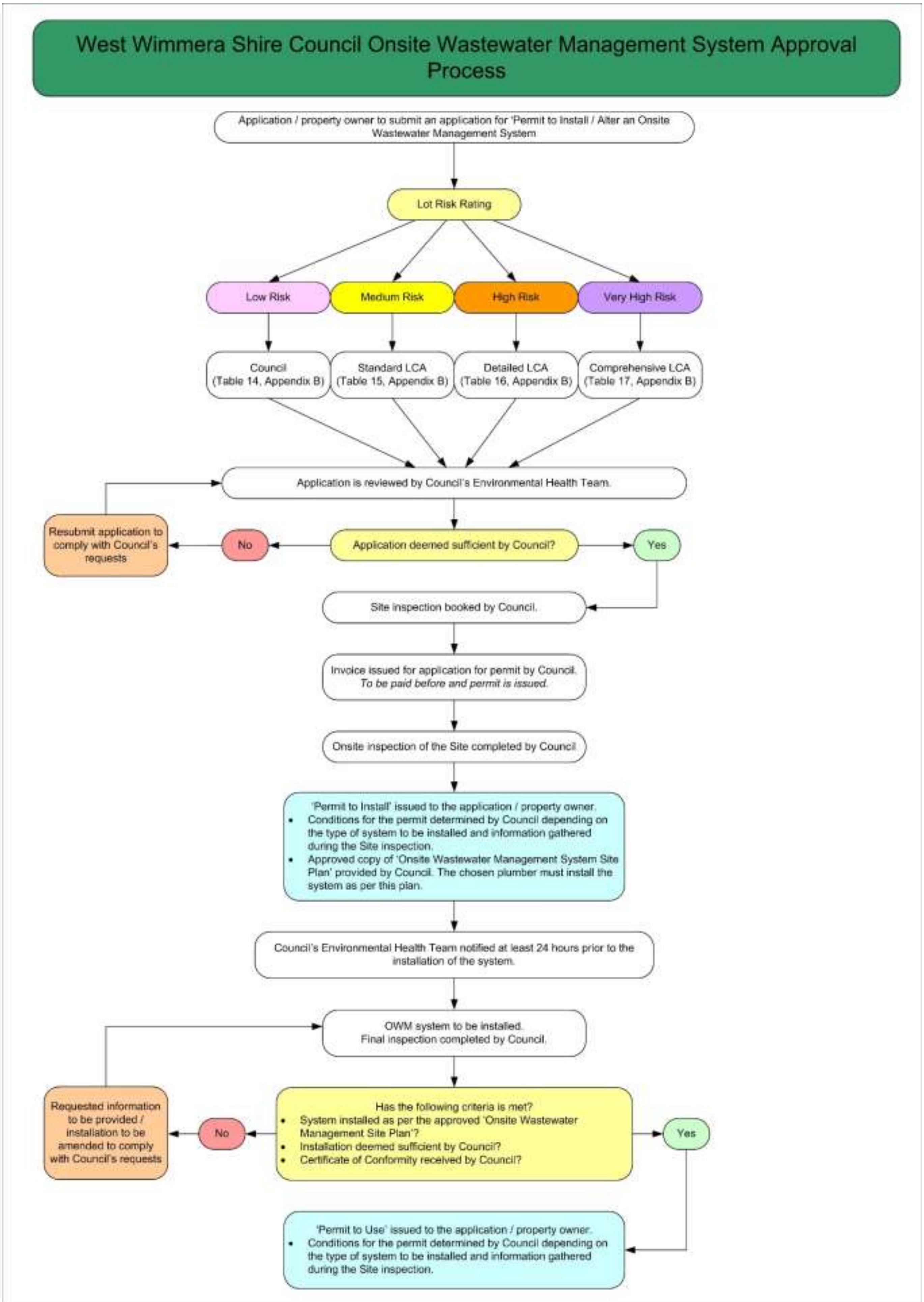
8 Development Planning and Assessment

All OWM system proposals must be submitted to Council with a 'Permit to Install / Alter' application form for the proposed treatment and EDA.

A LCA will not be necessary for Low Risk lots, unless Council considers it is necessary due to site-specific factors. The minimum OWM requirements (refer Section 7) are appropriate for Low and Moderate Risk lots. LCAs and detailed designs will be required for all High and Very High Risk lots (and any other lot as determined by Council).

9 OWM System Approval Process

The following flow chart provides an overview of the OWM system approval process.


West Wimmera Shire Council Onsite Wastewater Management System Approval Process
Application / property owner to submit an application for 'Permit to Install / Alter an Onsite Wastewater Management System
Lot Risk Rating
Low Risk
Medium Risk
High Risk
Very High Risk
Council (Table 14, Appendix B)
Standard LCA (Table 15, Appendix B)
Detailed LCA (Table 16, Appendix B)
Comprehensive LCA (Table 17, Appendix B)
Application is reviewed by Council's Environmental Health Team.
Resubmit application to comply with Council's requests
No
Application deemed sufficient by Council?
Yes
Site inspection booked by Council.
Invoice issued for application for permit by Council. To be paid before and permit is issued.
Onsite inspection of the Site completed by Council
'Permit to Install' issued to the application / property owner.
Conditions for the permit determined by Council depending on the type of system to be installed and information gathered during the Site inspection.
Approved copy of 'Onsite Wastewater Management System Site Plan' provided by Council. The chosen plumber must install the system as per this plan.
Council's Environmental Health Team notified at least 24 hours prior to the installation of the system.
OWM system to be installed. Final inspection completed by Council.
Requested information to be provided / installation to be amended to comply with Council's requests
No
Has the following criteria is met?
System installed as per the approved 'Onsite Wastewater Management Site Plan'?
Installation deemed sufficient by Council?
Certificate of Conformity received by Council?
Yes
'Permit to Use' issued to the application / property owner.
Conditions for the permit determined by Council depending on the type of system to be installed and information gathered during the Site inspection.

10 Onsite System Maintenance and Upgrade Options

This section aims to provide information and direction on the range of options available for improving and rectifying failing or poorly operating OWM systems. It is provided for informative purposes only and does not represent a rigid or exhaustive list of troubleshooting options.

10.1 Maintenance of Existing Systems

The following maintenance actions should be undertaken by the owner or occupier of the land, or a qualified service agent, in order to minimise the risk of system failure (compliant and under-performing systems alike):

- Regular desludging (pump-out) of septic or primary tank as required by EPA Certificates of Conformance for each type of system;
  - If the system doesn't have an EPA Certificate of Conformance, desludging should be completed at least every 3-5 years, or prior to this time if solids reduce the wastewater detention period to less than 24 hours;
  - A pump-out should significantly improve performance; however, this will not rectify existing damage to the dispersal area resulting from excess suspended solids;
- Checking of all system chambers and other checks as required by system manufacturers for secondary systems;
- Addition of chlorine for disinfection where a mechanical treatment system (AWTS / ATU) with chlorination is used;
- Ensuring householders do not discharge chemicals used within the dwelling to the system i.e. bleaches, antibacterial cleaning products, paints, dyes etc.;
- Ensuring that the system is not turned off at any time, where electrical components are present;
- Responding to system alarms within 24 hours as this usually indicates a system failure or problem;
- Ensuring stormwater doesn't enter the system or flow over the EDA;
- If the secondary treatment system (of any type) is more than five years old, then effluent samples should be collected for analysis of BOD_5, TSS and faecal coliforms (E. coli) to assess whether the system is still functioning to its specification and achieving the target effluent quality as prescribed by EPA Victoria; and
- Ensuring all sprinklers, irrigation area or other EDA is maintained, i.e. lawn mowing, checking that sprinklers / distribution lines are not damaged and that flushing of lines is undertaken periodically.

By undertaking these regular maintenance tasks, a compliant system can be expected to operate effectively without major problems. Maintenance measures can also benefit under-performing systems by mitigating the risks posed by the system failure (e.g. if an irrigation area is surcharging effluent, it is preferable that the effluent is disinfected).

10.2 Modification of Existing OWM Systems

In some cases, it is not necessary to replace all of the system components. Risks from defective OWM systems can be appropriately managed by modifying a system. The required modifications should be determined on a case-by-case basis, and discussed with Council prior to implementation.

If existing septic tanks are to be modified or repaired, they must be structurally sound and adequately sized for the number of bedrooms in the dwelling. Otherwise, they should be replaced with an adequately sized septic tank or treatment system.

10.2.1 Install Service Riser for Septic Tank Access

Inaccessible tanks, such as those that have been buried or built over, are highly unlikely to be inspected or pumped out as regularly as is required for optimum system performance (3-5 years for pump outs as recommended by *AS/NZS 1547:2012*). Tanks are often installed completely below ground to achieve minimum fall for gravity drainage from the dwelling; however, buried septic tanks often result in owners not knowing where the septic tank is (especially after properties change ownership).

Service risers are typically made from concrete or high density plastic and must be installed by a suitably experienced professional (such as a plumber). Care should be taken to ensure that tank and riser lids, and any other potential inlet points, are protected from groundwater and surface water ingress.

10.2.2 Minor Repairs

The structural integrity and design of the septic tank also determines its suitability for continued use. Generally, the older a septic tank, the more likely it is to have cracks, missing components (e.g. inlet or outlet 'T junctions' or a baffle), poorly sealed access openings, corrosion, or other physical problems.

It is possible to mitigate or repair these issues. Repairing cracks will need to be done when the tank is empty (after it has been pumped out), with care taken to ensure that all cracks are identified and repaired.

Mechanical treatment systems (AWTS / ATU) and sand filter components can often require repair or replacement following flooding, electrical faults or pump failure. Pumps can be removed and replaced when necessary. Internal pipes can be replaced where necessary if they have been dislodged or damaged. A suitably qualified service agent or the system manufacturer should undertake these repairs.

10.2.3 Outlet Filters for Septic Tanks

The simplest way to improve the performance of a standard septic tank is to retrofit the outlet pipe with an outlet filter. Filters of various designs are commercially available and can provide significant solids retention.

Filters have a large surface area to limit clogging and reduce maintenance requirements. Filters can reduce the impacts of solids carry over to the EDA or secondary treatment system. Filters should be removed and cleaned (hosed into the inlet side of the septic tank) and replaced in the septic tank at least twice per year.

10.3 Upgrade / Replacement of Existing OWM Systems

Where a new system, or major upgrade works, are required (i.e. substantial repair, expansion or replacement of either the treatment system and/or EDA), the system must comply with the current Standards and EPA Guidelines.

Where an existing system is shown to be operating effectively but does not comply with the current Standards and EPA Guidelines, then the system should be monitored. However, unless a failure occurs, contravening the General Environmental Duty (GED) from the EP Act, effluent is discharging off-site, or a dwelling extension / modification is proposed, the owner should not be required to upgrade or replace the system provided it is performing as per the original permit conditions. This situation is common for older dwellings where trenches may be undersized for the number of bedrooms, but only one (1) or two (2) people are living in the dwelling.

Replacement of systems and system components should be carried out according to the site-specific conditions and requirements of the lot, and by an appropriately qualified and experienced person. Common upgrade and replacement options for OWM systems are discussed in the following sections.

10.3.1 Enforcement of Upgrade Works

Under the EP Act 2017, local government is the primary agency responsible for the management of OWM systems. Under this Act, a property owner or occupier of the land cannot construct, alter or install an OWM system with a design or actual flow rate of sewage ≤5,000L on any day without a local government permit. Local Government use permits to regulate the installation, maintenance, and monitoring of OWM systems within their LGA. Council is also responsible for identifying failing OWM systems that are causing environmental, public health and amenity risks.

The EP Act (2017) introduces the General Environmental Duty (GED), which is a criminally enforceable preventative duty. A delegation of functions and powers from EPA to Council under the Act will allow for Council to take action under the GED. Under the Act, Council has the power to enforce compliance with Council permits, Certificate of Conformance conditions, and issue penalty infringement notices to premises where owners do not have their system regularly maintained by a professional service technician.

Part 5.7 of the EP Regulations 2021, states that for persons in management or control of land which an OWM system is located, including legacy systems that do not have a permit and were installed pre-1970 under the superseded Act; have an obligation to take reasonable steps to maintain the OWM system in good working order, a duty to keep maintenance records, respond to any problems that arise, and notify Council of a failure and rectification steps.

Council can issue infringement notices (fines) under Regulation 171, and can issue improvement notices (s 271 of the Act) and prohibition notices (s 272 of the Act), if they have reasonable belief that any of the grounds listed in those sections of the Act aren't satisfied.

