On-site Wastewater Management Plan

2022

Mansfield Shire

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1. Introduction

Mansfield Shire Council originally developed its Domestic Wastewater Management Plan (DWMP) in 2014 with funding from the State Government. The DWMP had a strong focus on a risk based approach in line with the requirements of State Environmental Protection Policy (Waters of Victoria) and Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments 2012.

That DWMP, now renamed On-site Wastewater Management Plan (OWMP) in line with new legislation, recognised legislative changes in the landscape and was structured to address:

- Council's approach to new wastewater generation (new installations) and;
- Council's approach to the review and improvement of/to historic/legacy wastewater systems particularly where the risks associated with those legacy systems were heightened due to density, constraints of a site and unsuitable development.

The focus of this updated plan, as with the original DWMP, remains protecting the public health and potable water supply catchments of Lake Eildon and Lake Nillahcootie, the inflowing rivers and waterways, and drainage line catchments from contamination of human origin.

This OWMP does not seek to "reinvent the wheel" but rather, undertake a high-level review of the principles underpinning Council's initial DWMP and its ambitious action plan.

2. Purpose

The OWMP details the risk analysis methodology applied to the Mansfield Shire identifying areas that are at high, medium and low risk of causing adverse impacts on potable water quality, public health and the environment if wastewater management strategies are not applied by the community, Council and our Project Partners.

Lake Eildon, the principal reservoir within the Goulburn Catchment, forms the border between the Mansfield and Murrindindi Shires. There is recognition that wastewater issues defy municipal boundaries and that management strategies need to do so as well.

This OWMP continues to focus on:

- analysing the risks associated with domestic wastewater in open, potable water catchments across Mansfield Shire;
- to identify initiatives and priorities addressing these risks;
- scientifically analyse risk factors across the Shire to identify areas of high, medium and low risk of domestic wastewater adversely impacting potable water supplies, public health, local amenity, the environment and other beneficial uses;
- provide a detailed analysis of each sewered and unsewered township, including the earlier analysis of the Goughs Bay sub-catchment based upon the Edis-White risk analysis model, to identify future development potential and future wastewater management requirements.
- explore the initiatives Council and our Project Partners can implement to address wastewater issues within each township, including cross references between recommendations made in this document with actions in the Action and Resource Plan.
- specify minimum land capability assessment and wastewater management requirements for differing types of proposals within high, medium and low risk areas to ensure resources of landowners, consultants and Council are dedicated to areas of highest risk;

- engage with landowners/residents, installers and designers to continually improve understanding about the installation, operation and maintenance of on-site systems and the newer requirements associated with General Environmental Duty (GED) and other recent legislative changes;
- detail education, training and process improvement initiatives that will ensure Council meets its statutory obligations in relation to domestic and other forms of on-site wastewater management.
- outline ongoing proactive compliance initiatives to ensure that the requirements of Certificates of Approval for wastewater management systems and Section 173 Agreements (under the *Planning and Environment Act 1987*) are met by landowners/residents at all times;
- identify appropriate infrastructure initiatives that will result in the continuous improvement of risk management in high and medium risk areas and support appropriate growth across the Shire.
- itemise suggested improvements to local policies and overlay provisions in the Mansfield Planning Schemes as a means of ensuring land capability and on-site wastewater risk management issues are integrated into day to day statutory, and longer term strategic, planning decisions.
- stipulate the updated timelines, and resources required, to implement all actions and initiatives; and
- reintroduce a monitoring and auditing framework after 2 years to track the implementation of the OWMP's Action and Resource Plan, including the provision of reports to our community and project partners.

3 Background

3.1 Legislative Framework

This OWMP has been re-developed in accordance with the requirements of the:

- State Environmental Protection Policy (Waters) (2018)
- *Public Health and Wellbeing Act 2008*; and
- Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments 2012.

The OWMP has been prepared and reviewed in consultation with all water authorities and comprises a strategy, including timelines and priorities, to prevent discharge of wastewater beyond property boundaries; and prevent individual and cumulative impacts on groundwater and surface water beneficial uses.

The OWMP also provides for the effective monitoring of the condition and management of on-site treatment systems, including but not limited to, compliance by permit holders with permit conditions and the EPA Code of Practice. It allows for the results of this monitoring being provided to stakeholders as agreed by the relevant stakeholders. In addition, enforcement action where non-compliance is identified and a process of review and updating (if necessary) of the OWMP every five years.