Council will endeavour to liaise with an occupier to ensure upgrade works are undertaken; however, in some circumstances enforcement will be required to ensure compliance with the Act. Where a Council authorised officer has detected alleged non-compliance with an improvement notice or prohibition notice that they have issued, they may refer the alleged offence(s) to the EPA for consideration of further enforcement action.

10.3.2 Replacement of Septic Tanks

Where simple repairs and pump-outs fail to meet compliance standards, existing septic tanks will require complete replacement.

Where appropriate, septic tanks can be replaced with another septic tank in accordance with a LCA report and design for the lot's specific circumstances. However, for permanently-occupied premises, it is likely that an upgrade to a secondary treatment system will be the preferred outcome (in accordance with a site-specific LCA and design report by an appropriately qualified professional). All proprietary treatment systems must hold current valid certificates from the EPA, which are called a 'Certificate of Conformance'.

Secondary treatment systems allow greater flexibility for EDA options. The existing trenches can be used to receive the secondary effluent from a new treatment system, with or without absorption system rejuvenation, as required. Alternatively, the existing absorption system can be decommissioned (and rehabilitated with clean soil where required) and replaced with a different EDA (including irrigation systems).

Where existing septic tanks are performing adequately (or have this capability), they can be retained and used as part of the secondary treatment system. The suitability of the existing tank for this purpose needs to be thoroughly assessed by a suitably qualified wastewater professional. In most cases, it will be more straightforward to decommission the septic tank and replace it with a new treatment system. Disposal options for decommissioned septic tanks include collapse and in-fill, removal to off-site landfill, or appropriate sanitisation for non-potable water storage; in accordance with the current Standards and EPA Guidelines.

10.3.3 Upgrades, Extensions, and Replacements for Absorption Systems

Absorption systems have relatively small footprint areas and rely substantially on effluent absorption, thus imposing high loading rates on the soil. This increases the risk of systems being overloaded and failing hydraulically in the long term, with potential adverse health and environmental impacts.

Furthermore, prolonged effluent application through absorption systems increases the risk of soil degradation by increasing salinity and sodicity, as well as the development of a 'clogging layer.' Over time, the organic load in effluent forms a clogging layer in the soil around the absorption system, which reduces the porosity of the soil and limits soil absorption of effluent. Higher suspended solids concentration in primary-treated effluent increases the rate of development of the clogging layer. The suspended solids concentration of primary-treated effluent generally increases as the pump out rate decreases (particularly if there is no outlet filter installed).

A range of options for upgrade or replacement of absorption systems is provided in the following sections. Site constraints, particularly available suitable space, will determine what options are feasible, and will be determined on a case by case basis. Properties with inadequate suitable space to replicate or extend their trenches will be most suited to trench rejuvenation, and potentially replacement of the septic tank with a secondary treatment system.

Trench Rejuvenation

Provided the absorption system is structurally sound and the clogging layer is not excessively developed, it is possible to 'rejuvenate' existing trenches by oxidising the clogging layer, either using an oxidising chemical, physical aeration (compressed air blowers), or both. This technique in combination with septic tank pump-out (if required) and installation of an outlet filter has good potential to improve overall system performance at a relatively low-cost.

This solution will only be appropriate as a long-term solution on lots with adequate available space for effluent dispersal and if the existing absorption system is appropriately sized for the number of occupants or number of bedrooms. However, it could be a valuable interim solution for lots without adequate available space, prior to implementation of a compliant solution.

Replace, Replicate or Expand Trenches

Where rejuvenation is not an option, such as when absorption systems are physically damaged, there is scope for trenches to be excavated and replaced in-situ, using imported materials including topsoil (preferably loam or sandy loam) and improving the existing subsoils. This is the most feasible option for small lots, or where all other areas have been developed.

If there is adequate available space elsewhere on the lot that has not been used for trenches previously, it is likely to be more straightforward and cost-effective to replicate the trenches in this area. This is more likely to be achievable on larger lots.

If the existing absorption system is undersized, and there is adequate suitable space adjacent to the terminal ends of the trenches, then the trenches can be extended to the minimum required size (as described in Section 7). The existing section of trench can also be rejuvenated to improve performance, or replaced if required.

Soil Amelioration

In practice, the most limiting layer to water movement is usually the heavier textured, clayey subsoil in the profile. Quite often, the soil chemistry of this layer is dominated by adsorbed sodium ions and / or magnesium ions, causing the clay particles to be easily dispersed and mobilised when in contact with water. When used for effluent dispersal these clay particles move down with the percolating water and clog up the fine pores, thus reducing the soil's permeability.

Subsoil clay that is dispersive must be treated with gypsum (calcium sulphate) to counteract the excessive sodium and magnesium and bring about a strong flocculated condition of the clay particles.

Shallow topsoil or topsoil that is too sandy may also limit the growth of the vegetation in the EDA. For optimal growth of typical vegetation used with OWM systems, the topsoil should be at least 150mm deep and have at least 5% organic matter.

Alternative Absorption System Design

Over the years there have been various modifications to conventional absorption systems, some of which have been developed into proprietary 'off-the-shelf' products including various brands of self-supporting arch drains and the *Advanced Enviro-Septic™* modular trench.

Other modified designs are based on existing technologies which, although not all are formally approved, have been shown to enhance performance. One recent example of this is the 'Wick' trench / bed, developed for use in clay soils as an alternative to standard absorption systems (referred to in the current Standards and EPA Guidelines as a 'Wick trench or bed').

This system can be described as a conventional absorption trench adjacent to a shallower evapotranspiration / absorption bed, with a continuous layer of geotextile fabric laid under the system and up into the evapotranspiration bed. The geotextile acts as a wick, using capillary movement, to distribute some of the effluent over the transpiration bed adjacent to the trench. This provides a larger surface area than would be available using the absorption system alone, with a greater potential for evapotranspiration and greater infiltration capacity. Typically, the evapotranspiration / absorption bed is approximately twice the width of the primary absorption trench.

It should be noted that the placement of geotextile material under the point of effluent application may result in the formation of a 'clogging layer' as biofilm develops in an anaerobic environment, particularly in the case that a system is loaded with primary effluent. This clogging layer will reduce the infiltration rate of the EDA system over time.

11 Commercial OWM Systems

11.1 Overview

Schedule 1 of the Environment Protection Regulations 2021 defines which activities require EPA prescribed permission under the EP Act. Wastewater treatment systems with a design or actual flow rate of >5,000L/day on any day requires an A03 development and operating licence from the EPA.

An A03 development and operating licence are statutory documents which allow scheduled works to be constructed and operated, subject to conditions set by the EPA during the assessment process. As part of the approval process, the EPA assesses any potential environmental impacts from the proposal, mitigation for any impacts, compliance with policy requirements (including protection of beneficial uses), and comments from referral agencies and the general public.

The EPA licences set acceptable waste discharge and management criteria. They are publicly available documents that can be viewed at the following:

https://www.epa.vic.gov.au/about-epa/public-registers/permissions

In some cases, the EPA may approve an exemption from the need to obtain licences.

The EPA periodically inspects all licenced sites, with the frequency informed by a range of factors related to the degree of public health and environmental risk posed by the site. Targeted inspections can also be made based on intelligence and pollution report information.

Licenced sites are required to submit an Annual Performance Statement detailing their performance against the licence conditions. These are also public documents that can be searched on the above link. The EPA conducts a combination of targeted and random assessments of Annual Performance Statements.

There are other types of industrial activity (not wastewater treatment) that are not directly regulated under the Environment Protection Regulations 2021 that still have potential to impact on water quality. Examples include dairy farm effluent management and stormwater from commercial and light industrial operations, particularly in unsewered areas. The EPA has a role in pollution prevention and response in these activities. The EPA's approach to these issues is outlined in the Compliance and Enforcement Policy, publication 1388. The Compliance and Enforcement Policy articulates the EPA's approach, method and priorities for ensuring compliance with the relevant Acts and statutory documents and carrying out the EPA's compliance and enforcement powers.

Council is responsible for the management of all OWM systems <5,000L/day, which includes some commercial systems. It is important to note that commercial enterprises, such as small factories and cafes operating in unsewered areas, often generate <2,000L/day and therefore are regarded from an operational perspective as domestic systems. The characteristics of the wastewater will differ from a typical residential dwelling, but the wastewater is expected to contain the same broad ranges of contaminants. This is unless the commercial enterprise is producing high strength or unusual wastes, such as small-scale food, alcohol or chemical processing, in which case it should be regarded as a commercial development. Commercial enterprises generating up to 5,000L/day in the Shire include (but are not limited to) restaurants, pubs, and tourist accommodation.

Without proactive enforcement from the regulator, system maintenance, monitoring, and record-keeping can become lax over time, with system performance suffering as a result. Generally speaking, older commercial systems are often non-compliant with current expectations and standards. However, they continue operating until improvements are triggered, typically by the identification of problems, the redevelopment of the premises, or proactive intervention by regulators, local government or other agencies.

11.2 Risk Associated with Commercial OWM Systems

The most common causes of failure or underperformance of commercial wastewater treatment systems include the following:

- Surge loads, e.g. peak holiday seasons or production cycles in factories;
- Irregular and / or ineffective maintenance and upgrades;
- Inadequate desludging; and
- AWTS and other aerobic systems being switched off for long periods of time, leading to die-off of aerobic microorganisms and delayed start-up and poor performance when switched back on.

The most common causes of failure or underperformance of commercial effluent dispersal or reuse systems include the following:

- Poor design or maintenance of the treatment system;
- Inappropriate design, including undersized Effluent Dispersal Area for peak loads without appropriate load buffering;
- Inadequate setback distances from sensitive receptors, such as watercourses, which no longer meet the minimum setbacks in the current Standards and EPA Guidelines;
- Poor or inappropriate installation;
- Inadequate maintenance, including regular back-flushing of irrigation systems with clean water to prevent solids build-up and delays to repairs (e.g. broken sections of pipe); and
- ‘Creeping failure’ of trench and bed systems as soils and media become blocked with suspended solids from poorly designed and/or poorly maintained treatment systems.

11.3 Management Strategies for Commercial OWM Systems

11.3.1 Wastewater Treatment Systems

All commercial wastewater treatment systems should have an up-to-date Operation and Maintenance (O&M) Plan or Manual which includes a diagram of the system and provides instructions for all maintenance schedules required for the system, and details of who is responsible for the management and maintenance of the system.

Commercial systems <5,000L/day should be serviced and maintained in accordance with the system manufacturer’s requirements. Secondary treatment systems will require servicing quarterly; however, some commercial systems will require daily monitoring by an onsite system operator. System maintenance records are to be kept on file for a period of five (5) years, and supplied to Council when requested.

For commercial OWM systems >5,000L/day, regular maintenance by appropriately trained staff and / or contractors is essential. Depending on the scale and complexity of the treatment system, and the nature of the wastewater to be treated, daily low-level maintenance may be required. This can often be carried out by appropriately trained staff (e.g. checking effluent levels, visually checking and/or testing samples of effluent for treatment performance, etc.). More specialised maintenance must be carried out by appropriately qualified and experienced personnel.

Routine inspections of the wastewater treatment and EDAs at EPA licensed commercial properties should be carried out by an appropriately qualified and experienced contractor. The contractor should be independent, i.e. not an employee or regular contractor. More recent EPA licences typically include a schedule of inspections.

Commercial systems which are licensed by the EPA will require effluent quality monitoring at the outlet point of the treatment system to ensure the effluent quality meets the requirements for its end use. For example, surface irrigation requires disinfection, with performance indicated by concentrations of pathogen indicator organisms, as well as residual chlorine levels, if chlorine is the method of disinfection used.

Council is responsible for monitoring commercial systems <5,000L/day, with the EPA responsible for systems >5,000L/day. The EPA is responsible for carrying out additional investigations at its own discretion, including in response to complaints about a system from Council or members of the public.

11.3.2 Effluent Dispersal Areas

The issues surrounding selection, design, installation, and maintenance of commercial-scale EDAs are largely the same as for domestic systems. However, potential problems associated with scale and flow-balancing are introduced with large and / or irregular effluent flows. For seasonal developments, part of the EDA may need to be switched off, or alternatively the off-season (reduced) effluent load can be distributed throughout the entire area over longer time periods using a flow sequencing control system.

EDAs require regular maintenance and should be closely monitored to ensure effective operation and even distribution of effluent. An O&M Manual or Plan should be developed, as for the treatment system. EDAs that are turfed will require regular mowing, with lawn clippings removed from the area. Other vegetation types should be pruned and maintained as necessary to ensure nutrients are being removed by plant uptake.

12 Action Plan

The Action Plan outlines the management strategies and actions to address priorities. The Environmental Health Unit will have the primary responsibility for the coordination and implementation of the recommendations. Council's Planning, Environment, Infrastructure, Building, and GIS staff will assist them.

Table 13: Action Plan

Item Number	Action	Description	Priority	Due Date	Responsibility	Resource Funding
1	**Adoption of OWMP**	Adopt and implement the new OWMP.	High	July 2024	Environmental Health Technician	Existing Funding
2	**Preparation of policies and procedures**	Prepare and document the following to ensure they are in line with the OWMP: • Non-compliance with inspection procedure; • Complaint inspection procedure; • Rectification / upgrade works procedure; • Issuing of fines / notices procedure; • Permit to Install / Alter procedure; • Approval to Use procedure; and • Compliance and Enforcement Policy.	Medium	June 2025	Environmental Health Technician	Officer time in existing resource.
3	**Electronic data management**	Investigate options for field equipment for electronic data management, such as tablets / laptops connected to the data management system.	Low	June 2026	Environmental Health Technician	Existing Funding
4 **5**		Expand electronic data management parameters to include the type of wastewater treatment system and effluent dispersal/ reuse system.	Medium	June 2025	Environmental Health Technician	Funding Required
6		Input paper OWM (septic tank) permits into an electronic data management system.	Medium	June 2026	Environmental Health Technician	Officer time in existing resource
7		Record new OWM permits into an electronic data management system.	High	Ongoing	Environmental Health Technician	Officer time in existing resource

Item Number	Action	Description	Priority	Due Date	Responsibility	Resource Funding
8		Record OWM system details obtained during inspection and compliance programs.	High	Ongoing	Environmental Health Technician	Officer time in existing resource
9	**Spatial Data Management**	Record location of system components for new OWM permits into an electronic data management system.	Medium	Ongoing	GIS Officer and Environmental Health Technician	Funding Required
10		Record location of system components obtained during inspections.	Medium	Ongoing		
11	**Community education program**	Provide wastewater forms, fact sheets, and information on Council's website.	Medium	June 2025	Environmental Health Technician	Officer time in existing resource
12		Develop information statements and educational material for new owners of properties with OWM systems to improve performance.	Medium	June 2026	Environmental Health Technician	Officer time in existing resource
13		Council to support and guide plumbers and authorised servicing agents to improve standards in the industry.	Medium	June 2026	Environmental Health Technician	Officer time in existing resource
14a	**Review and reporting**	Council to internally report on the progress of the Action Plan.	High	Annually	Environmental Health Technician and Manager Planning and Environment	Officer time in existing resource
14b		Council to report on the progress of the Action Plan on Councils website.		Every two (2) years		
15		Internal review of OWMP every three (3) years.	High	June 2027	Environmental Health Technician and Manager Planning and Environment	Officer time in existing resource
16		External review and update of OWMP every five (5) years.	High	June 2029	Environmental Health Technician	Funding Required

Appendix A

Risk Assessment Framework

A Risk Assessment Framework

A.1 Data Acquisition

Geographic Information System (GIS) data covering a wide variety of physical and planning components has been acquired from Council, the DEECA DataShare Portal, the Bureau of Meteorology (BoM), and Scientific Information for Land Owners (SILO) website.

The data obtained included: cadastre (property and lot) information, roads, Local Government Area (LGA), township and locality boundaries, sewer network, topography, digital elevation model (DEM), planning scheme zonings and overlays, hydrology and drainage, climate data including rainfall, flood prone land (land subject to inundation), soil landscapes and land system information, and groundwater bore locations. All data was received during late 2023. The GIS data supplied was used for the development of Risk Assessment Framework (RAF).

A.2 Data Analysis

The individual constraint maps were created using a GIS, specifically QGIS, which applied constraint classes for a number of built constraints and land capability constraints, including site and soil parameters. Four (4) constraints were selected, which when consolidated, contribute to assessing the overall land capability for OWM systems, and were used as an input into the RAF. These were selected based on the availability of digital data, and in the light of experience gained in designing and auditing OWM systems. The discrete constraints selected were:

- Soil type;
- Slope (surface elevation);
- Useable lot area; and
- Climate.

Risk Analysis mapping refers to all unsewered potentially developable lots, irrespective of whether they are developed or not. Lots that were excluded from the Risk Analysis included those that are sewered; <400m^2 in area; parks and conservation; crown land; road reserve; and public land management.

There were other parameters that could have been considered in a more detailed constraint assessment; however, such data was not available for this Risk Assessment and the scope of the project did not permit its collection. Nevertheless, the constraints chosen were considered acceptable for the purpose of quantifying the constraints for the broad-scale Risk Assessment. The maps have been produced for use at a broad scale and the limitations of the data used in the creation of these maps for input in the Risk Analysis must be recognised and is detailed in Section 4.3 of the OWMP.

A.3 Soil Type

The soil type and its absorption capabilities in this report refer to what type of OWM system is suitable. Soils play a vital role in the design, operation, and performance of OWM systems. The key soil property used in the RAF is the soil category as per Table E1 of *AS/NZS 1547:2012* as this is in-line with the DELWP Risk Assessment Guidance report (2022).

The most current soil-landform unit datasets were obtained from the DEECA DataShare portal. The Shire includes two (2) Land Resource Assessments (LRAs), being the Glenelg-Hopkins LRA (Baxter & Robinson 2001) in the south adjacent the Glenelg River and the Wimmera LRA

(Robinson et al. 2005) throughout the rest of the Shire. The LRAs were used as the basis for the determination of soil suitability for OWM, specifically on soil category.

There were 20 different soil landform units identified within the Glenelg-Hopkins LRA, with 36 identified within the Wimmera LRA. Figure 15 thematically identifies the different soil landform units and their associated locations. Refer to the LRA reports accompanying the LRAs[2&3] for additional detailed descriptions on each of the soil landform units.

It is important to note that soil landform units are not homogeneous. It should be noted that at this mapping scale soil attributes are expected to vary within soil landform units. Due to the degree of variance within each soil landform unit, the soil characteristics with the most dominant landform element proportion (e.g. greatest percentage) were used as a representation for that soil landform unit.

The soil landform unit datasets were analysed to determine the soil type. The constraint class was assigned to each soil landform unit within the Shire based the DEECA Risk Assessment Guidance Report (2022). Reference was also made to the *AS/NZS 1547:2012*, the current Standards and EPA Guidelines, and the experience of the project team in the design and monitoring of OWM systems. The risk bandings have been informed by Table 3-2 of the DEECA Risk Assessment Guidance Report (2022).

- High: Lots that contain soils of Category 1 and 6;
- Moderate: Lots that contain soils of Category 2 and 5; and
- Low: Lots that contain soils of Category 3 and 4.

Although the soil type constraint for a particular soil landform unit may be high, it does not necessarily mean that wastewater could not be sustainably managed onsite. Site specific investigations are required in LCA reports to confirm the attributes used for the soil suitability constraint analysis and to determine the appropriate method for sustainable OWM.

For lots constrained by unfavourable soil, it might be possible to mitigate this constraint by:

- Secondary treatment with an AWTS or sand filter;
- Applying a lower (soil) loading rate; or
- Improving soil by amelioration or importation of good quality soil.

[2] https://vro.agriculture.vic.gov.au/dpi/vro/glenregn.nsf/pages/glenelg_soil_map

[3] https://vro.agriculture.vic.gov.au/dpi/vro/wimregn.nsf/pages/soil_landform_mapping

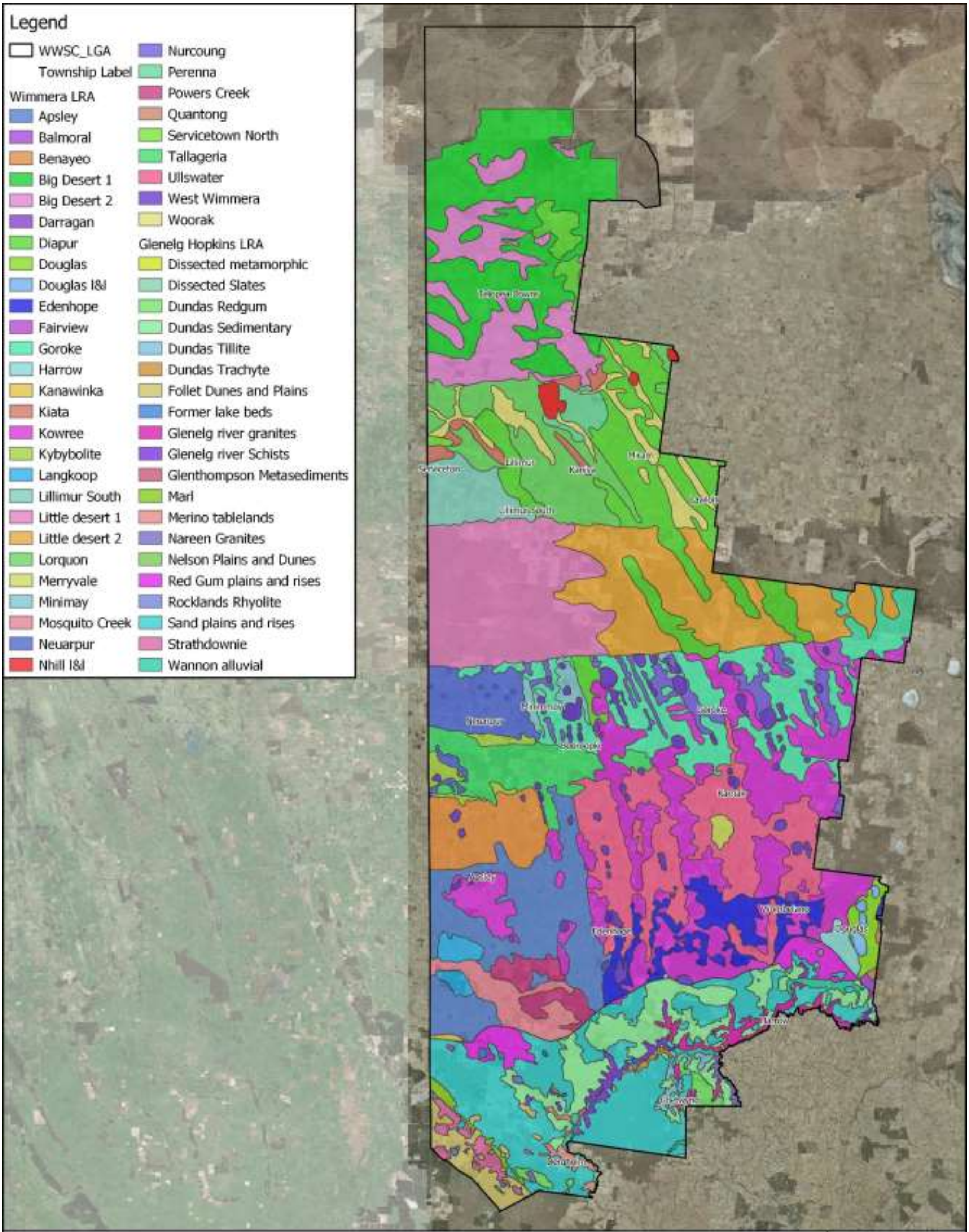


Figure 15: Soil Land Resource Assessment

West Wimmera Shire Council OWMP 2024

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0 20 40 60 km (Approx Scale)

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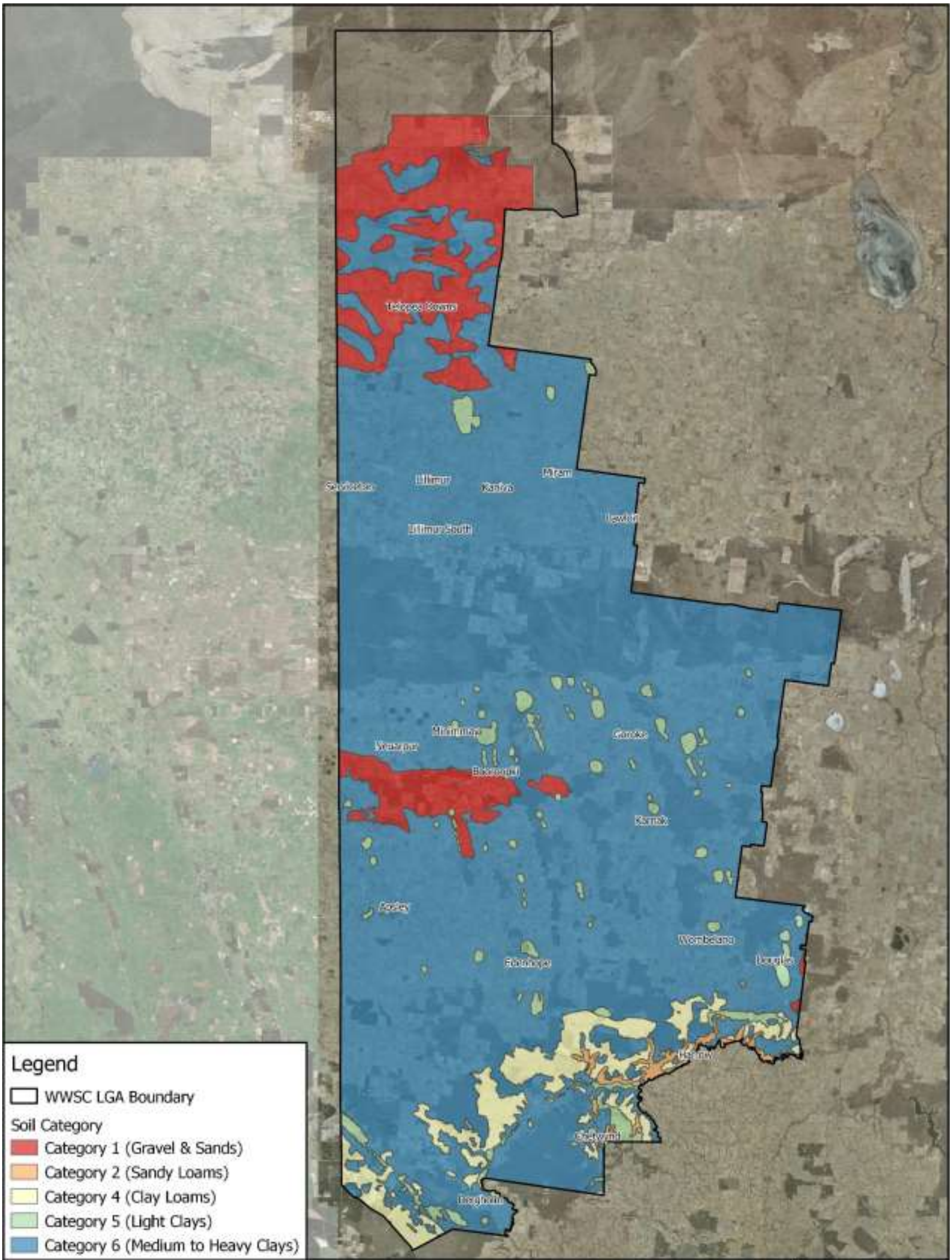

Figure 16: Soil Categories

West Wimmera Shire Council OWMP 2024

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A.4 Slope

The slope of the ground surface affects what type, or the availability of effluent application on the lot. This is closely linked to the soil type and the soil's absorption capabilities.

Table K1 of *AS/NZS 1547:2012* details a range of factors likely to limit the selection and applicability of EDAs, with slope gradient identified as one critical factor.

Steep slopes, particularly when combined with shallow or poorly drained soils, can lead to surface breakout of effluent downslope of the Effluent Dispersal Area. Conventional OWM systems are likely to be unsuitable and these lots will require a detailed site assessment and specific system design to produce a sustainable outcome. These steeply sloping sites are generally unsuitable for conventional absorption trenches and beds and can also be problematic for surface irrigation techniques. Conversely, flat and gently sloping sites are less likely to experience such problems and are considered lower risk.

Surface elevation for the entire Shire was obtained in the form of a Digital Elevation Model (DEM) with a maximum cell size of 10m. The surface elevation for the Shire ranges from approximately ~60m to ~220m Australian Height Datum (AHD). Gridded slope data was derived from the DEM and combined with the cadastre data set to calculate the average slope as a percent grade for each lot within the Shire. The slope was based on the average slope across each lot, ranging from 0 to 37%.

The following criteria were used to determine the OWM constraint classification on the average lot slope. The risk bandings have been informed by Table 3-2 of the DEECA Risk Assessment Guidance Report (2022).

- High: Lots that have an average slope greater than 10%;
- Moderate: Lots that have an average slope, inclusive of, and between 6% and 10%; and
- Low: Lots that have an average slope less than 6%.

For lots constrained by steep slope, it might be possible to mitigate this constraint by:

- Applying a lower soil (effluent) loading rate over a larger area;
- Designing an irrigation system to ensure even distribution of effluent over the slope; or
- Terracing to create a level EDA.

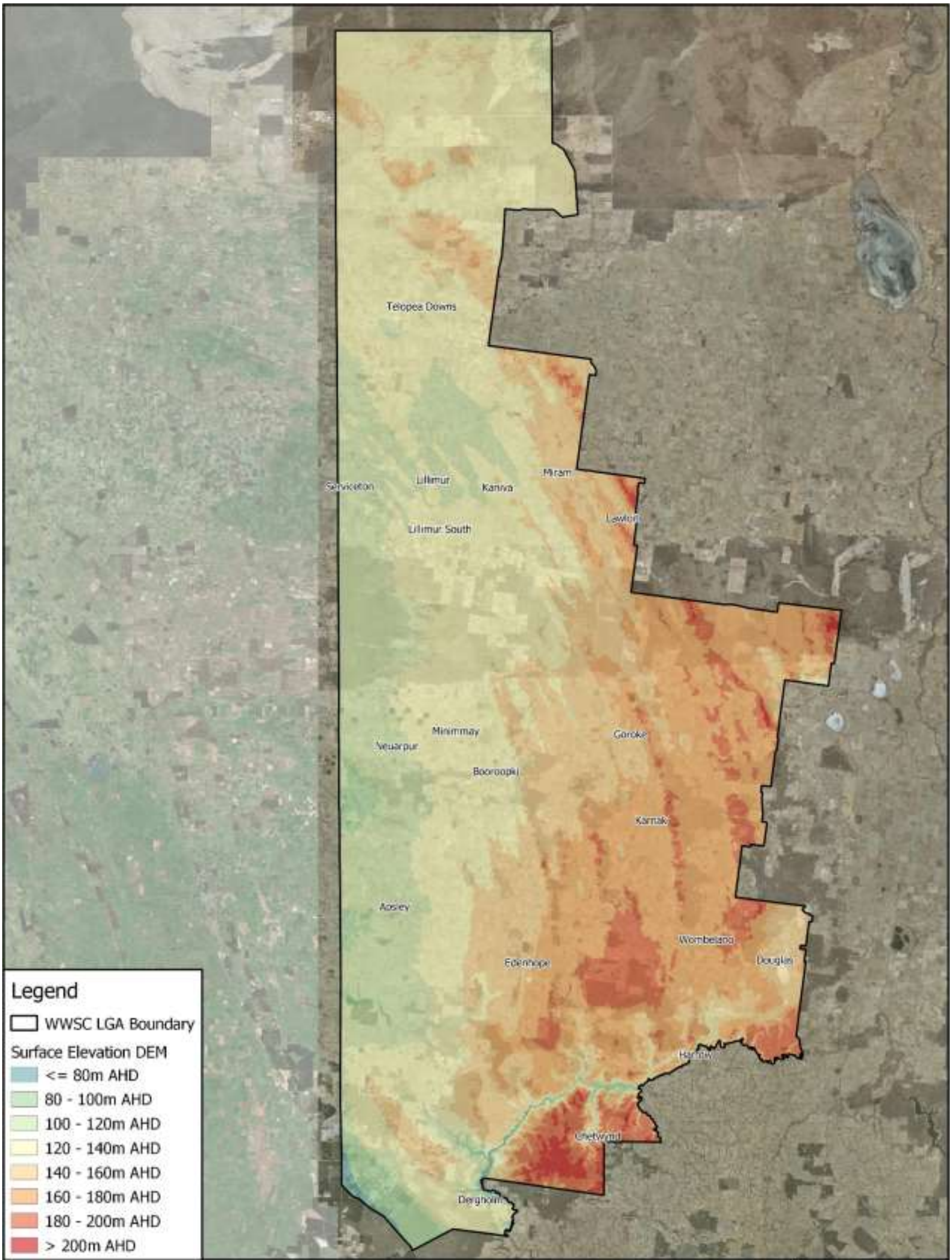

Figure 17: Digital Elevation Model

West Wimmera Shire Council OWMP 2024

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(Approx Scale)

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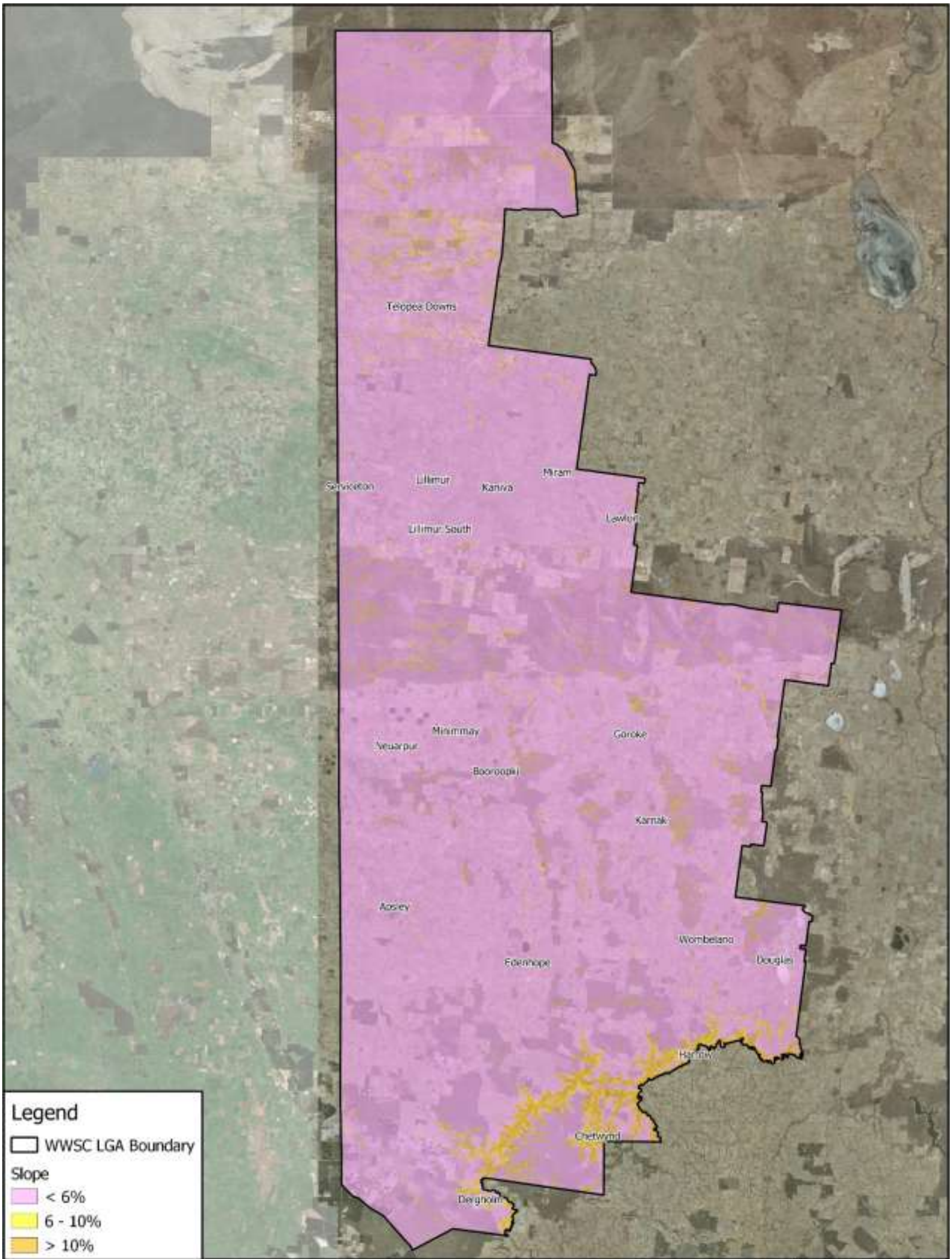

Figure 18: Slope

West Wimmera Shire Council OMWP 2024

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A.5 Useable Lot Area

Useable lot area, irrespective of total lot size, plays a key role in determining a lot's capacity for sustainable long-term OWM and influences the selection of appropriate OWM systems. The useable lot area for effluent management broadly refers to available land (i.e. not built out or used for a conflicting purpose) where OWM will not be unduly constrained by site and soil characteristics.

As a general rule, the smaller the lot, the less land that will be available for effluent management after allowing for other development on the land. Older development controls did not always consider site-specific land capability constraints and, as a consequence, many existing and vacant residential lots are extremely constrained for OWM; and many older existing OWM systems, such as septic absorption trenches, are undersized by today's standards.

An adequately sized EDA provides for long-term, sustainable effluent loading rates that match the assimilative capacity of the soil and vegetation systems, reducing the risk of adverse impacts on public health and the environment.

The minimum area available for effluent management (area complying with setbacks) will vary depending on the physical constraints present on the lot, the nature of the development, as well as the type of treatment and EDA used. The constraint class boundaries reflect the likelihood of a lot having sufficient area available for effluent management available after allowing for typical improvements.

There are many factors that determine the available area on any given lot, including:

- Maintenance of appropriate setback distances from boundaries, buildings, driveways / paths, groundwater bores, dams, and watercourses (intermittent and permanent); and
- Total development area (including the dwelling, sheds, pools, driveways and garden paths, gardens unsuitable for effluent reuse, and any other hardstand areas, etc.).

Available areas may be unsuitable or constrained for OWM due to other factors, including (but not limited to):

- Excessive slope;
- Excessively shallow soils;
- Heavy (clay) soils with low permeability;
- Climate in regards to the degree of soil moisture surplus or freezing conditions;
- Excessively poor drainage or stormwater run-on; and
- Excessive shading by vegetation.

For this study, the useable lot area was determined by the setbacks to surface water features and groundwater bores. The following sections detail the methodology and results for each analysis and the determination of the final useable lot area.

A.5.1 Proximity to Surface Waters

This section seeks to explain how the distance to surface waters can affect the quality of the water and influences the useable lot area calculation.

WWSC is located across three (3) Catchment Management Authority (CMA) areas, consisting of the Glenelg Hopkins CMA in the south, Wimmera CMA in the centre, and Mallee CMA in the far north. The Shire consists of four (4) river basins, with the Mallee basin in the far north, Wimmera-

Avon Rivers basin in the east, Glenelg River basin in the south, and Millicent Coast basin in the remaining area. No Special Water Supply Catchments (SWSCs) are located within the Shire.

Setback distances (buffers) are usually provided between effluent dispersal / reuse areas and sensitive receptors, such as surface water features, to help prevent adverse impacts on water quality, particularly should the OWM system fail.

There is no simple and defined method for objectively determining safe setback distances, so regulators often recommend conservative minimum setback distances that would be expected to satisfy the objective in the majority of situations.

The current EPA Guidelines specifies differing setback distances for primary (i.e. septic / trench) systems and secondary (or greywater) systems. As there are no potable water assets within the Shire, a 60m setback to all surface water features has been applied based on the most limiting (primary) setback. Surface water features (1:25,000 scale) were obtained from the DEECA DataShare Portal. No setbacks were applied to constructed drains, which would likely be accounted for within other watercourse / waterway setbacks.

For a broad-scale risk assessment, it is appropriate to analyse the separation distances that are available on a lot basis and assign constraint classes accordingly.

AS/NZS 1547:2012 details instances where recommended setbacks from sensitive receptors can be relaxed where standard setback distances cannot be achieved. These systems would require individual assessment and design in order to meet the requirements of the Standard.

For lots constrained by proximity to surface waters, it might be possible to mitigate this constraint by:

- Secondary treatment with an AWTS or sand filter;
- Moving the EDA to increase setback distance; or
- Replacing surface irrigation with subsurface irrigation.

A.5.2 Proximity to Groundwater Bores

This section seeks to explain how the distance from OWM systems to groundwater bores can affect the quality of groundwater and influences the useable lot area calculation.

The Shire is located across three (3) groundwater catchment areas: Glenelg in the south; a small portion of the Wimmera-Mallee in the east; and West Wimmera within the remaining areas.

A Groundwater Management Unit refers to either a Groundwater Management Area (GMA) or Water Supply Protection Area (WSPA) as determined within the Groundwater Catchment.

A GMA is defined as an area where groundwater of a suitable quality for irrigation, commercial, or domestic and stock use is available or expected to be available. The majority of the Shire is located within the 'West Wimmera GMA', and a portion of the 'Upper Glenelg GMA' in the southeast. The West Wimmera GMA occurs to the north of Langkoop and Kadnook and the area surrounding Harrow and covers 7,383km^2 of the Shire. The Upper Glenelg GMA occurs to the east of Harrow and south of White Lake, and covers 78km^2 of the Shire.

WSPAs are declared under Section 27 of the Water Act 1989 to protect groundwater or surface water resources through the development of a management plan which aims for equitable management and long-term sustainability. There are 25 WSPA declared in Victoria. The 'Glenelg WSPA' is located in the southwest of the Shire with an area of 385km^2, and is located to the south of Langkoop, and to the west of Poolaijelo, Dorodong, and Dergholm.

The location of EDAs in close proximity to groundwater bores increases the potential for contamination of groundwater. When water is extracted from a groundwater bore a zone of influence is created, altering the head level of the groundwater. Setback distances are recommended between Effluent Dispersal Areas and groundwater bores (potable and non-potable). The current EPA Guidelines recommends a 50m setback (for Category 1 and 2a soils) and 20m setback (for Category 2b to 6 soils). A conservative approach was taken when developing the OWMP and the most limiting (primary) setback of 50m was used for all the groundwater bores located within the Shire.

The spatial data of the groundwater bore locations within the Shire was acquired from the Water Measurement Information System (WMIS) Database Interface as managed by DEECA. Using GIS, the 50m groundwater setback was applied to a total of 2,218 groundwater bores that were identified within the Shire.

AS/NZS 1547:2012 details instances where recommended setbacks can be relaxed where standard setback distances cannot be achieved. In most cases, the preferred result would be to have the identified bores condemned and capped to prevent further use, negating the need for setbacks from these resources. However, it is acknowledged that this outcome would not be acceptable to some owners who utilise the resource.

For lots constrained by proximity to groundwater bores, it might be possible to mitigate the constraint by:

- Secondary treatment with an AWTS or sand filter;
- Moving the EDA to increase setback distance; or
- Replacing surface irrigation with subsurface irrigation.

A.5.3 Useable Lot Area Analysis

The cadastre data set obtained from the DEECA DataShare Portal was queried to determine the spatial relationship between each lot, its existing land area and the setback zones to surface water features and groundwater bores to determine the useable lot area for each lot within the Shire. This is based on an assumed footprint of 500m^2 for an average building envelope and improvements (e.g. driveway) and allowing for an average sized EDA and reserve EDA on the remainder of the lot.

The following criteria were used to determine the useable lot area classification with regards to OWM suitability. The risk bandings have been informed by Table 3-2 of the DEECA Risk Assessment Guidance Report (2022).

- Very High: Lots with useable area <0.4ha;
- High: Lots with useable area 0.4 – 2ha;
- Moderate: Lots with useable area 2 – 10ha; and
- Low: Lots with useable area >10ha.

Lots containing less than 0.4ha of useable area invariably have a very limited area available for effluent management. Site specific hydraulic design for wastewater management would be necessary.

If OWM is to be provided, it may be necessary to provide a high level of treatment and specialised land application design using systems such as sand mounds or pressurised subsurface irrigation, to ensure long term sustainability. Other mitigation measures like the adoption of water conserving practices will be important in ensuring the system's effectiveness. Such systems are likely to have limited opportunity for expansion, as may be required in response to increased occupancy, or if a new reticulated water supply becomes available. A lot with less than 0.4ha of useable land will not necessarily be unsuitable for OWM or currently be serviced by a failing system; however, it is likely to contain a number of significant limitations to the safe operation of OWM systems assessed at a broad scale.

In the case of lots with useable areas between 0.4ha and 2ha, and in the absence of any other significant physical constraints, the area available for effluent management usually increases proportionately with the potential for sustainable OWM. The choice of options is likely to be slightly greater than that available for lots with useable area less than 2ha; however, detailed site and soil investigation is still important to identify the most appropriate solution.

In most cases, lots larger than 10ha will have far fewer problems providing sufficient space for sustainable OWM. Overall constraint for OWM for these lots will be determined by the land capability constraints.

For lots constrained by useable area, it might be possible to mitigate this constraint by:

- Secondary treatment with an AWTS or sand filter;
- Secondary treatment with land application to trenches at higher loading rates as outlined in *AS/NZS 1547:2012*; or
- Primary treatment with land application to a sand mound at higher loading rates as outlined in *AS/NZS 1547:2012*.

The associated OWM constraint map for the Shire is provided as Figure 19.

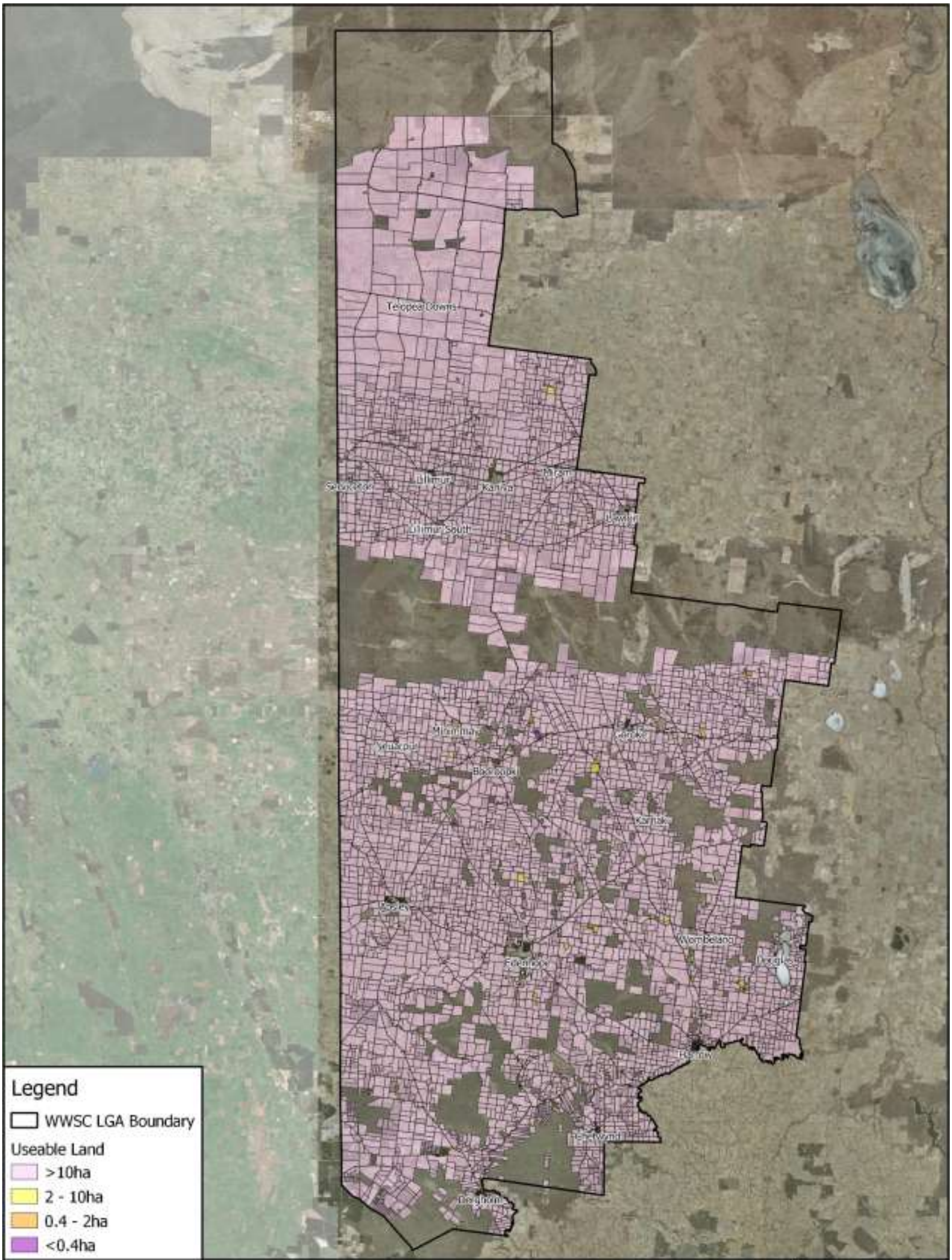

Figure 19: Useable Land

West Wimmera Shire Council OMWP 2024

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0 20 40 60 km

(Approx Scale)

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A.6 Climate

Climate, specifically rainfall, plays a significant role in determining the appropriate loading rates of effluent and associated sizing of Effluent Dispersal Areas for OWM. The climate feature of most interest in the Risk Assessment is the average annual number of days receiving >10mm of rainfall as this can result in surface runoff, increase in soil moisture storage, and increase in deep infiltration to groundwater.

There is one (1) BoM station located within the Shire which records daily rainfall (Edenhope Airport), with 12 BoM stations recording daily rainfall surrounding the Shire.

To increase data within the Shire, the project uses interpolated gridded data from the SILO database. SILO is a climate and meteorological data service developed and hosted by the Queensland Government which provides representative data for the entire continent, produced using real climate data collected over long time periods by the BoM. The service provides a realistic representation of a broad range of climate statistics for most areas which are not serviced by local BoM stations.

Daily rainfall data for 13 SILO data points was compiled from throughout the Shire, with one (1) point to the south east of the Shire. The number of days with rainfall exceeding >10mm was averaged across a 40 year period to obtain an annual average value for each data point. This was then interpolated using GIS across the Shire to generate ‘climate zones’. The data is considered to be a realistic representation of long-term climate patterns, suitable for use in OWM investigations and designs.

Two (2) distinct climate zones were identified within the Shire based on the average annual number of days receiving >10mm of rainfall, as detailed in the following. Climate zones are presented in Figure 20 of the OWMP.

- Climate Zone 1: <10 days per year of rainfall exceeding 10mm; and
- Climate Zone 2: 10 – 40 days per year of rainfall exceeding 10mm.

A.7 Risk Assessment Summary

It is evident that variability in constraints exists between the targeted localities and townships within the Shire. Further detailed studies into the performance of existing OWM systems within each of the targeted unsewered localities and townships is recommended to verify the findings of this broad-scale risk assessment. The study is to provide a more detailed understanding of maximum lot development density, and hence minimum lot size in proposed development areas.

This will aid Council in ensuring future development will not adversely impact public health and the environment. The Risk Assessment, which consolidates the individual constraints, has been detailed in Sections 4 and 5 of the OWMP.

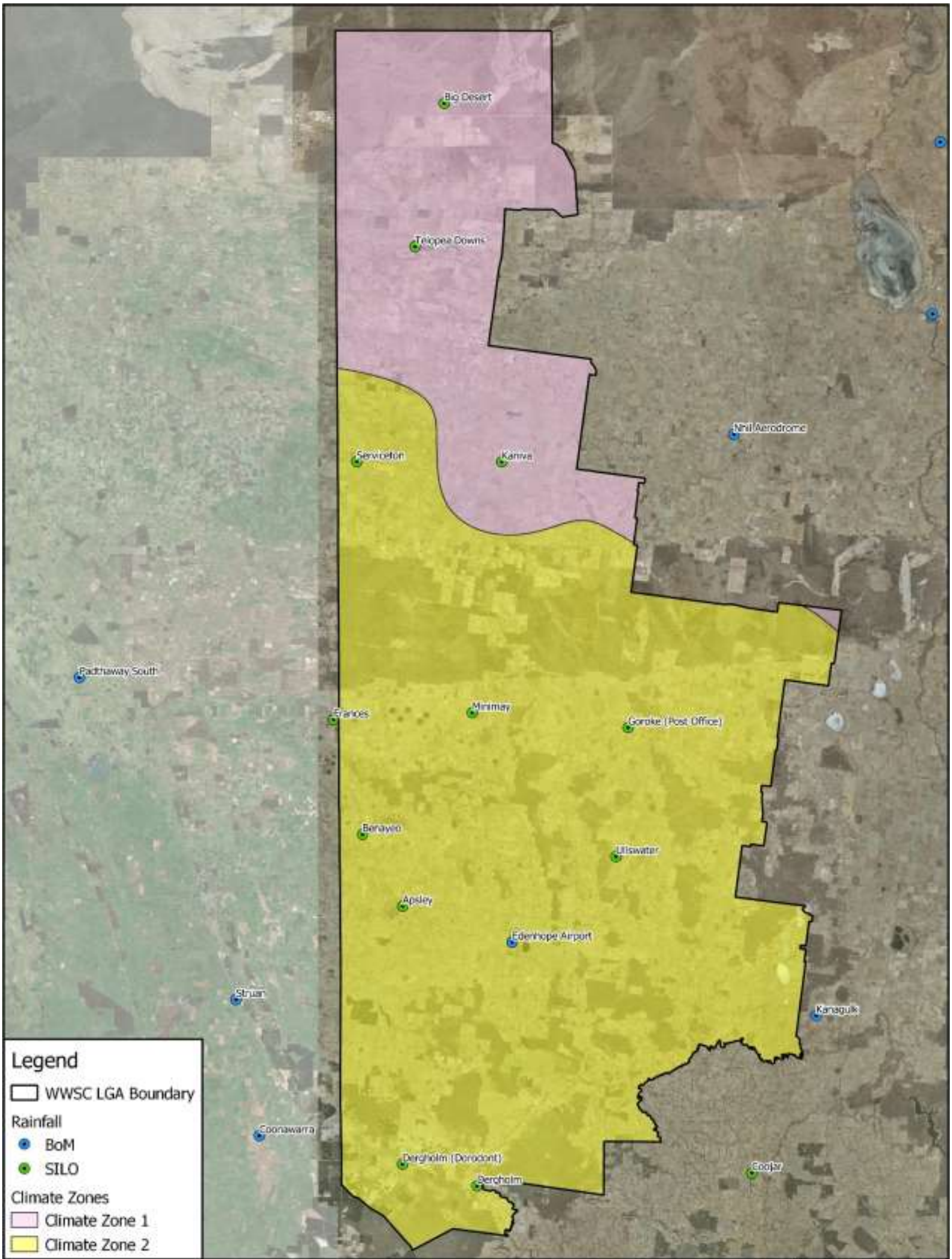

Figure 20: Climate Zones

West Wimmera Shire Council OMWP 2024

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0 20 40 60 km (Approx Scale)

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Appendix B

Land Capability Assessment Requirements

B Land Capability Assessment

A Land Capability Assessment (LCA) is required when submitting a Planning Permit application for a development or subdivision on a Moderate, High or Very High Risk lot, or when a Certificate to Install or Alter an OWMS is required.

A LCA must be conducted in accordance with the minimum standards outlined in the current EPA Guidelines and *AS/NZS 1547:2012* and should be guided by the Victorian Model Land Capability Assessment Framework 2nd edition (MAV & DSE, 2014). A LCA needs to demonstrate that the requirements of the OWMP are met.

The Risk Rating determined by the Risk Assessment Framework will act as the default LCA standard for lots as defined by the OWMP. Copies of the minimum requirements for assessment and reporting for each level of LCA are provided in this Appendix.

It is important to note that there may be circumstances where the desktop risk assessment results do not correlate accurately with actual site conditions. In these circumstances, an increase or decrease in the Risk Rating and LCA requirements may occur at the discretion of Council through completing a site inspection and field investigation.

Therefore, the results of site-specific LCAs will constantly update the Risk Assessment database held by Council, which will improve site understanding and validity of results. A risk pro-forma checklist, as shown below in Table 14, can be used by the LCA assessor to accommodate any request to Council to alter the Risk Rating of a lot.

Table 14: Risk Pro-forma Checklist Example

Parameter	Site specific input
PFI Identification Number[4]	(e.g. 52829583)
Lot Address	(e.g. 6669 Kaniva-Edenhope Road)
Locality	(e.g. Patyah)
Zoning and Overlay	(e.g. Township Zone)
Area (ha)	(e.g. 15.3ha)
Soil Texture	Soil Category as per *AS/NZS 1547:2012* (e.g. Category 6 - Medium Clay)
Slope (%)	Average slope (e.g. 1.3%)
Presence of Surface Waters	Distance to nearest surface water
Presence of Groundwater Bores	Distance to nearest groundwater bore (domestic and non-domestic)
Useable Lot Area (ha)	Apply all relevant setback distances

It may be suitable for accredited LCA assessors to provide a clause within the contract warning clients of a potential fluctuation of requirements, and hence cost, that is dependent on Risk Rating

[4] Parcel identifier, as per DELWP DataShare Portal cadastre dataset.

confirmation of the lot. The current EPA Guidelines states that Council's Environmental Health Officers (EHOs) or other Authorised Officers (AO) can determine what comprises a satisfactory LCA.

The MAV has developed a model LCA report and procedures to assist LCA assessors and regulators. As a minimum, LCAs should follow the 12-stage best practice model detailed within the current EPA Guidelines and Victorian LCA Framework (MAV, 2014). The specific LCA requirements for the determined Risk Ratings (Moderate, High, and Very High) are detailed in the following sections.

With regards to OWM system selection and sizing, the design loading rate for the most limiting soil horizon within 600mm from the base of the EDA must be used. This approach ensures that the loading of wastewater on the soil can be supported for the entire soil profile to ensure that surface runoff and excessive deep drainage does not occur. The OWM system should be sized either:

- By site-specific design as detailed by the respective LCA requirements explained in the following; or, if applicable;
- As per the System Sizing Tables in Section 7 of the OWMP, if permitted.

B.1 Requirements for Low Risk Lots

For Low Risk lots, it is envisaged that a LCA will generally not be necessary, unless deemed so by Council staff. Council may request a soil assessment to be provided in addition to a site plan on a case-by-case basis.

Applications for Low Risk lots can be assessed using the risk pro-forma checklist (Table 14) and / or the 'Site Information Sheet' template in Appendix D of *AS/NZS 1547:2012* to confirm and record the site and soil characteristics. If available, the proposed treatment and EDA combination can be selected from the locality OWM system requirements as outlined in Section 7 of the OWMP.

Council may visit the site to confirm site and soil details are as per the pro-forma detail and that the proposed OWM treatment and EDA is appropriate for the site. If a lot with a Low Risk rating is located within a region of increased risk or OWM constraint, Council staff may require, at their discretion, a Standard LCA and Report to be completed. This may include lots that are located in WSPAs or GMAs.

B.2 Requirements for Moderate Risk Lots

For Moderate Risk lots, a Standard LCA is required which includes Site Inspection and Field Investigations. However, where appropriate, the proposed treatment and EDA combination can be selected from the locality OWM system requirements as outlined in Section 7 of the OWMP.

For lots with a Moderate Risk rating located outside of areas of increased risk, Council, at their discretion, may not require an LCA to be completed and the procedure as per Low Risk rated lots may be followed.

B.3 Requirements for High Risk Lots

For High Risk lots, a Detailed LCA is required which requires additional information to the Standard LCA. The main requirement of a Detailed LCA is to undertake a monthly water balance for sizing the OWM system.

More comprehensive soil testing is also required to assist with appropriate system selection and ensuring any necessary mitigation measures are implemented into the site management plan.

B.4 Requirements for Very High Risk Lots

For Very High Risk lots, a Comprehensive LCA is required, which requires a higher level of assessment and reporting due to the inherent constraints and risks associated with OWM on the lot.

A Comprehensive LCA requires soil chemical analysis, conservative monthly water balance, an annual nutrient balance and a detailed site specific hydraulic design in addition to the standard LCA requirements.

B.5 Generic LCA Requirements - Overlays

As detailed in Stage 1 of each LCA procedure (Appendix B.7), confirmation of any relevant sensitivity overlays (e.g. land subject to inundation) with Council is required. If any risk is identified, this needs to be specifically addressed within the LCA. Discussion with Council is required to determine the necessary requirements to be met. If the site is located within a known shallow groundwater region, the depth to (permanent and shallow) groundwater will need to be determined and discussed within the LCA report.

It should be noted that a LCA may indicate that it is not possible to design an appropriate OWM system for a given site and sometimes costs for construction may be prohibitive. However, the onus of justification rests with the LCA assessor to demonstrate to Council's satisfaction that the risk from a proposed OWM system combination has been adequately addressed by design or management measures.

B.6 Subdivision LCA Requirements

It is very important that an LCA is performed early in the planning phase of land development before rezoning or subdivision as it achieves a more sustainable result. Areas with higher degrees of limitation can be appropriately zoned and subdivision layouts can make best use of the constraints and opportunities of the land.

It is also a requirement under the Planning Scheme to be able to demonstrate that the land is suitable for the development of a dwelling prior to subdivision approval. Chapter 5 of the MAV Model Land Capability Assessment Framework (2014) broadly discusses LCAs for subdivisions.

Regardless of the scale of an LCA, the objective is the same, that is, the determination of a sustainable OWM strategy for each proposed lot to reduce potential impacts to the local receiving environments. Different management strategies may be required within the same subdivision due to varying constraints identified across the site through the LCA.

Only concept OWM system designs are necessary at this stage to determine the minimum size of the Effluent Dispersal Area. Options may be left as broad technology types suitable for the lots, with detailed system design required at the individual lot development stage.

The LCA requirements detailed within Appendix B of the OWMP are applicable to all scales of development planning and assessment. The Risk Rating of the existing lot will direct the level of detail required for an LCA for a subdivision or rezoning of a lot.

B.7 Minimum LCA Requirements

Table 15: Minimum Requirements for Standard LCA and Report

Report Element	Standard Requirements	Completed
1. Introduction and Background	Report summary / executive summary.	☐
	Confirmation of Risk Rating.	☐
	Confirmation of any relevant sensitivity overlays as per communications with Council.	☐
	Confirmation that lot(s) meet minimum lot size criteria for WWSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, increase in building entitlements (subdivision) or non-domestic development.	☐
	Name, contact details, and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Lot area.	☐
	Proposed / existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Catchment Management Authority, and State Government requirements, including restrictions and caveats on title, and planning / building / bushfire / flood controls, e.g. zones and overlays. Note Environmental Significant Overlays and potable water supply. Compile this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the site and adjacent land, e.g. climatic information, groundwater and bore water information. Refer to stage 3 pp.35 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐
	Details of date, time, and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two (2) soil test pits or auger holes within the identified area(s) available for effluent management , with additional test pits required for more than one (1) soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice or relevant guideline section.	☐
	Soil assessment that considers the following parameters from Table 2 of the Victorian LCA Framework (2014): • Colour and mottling; • Electrical conductivity; • Emerson Aggregate Class;	☐

Report Element	<u>Standard</u> Requirements	Completed
	• Permeability and design loading rate (using soil texture); • pH; • Rock fragments; • Soil depth; • Soil texture (field textural analysis); and • Depth to watertable (if required). Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints.	
3. Available Area and Setback Distances	Calculation of area(s) available for effluent management and location on the Site Plan.	☐
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice 891.4 (2016), or relevant guideline section). Justification required.	☐
4. LCA Confirmation	Contact Council if the LCA assessor disagrees with the final Risk Rating for the site.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water, and groundwater.	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Description and location of applicable OWM treatment system options (refer to relevant Locality Report and EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location (as per relevant Locality Report). Sizing of Effluent Dispersal Area as per the OWM system requirements of the OWMP (refer Section 7).	☐
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints posed to the sustainable treatment and application of wastewater onsite. This may include the following: • Storm water management • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and OWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐
9. Conclusion	Conclusion summarising all the important design, sizing and mitigation requirements to ensure sustainable OWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones, overlays and restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays).	☐

Report Element	Standard Requirements	Completed
	Type of catchment (e.g. WSPA or GMA).	☐
	North arrow.	☐
	Contour lines (at maximum 10m intervals), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of other utilities i.e. electricity, gas, telecommunications (which must be located outside the Effluent Dispersal Areas)	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface water features (dams, creeks, reservoirs and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐
	Location, depth, and specified use of groundwater bores on the site and adjacent properties from the register of the relevant Rural Water Corporation. Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐
	Location of existing and proposed buildings, sheds, driveways, paths and any other improvements.	☐
	Area(s) available for effluent management.	☐
	Location of proposed Effluent Dispersal Area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the Effluent Dispersal Area.	☐
	Location of proposed OWM treatment system (nominal).	☐
	Location of reserve Effluent Dispersal Area (sized to scale).	☐
11. Appendices	Figures	☐
	Site Plan	☐
	Soil bore logs for all test pits or auger holes	☐
	Certificate of Title(s) for lot (plan)	☐
	Proposed building plans	☐
	Planning Permit application (where applicable)	☐

Table 16: Minimum Requirements for Detailed LCA

Report Element	Detailed Requirements	Completed
1. Introduction and Background	Report summary / executive summary.	☐
	Confirmation of Risk Rating.	☐
	Confirmation of any relevant sensitivity overlays as per communications with Council.	☐
	Confirmation that lot(s) meet minimum lot size criteria for WWSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, increase in building entitlements (subdivision) or non-domestic development.	☐
	Name, contact details, and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Lot area.	☐
	Proposed / existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
	Site survey plan (2m contours) will need to be conducted by a qualified surveyor.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Catchment Management Authority, and State Government requirements, including restrictions and caveats on title, and planning / building / bushfire / flood controls, e.g. zones and overlays. Note Environmental Significant Overlays and potable water supply. Compile this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the site and adjacent land, e.g. climatic information, groundwater and bore water information. Refer to stage 3 pp.35 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐
	Details of date, time, and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two soil test pits or auger holes within the identified area(s) available for effluent management with additional test pits required for more than one (1) soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice.	☐
	Soil assessment that considers all of the parameters in Table 2 of the Victorian LCA Framework (2014): • Colour and mottling; • Electrical conductivity; • Emerson Aggregate Class;	☐

Report Element	Detailed Requirements	Completed
	• Permeability and design loading rate (using soil texture); • pH; • Rock fragments; • Soil depth; • Soil texture (field textural analysis); • Watertable (depth to); • Cation exchange capacity (CEC); • Sodicity (Exchangeable Sodium Percentage ESP); and • Sodium Absorption Ratio (SAR). Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints. Soil permeability testing conducted in situ for the soil within the area(s) available for effluent management as per constant head well permeameter method (Appendix G, *AS/NZS 1547:2012*) can be undertaken if desired, otherwise soil texture classification via Table E1 of *AS/NZS 1547:2012* and application of effluent using the loading rates within Tables L1, M1, and N1 of the *AS/NZS 1547:2012* is satisfactory.	
	Detailed review of available published soils information for the site. Soil landscapes and different soil facets should be mapped on the Site Plan.	☐
3. Available Area and Setback Distances	Calculation of area(s) available for effluent management and location on Site Plan.	☐
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice 891.4 (2016), or relevant guideline section). Justification required.	☐
4. LCA Confirmation	Contact Council if the LCA assessor disagrees with the final Risk Rating for the site.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water, and groundwater.	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Assess the capacity of the land to assimilate the treated wastewater based on the data collected (see Section 2.3.4 and Appendix H of EPA Code of Practice 891.4 (2016) or relevant guideline section) for both levels of effluent quality, primary and secondary.	☐
	Description and location of applicable OWM treatment system options (refer to the EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location.	☐
	Monthly water balance modelling sizing the preferred effluent dispersal area. Median rainfall and mean evaporation data must be used for relevant locality, as detailed in Appendix C. All inputs, results and justification to be shown in the report.	☐

Report Element	**Detailed** Requirements	Completed
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints. This may include the following: • Storm water management; • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and OWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐
9. Conclusion	Conclusion summarising all the important design, sizing and mitigation requirements to ensure sustainable OWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones, overlays and or restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays).	☐
	Type of catchment (e.g. WSPA or GMA).	☐
	North arrow.	☐
	Contour lines (at maximum of 2m intervals), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of other utilities i.e. electricity, gas, telecommunications (which must be located outside the Effluent Dispersal Areas)	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface water features (dams, creeks, reservoirs, and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐
	Location, depth, and specified use of groundwater bores on the site and adjacent properties from the register of the relevant Rural Water Corporation. Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐
	Location of existing and proposed buildings, sheds, driveways, paths, and any other improvements.	☐
	Area(s) available for effluent management	☐
	Location of proposed Effluent Dispersal Area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the Effluent Dispersal Area.	☐
	Location of proposed OWM treatment system (nominal).	☐
	Location of reserve Effluent Dispersal Area (sized to scale).	☐
11. Appendices	Copy of the monthly water balance calculations.	☐
	Figures.	☐

Report Element	**Detailed** Requirements	Completed
	Site Plan.	☐
	Soil bore logs for all test pits or auger holes.	☐
	Certificate of Title (s) for lot (plan).	☐
	Proposed building plans.	☐
	Planning Permit application (where applicable).	☐

Table 17: Minimum Requirements Comprehensive LCA

Report Element	Comprehensive Requirements	Completed
1. Introduction and Background	Report summary / executive summary.	☐
	Confirmation of Risk Rating.	☐
	Confirmation of any relevant sensitivity overlays as per communications with Council.	☐
	Confirmation that lot(s) meet minimum lot size criteria for WWSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, increase in building entitlements (subdivision) or non-domestic development.	☐
	Name, contact details, and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Lot area.	☐
	Proposed / existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
	Site survey plan (2m contours) will need to be conducted by a qualified surveyor.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Catchment Management Authority, and State Government requirements, including restrictions and caveats on title, and planning / building / bushfire / flood controls, e.g. zones and overlays. Note Environmental Significant Overlays and potable water supply. Compile this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the site and adjacent land, e.g. climatic information, groundwater and bore water information. Refer to stage 3 pp.35 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐
	Details of date, time, and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two (2) soil test pits or auger holes within the identified area(s) available for effluent management with additional test pits required for more than one (1) soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice.	☐
	Soil assessment that considers all of the parameters in Table 2 of the Victorian LCA Framework (2014): • Colour and mottling; • Electrical conductivity;	☐

Report Element	Comprehensive Requirements	Completed
	• Emerson Aggregate Class; • Permeability and design loading rate (using soil texture); • pH; • Rock fragments; • Soil depth; • Soil texture (field textural analysis); • Watertable (depth to); • Cation exchange capacity (CEC); • Sodicity (Exchangeable Sodium Percentage ESP); and • Sodium Absorption Ratio (SAR). Phosphorous Sorption Capacity is also required to be measured for the soil to which the effluent will be applied to. Detailed explanation of the level of constraint with regards to OWM and recommended mitigation measures to overcome these constraints. Soil permeability testing conducted in situ for the soil within the area(s) available for effluent management as per constant head well permeameter method (Appendix G, *AS/NZS 1547:2012*) can be undertaken if desired, otherwise soil texture classification via Table E1 of *AS/NZS 1547:2012* and application of effluent using the loading rates within Tables L1, M1, and N1 of the *AS/NZS 1547:2012* is satisfactory.	
	Detailed review of available published soils information for the site. Soil landscapes and different soil facets should be mapped on the Site Plan.	☐
3. Available Area and Setback Distances	Calculation of area(s) available for effluent management and location on Site Plan.	☐
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice 891.4 (2016), or relevant guideline section). Justification required.	☐
4. LCA Confirmation	Contact Council if the LCA assessor disagrees with the final Risk Rating for the site.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water and groundwater.	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Assess the capacity of the land to assimilate the treated wastewater based on the data collected (see Section 2.3.4 and Appendix H of EPA Code of Practice 891.4 (2016), or relevant guideline section) for both levels of effluent quality; primary and secondary.	☐
	Description and location of applicable OWM treatment system options (refer to EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location. Effluent Dispersal Area to be sized on the most limiting balance as detailed in the following.	☐

Report Element	Comprehensive Requirements	Completed
	A water balance is required to size the preferred effluent dispersal area for the proposed development scenario. A monthly water balance using the prescribed median rainfall and mean evaporation data must be used for relevant locality. All inputs, results and justification to be shown in the report.	☐
	Undertake an annual nutrient balance (refer to pp.33 MAV (2014) for example methodology) for the proposed development scenario. All inputs, results and justification to be shown in the report.	☐
	Prepare a site specific detailed hydraulic design for the Effluent Dispersal Area suitable for supplier quotation and construction.	☐
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints. This may include the following: • Storm water management • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and OWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐
9. Conclusion	Conclusion summarising all the important design, sizing, and mitigation requirements to ensure sustainable OWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones, overlays and restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays).	☐
	Type of catchment (e.g. WSPA or GMA).	☐
	North arrow.	☐
	Contour lines (2m intervals from survey plan or Council provided data), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of other utilities i.e. electricity, gas, telecommunications (which must be located outside the Effluent Dispersal Areas)	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface water features (dams, creeks, reservoirs, and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐
	Location, depth, and specified use of groundwater bores on the site and adjacent properties from the register of the relevant Rural Water Corporation. Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice 891.4 (2016), or relevant guideline section.	☐

Report Element	Comprehensive Requirements	Completed
	Location of existing and proposed buildings, sheds, driveways, paths, and any other improvements.	☐
	Area(s) available for effluent management	☐
	Location of proposed Effluent Dispersal Area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the Effluent Dispersal Area.	☐
	Location of proposed OWM treatment system (nominal).	☐
	Location of reserve Effluent Dispersal Area (sized to scale).	☐
11. Appendices	Copy of the water (hydraulic) balance calculations.	☐
	Copy of the nutrient balance calculations.	☐
	Figures.	☐
	Site Plan.	☐
	Soil bore logs for all test pits or auger holes.	☐
	Copy of the Survey Plan.	☐
	Certificate of Title(s) for lot (plan).	☐
	Proposed building plans.	☐
	Planning Permit application (where applicable).	☐

Appendix C

Locality Climate Data

Station	Rainfall Data (mm)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Apsley	18.0	13.9	20.2	27.3	50.4	62.9	75.8	80.0	61.8	42.9	29.5	28.0	510.7
Benayeo	20.4	14.2	15.6	23.4	44.2	55.8	63.8	74.0	55.2	42.6	26.6	21.9	457.7
Big Desert	15.9	12.7	11.5	12.0	31.6	37.6	41.6	45.3	36.6	31.1	23.1	20.2	319.2
Bringalbert	21.6	15.4	18.4	22.0	48.0	53.9	64.5	76.8	54.8	41.0	25.7	24.0	466.1
Broughton	16.6	14.0	11.1	14.0	34.7	40.9	45.5	48.4	35.0	32.7	24.6	23.4	340.9
Caram	19.1	14.6	15.7	23.6	43.2	54.5	62.7	71.4	48.1	38.9	28.7	24.8	445.3
Chetwynd	22.6	19.3	25.7	31.8	51.7	67.0	86.5	86.1	58.6	46.5	30.6	32.1	558.5
Connewirricoo	22.0	16.7	20.2	30.6	51.9	60.5	79.1	83.6	57.5	48.2	29.2	29.3	528.8
Dergholm	22.8	19.4	23.6	31.6	54.2	67.2	87.0	88.2	63.4	48.0	37.6	29.9	572.9
Dorodong	24.8	15.2	25.6	32.8	59.2	70.4	84.1	81.8	70.1	50.0	34.6	29.2	577.8
Douglas	19.5	12.8	16.2	22.5	44.6	55.5	60.3	65.3	49.3	40.7	30.7	24.8	442.2
Edenhope	21.3	11.3	22.8	30.1	50.2	62.0	73.3	79.8	57.0	45.9	29.6	25.3	508.6
Goroke	15.8	14.8	16.4	22.2	41.0	51.8	56.8	57.8	44.6	34.0	29.8	19.2	404.2
Grass Flat	15.7	11.6	13.9	14.7	37.6	37.0	45.2	47.6	36.4	39.1	25.4	20.3	344.5
Gymbowen	14.9	14.1	13.7	18.7	40.6	45.9	54.5	56.2	43.8	36.6	28.3	20.3	387.6
Harrow	21.8	14.5	21.2	27.5	49.4	60.7	69.0	74.5	59.1	44.7	30.6	26.0	499.0
Kadnook	21.8	16.8	19.9	30.5	51.7	60.5	76.6	80.8	56.2	47.2	27.3	28.8	518.1
Kaniva	16.7	12.6	11.6	19.8	38.5	45.9	47.2	51.5	37.7	35.8	24.5	23.2	365.0
Karnak	16.8	14.2	16.3	21.4	39.9	49.4	54.4	65.4	43.7	39.5	28.9	22.1	412.0
Langkoop	18.7	16.3	18.7	31.0	51.4	67.9	79.4	83.0	58.8	44.0	27.5	29.4	526.1
Lawloit	15.4	12.9	11.7	19.2	39.0	41.8	49.2	50.3	35.1	36.3	25.4	19.4	355.7
Lillimur	18.0	12.2	11.4	15.5	37.9	45.6	45.9	52.9	41.8	37.2	24.2	22.8	365.4
Miga Lake	15.5	12.9	15.0	21.0	45.3	49.9	56.6	62.8	48.1	40.1	27.7	23.1	418.0
Minimay	19.1	17.0	18.8	19.6	44.6	50.7	56.9	65.8	46.3	34.7	27.3	21.9	422.6
Miram	18.6	14.4	11.5	21.2	37.1	42.6	45.0	51.9	36.5	36.0	24.2	20.2	359.2
Mitre	14.9	12.4	15.3	17.9	39.2	47.5	51.8	52.6	42.2	38.2	26.2	20.8	379.0
Neuarpurr	18.8	16.4	20.8	22.0	44.7	52.9	60.8	66.7	52.1	40.4	23.6	22.4	441.6
Nurcoung	14.5	13.8	14.4	16.4	40.6	42.1	49.1	49.1	40.4	37.7	25.0	21.5	364.6
Ozenkadnook	20.2	14.2	18.3	22.4	42.3	52.9	58.3	66.9	50.2	37.0	28.2	24.3	435.2
Patyah	20.2	15.9	20.9	23.6	44.1	53.0	62.4	74.9	56.0	38.4	27.3	23.3	460.0
Peronne	17.6	15.4	15.1	21.2	42.8	49.6	51.9	59.5	47.5	36.0	28.3	20.0	404.9
Poolaijelo	21.6	19.3	22.2	35.9	49.8	70.5	85.2	83.3	61.2	46.8	30.3	27.2	553.3
Powers Creek	22.1	17.2	22.7	31.5	50.3	65.9	84.2	87.5	58.0	48.0	30.9	28.7	547.0
Serviceton	14.6	13.7	13.4	18.3	41.2	52.1	52.0	60.0	47.9	37.2	26.6	22.1	399.1
Tarrayoukyan	23.3	17.7	26.5	33.8	58.3	69.2	83.3	87.1	61.7	46.7	33.4	31.4	572.4
Telopea Downs	16.2	9.8	10.8	18.2	35.7	40.2	48.8	47.5	38.7	31.3	25.7	24.8	347.7
Ullswater	19.2	14.7	17.5	24.4	43.6	54.6	63.8	72.2	50.2	38.1	27.8	25.3	451.4
Wombelano	16.0	12.8	15.9	23.2	45.0	57.3	62.4	68.7	53.0	42.0	29.2	25.0	450.5

Station	Evaporation Data (mm)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Apsley	230.4	190.9	155.6	91.3	53.4	37.0	41.7	59.5	85.1	125.8	160.1	205.4	1,436.2
Benayeo	234.1	193.7	158.0	92.9	54.6	37.9	42.7	60.7	86.6	127.8	163.0	208.9	1,460.9
Big Desert	259.6	213.9	174.0	102.6	59.5	39.9	45.0	66.0	98.4	147.9	188.1	237.1	1,631.9
Bringalbert	233.0	192.9	157.1	92.0	53.6	36.9	41.6	59.6	85.8	127.3	161.4	208.1	1,449.3
Broughton	250.7	206.8	167.9	98.5	56.9	37.9	42.9	62.8	93.3	140.5	178.0	227.4	1,563.7
Caram	228.0	189.1	153.6	89.1	51.1	34.6	39.3	56.9	83.1	124.5	157.9	203.7	1,410.9
Chetwynd	218.3	181.5	147.9	86.1	49.7	34.2	38.9	56.1	80.6	119.5	151.1	194.0	1,358.1
Connewirricoo	220.9	183.6	149.6	87.2	50.4	34.6	39.5	56.7	81.6	121.1	152.5	196.6	1,374.1
Dergholm	217.4	180.9	148.0	87.1	51.2	35.9	40.8	58.0	81.9	120.3	151.0	193.3	1,365.7
Dorodong	216.3	179.9	147.0	86.5	50.8	35.6	40.4	57.5	81.4	119.6	150.1	192.2	1,357.3
Douglas	225.4	187.0	152.2	88.2	50.5	34.2	38.9	56.4	82.3	123.2	156.0	201.3	1,395.6
Edenhope	225.1	186.8	152.0	88.6	51.2	35.0	39.8	57.3	82.7	122.9	156.1	200.5	1,398.0
Goroke	236.9	195.9	159.2	92.7	53.2	35.9	40.6	58.9	86.6	129.8	166.0	212.6	1,468.5
Grass Flat	242.4	200.2	162.6	94.7	54.2	36.3	41.0	59.5	88.2	133.2	169.7	218.7	1,500.8
Gymbowen	235.2	194.6	157.9	91.6	52.3	35.1	39.8	57.9	85.4	128.6	163.6	211.1	1,453.2
Harrow	222.5	184.9	150.6	87.6	50.4	34.5	39.2	56.6	81.8	121.9	154.6	198.4	1,383.0
Kadnook	222.0	184.4	150.3	87.5	50.5	34.6	39.4	56.7	81.8	121.5	153.3	197.7	1,379.7
Kaniva	245.9	203.0	165.2	97.2	56.5	38.2	43.1	62.3	91.4	136.7	174.7	222.1	1,536.2
Karnak	231.8	192.0	156.1	90.7	52.0	35.1	39.9	57.7	84.6	126.7	160.9	207.6	1,435.1
Langkoop	225.7	187.3	152.9	90.0	52.8	36.9	41.7	59.2	84.1	123.9	156.0	200.9	1,411.5
Lawloit	245.4	202.6	164.4	96.0	55.0	36.7	41.6	60.7	90.2	135.9	172.8	221.7	1,523.0
Lillimur	247.0	203.9	166.0	98.0	57.3	38.9	43.9	63.2	92.4	138.0	176.2	223.4	1,548.2
Miga Lake	229.7	190.4	154.5	89.5	50.9	34.2	38.9	56.6	83.3	125.3	159.3	205.6	1,418.2
Minimay	237.4	196.4	159.8	93.7	54.6	37.3	42.0	60.4	87.5	130.3	165.4	212.9	1,477.8
Miram	247.0	204.0	165.7	97.2	56.2	37.6	42.6	61.9	91.5	137.5	174.5	223.5	1,539.1
Mitre	235.3	194.6	157.9	91.4	52.0	34.7	39.4	57.4	85.1	128.5	163.8	211.3	1,451.6
Neuarpurr	237.5	196.3	159.9	94.0	55.1	37.8	42.6	60.9	87.8	130.3	165.4	212.7	1,480.2
Nurcoung	239.3	197.8	160.5	93.2	53.1	35.4	40.1	58.5	86.8	131.2	168.4	215.4	1,479.5
Ozenkadnook	232.0	192.2	156.3	91.1	52.5	35.7	40.4	58.4	84.9	126.8	160.9	207.5	1,438.6
Patyah	230.9	191.3	155.7	91.0	52.7	36.1	40.8	58.7	84.9	126.1	159.8	206.2	1,434.1
Peronne	237.3	196.3	159.6	93.3	53.9	36.6	41.3	59.6	87.0	130.2	165.4	212.9	1,473.3
Poolaijelo	221.2	183.8	150.0	87.9	51.3	35.6	40.5	57.8	82.3	121.5	152.7	196.7	1,381.1
Powers Creek	220.1	182.9	149.0	86.9	50.2	34.6	39.4	56.5	81.3	120.4	151.7	195.6	1,368.7
Serviceton	244.6	201.7	164.2	97.0	57.0	38.9	43.8	62.9	91.4	136.4	174.0	220.6	1,532.4
Tarrayoukyan	215.3	179.1	145.7	84.4	48.3	33.0	37.7	54.7	79.1	117.6	148.0	191.0	1,333.8
Telopea Downs	251.9	207.4	168.9	99.7	58.2	39.2	44.4	64.5	95.2	142.5	181.5	228.8	1,582.2
Ullswater	227.7	188.7	153.4	89.0	51.0	34.5	39.2	56.8	83.0	124.1	157.5	203.3	1,408.1
Wombelano	226.5	187.8	152.7	88.5	50.6	34.2	38.9	56.4	82.5	123.6	156.8	202.2	1,400.6