As previously required, an independent audit of implementation of the OWMP, will again be undertaken by an accredited auditor (water corporation approved) in 2 years (mid 2024). Stakeholders, including ratepayers will be issued with the results of the audit once completed.

Council is required to demonstrate that suitable resourcing for implementation, including monitoring, enforcement, review and audit, is in place. The actions of this plan include resourcing

requirements to deliver agreed inspection and wastewater system monitoring targets.

The relevance of the following legislations to on-site wastewater management has been considered in the advance of this OWMP.

State Environmental Protection Policy (Waters) (2018)

This SEPP is created under the auspices of the *Environment Protection Act 1970* and aims to achieve integrated catchment management by providing a statutory framework for the protection of the uses and values of Victoria's marine and fresh water assets and environments. This requirement is currently preserved by the *Environment Protection Act 2017.*

It applies to all natural water environments (including seasonal waterways), their catchments and activities undertaken within catchments that impact on surface waters. It excludes artificial water holding and treatment systems, off stream private dams and artificial wetlands.

The SEPP also aims to maintain and improve groundwater, to protect existing and potential beneficial uses of these water resources, including potable water supply. It is relevant to our OW MP as there is a potential impact from effluent disposal trenches, surface discharge and the reuse of treated wastewater from underperforming on-site detention systems on the quality of groundwater, if systems are not designed to ensure such impacts are avoided. This is why a land capability assessment must assess what impacts, if any, a wastewater management system will have on groundwater.

Management of on-site systems and their operation and design are supported by these standards and guidelines:

- MAV Land Capability Assessment Framework (2014) – replacing EPA Publication 746.1.
- AS/NZS 1547:2012 On-site Domestic Wastewater Management
- AS/NZS 3500:2003 Plumbing and Drainage.
- EPA Code of Practice – On-site Wastewater Management, Publication 891.4 (2016); and
- Ministerial Guidelines – Planning Permit Applications in Open, Potable Water Supply Catchment Areas (DSE, 2012)

Certificates of Approval to individual on-site wastewater systems are no longer issued by the EPA (this practice ceased in July 2016). EPA now approves four system types in line with Australian Standards;

- AS/NZS 1546.1 Septic tanks
- AS/NZS 1546.2 Waterless composting toilets
- AS/NZS 1546.3 Aerated wastewater treatment systems
- AS/NZS 1546.4 Domestic greywater treatment systems

Assessed by others and issued with a certificate of conformity from a certifying authority.

Public Health and Wellbeing Act 2008

This Act identifies the roles and responsibilities of various parties, including councils, in the prevention of disease, in prolonging life and in the promotion of public health through various forms of licenses, approvals and enforcement.

Under this Act all "*councils are given the duty to do whatever it can to mitigate health threats and other nuisances"* via coordinated programs and initiatives.

Ministerial Guidelines for Planning Applications in Open, Potable Water Supply Catchment Areas (2012)

This document was produced by DEWLP, and is owned by the Minister for Water, but was adopted for the purposes of Section 160(1A) (g) of the *Planning and Environment Act 1987* which states:

"(1A) Before deciding on an application, the responsible authority, if the circumstances appear to so require, may consider—

(g) *any other strategic plan, policy statement, code or guideline which has been adopted by a Minister, government department, public authority or municipal council."*

The Guidelines apply to all declared special water supply catchment areas under Division 2 of Part 4 of the Catchment and Land Protection Act 1994.

Their purpose is simple; to protect the quality of potable water supplies using a risk-based approach that facilitates appropriate development within catchments.

Local Government Act 2020

The Local Government Act 2020 provides a framework for the establishment and operation of councils. This Act has only a small influence on this Plan but provides councils with the ability to develop and adopt local laws and to put a special charge scheme or environmental levy in place to provide necessary infrastructure to meet community needs.

Water Act 1989

The *Water Act 1989* is the key piece of legislation that guides water corporations and authorities (i.e., water storage managers and water retailers). The stated aims are to provide for the orderly and efficient use of water resources and to ensure consistency in the management and treatment of water supplies across Victoria. The Act also sets the framework for the protection and enhancement of waterways, catchment or groundwater. It also provides the enforcement framework to assist Council Officers in addressing health risks and nuisances.

Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act* 1994 (CALP) sets the framework for the management and protection of catchments to maintain their productivity in the long term, enhance land and water resources and to establish the processes by which the State's land and water resources are assessed.

It has a strong focus on community involvement in achieving these aims, targeting landowners and managers by identifying their duties in relation to land and water management.

The Goulburn Broken Catchment Management Authority is created under this Act and is responsible for the management of the catchments within Mansfield and Murrindindi Shires.

Safe Drinking Water Act 2003 and Regulations 2015

The Safe Drinking Water Act 2003 together with the Regulations supports a risk-based framework to ensure safe drinking water and is a reason for working with GVW (and GMW) as project partners in formulating the OWMP.

Planning and Environment Act 1987 (Amended 2013)

The *Planning and Environment Act 1987* is the principal act which governs planning policy and decision making. *Planning and Environment Act 1987* identifies the objectives which must guide all planning decisions in Victoria, while also identifying the roles and responsibilities of various authorities and stakeholders.

Under the Act Councils are charged with the responsibility of being both a planning authority (when rezoning land, amending the Local Planning Policy Framework (LPPF) or local provisions) and a responsible authority (when assessing planning applications to use and develop land).

Subdivisions Act 1988

The *Subdivisions Act 1988* is a key piece of planning legislation that supports the *Planning and Environment Act 1987*. It outlines the requirements and procedures of the subdivision and consolidation of land, as well as the creation, variation or removal of easements and other types of restrictions on a Land Title.

Furthermore, the Act specifies the rights and responsibilities of referral authorities, including their ability to require easements to be registered on Title, or for the transfer of land to them in order to provide services to support the new subdivided land (e.g., GVW would usually require a sewerage easement within which reticulated sewerage infrastructure is placed to guarantee unencumbered access to their infrastructure).

Victorian Waterway Management Strategy (2013)

The aim of this Strategy, written by DELWP, is to provide a framework to maintain or improve the condition of rivers, estuaries, and wetlands so that the beneficial uses and values identified by the SEPP Waters of Victoria are protected and enhanced.

The document seeks to support regional planning processes and catchment management and is aimed at identifying the roles and responsibilities of landowners, government, local councils, land managers, water corporations and catchment management authorities and other groups involved in the management or use of waterways.

Environment Protection Act 2017

The *Environment Protection Act 1970* created a legislative framework to protect the environment in Victoria. The Act provides the basis of the regulatory framework for (septic tank) systems which in July 2021 became known as on-site wastewater management systems.

The *Environment Protection Act 2017*, came into effect on 1 July 2021, replacing the previous *Environment Protection Act 1970*.

This document incorporates the environmental obligations and protections of Victorians with a focus on environment protection and human health using prevention-based approaches.

The Act gives EPA and Councils enhanced responsibilities, powers and additional tools to prevent and minimise the risks of harm and to hold environmental polluters to account.

The *Environment Protection Act 2017* provides enhanced powers and tools to prevent and minimise the risks of harm to human health and the environment from pollution and waste. This includes the on-site management of wastewater permits. Permit application requirements, grounds for application refusal and (septic tank) maintenance requirements are also outlined under the Act.

Duty to notify the EPA is a strong focus of the *Environment Protection Act 2017*. A key aspect of the amendment, which is criminally enforceable, is the General Environmental Duty (GED). It requires that a person in management or control of land on which an on-site wastewater

management system is located must take all reasonable steps to ensure the system is operated so as not to pose a risk.

3.2 Our Work so far - Domestic Wastewater Management Plan 2014

Domestic Wastewater Management Plan 2014

The key focus of the 2014 DWMP was to validate the appropriateness of wastewater arrangements for all new proposed development (without reticulated services).

It also introduced a Council action to commence the process of broad community education regarding owners and occupiers' wastewater responsibilities.

Importantly it initiated a process aimed to assess the performance of existing wastewater systems in use within the Municipality – with priority based on perceived risk (slope, size of allotment, density of development, proximity to waterways etc.).

Independent Audit of 2014 Domestic Wastewater Management Plan

In 2016 an independent and accredited audit was conducted on the DWMP. Recommendations from the audit were included in an update of the action plan.

Key areas addressed were:

- Resources and Funding
- Risk Management;
- Education and awareness of Community, LCA Consultants and installers;
- Compliance;
- Inspection Management
- The status of the action plan targets.

Assessment of the Action and Resource Plan continued as part of the (irregular) Project Partner Meetings.

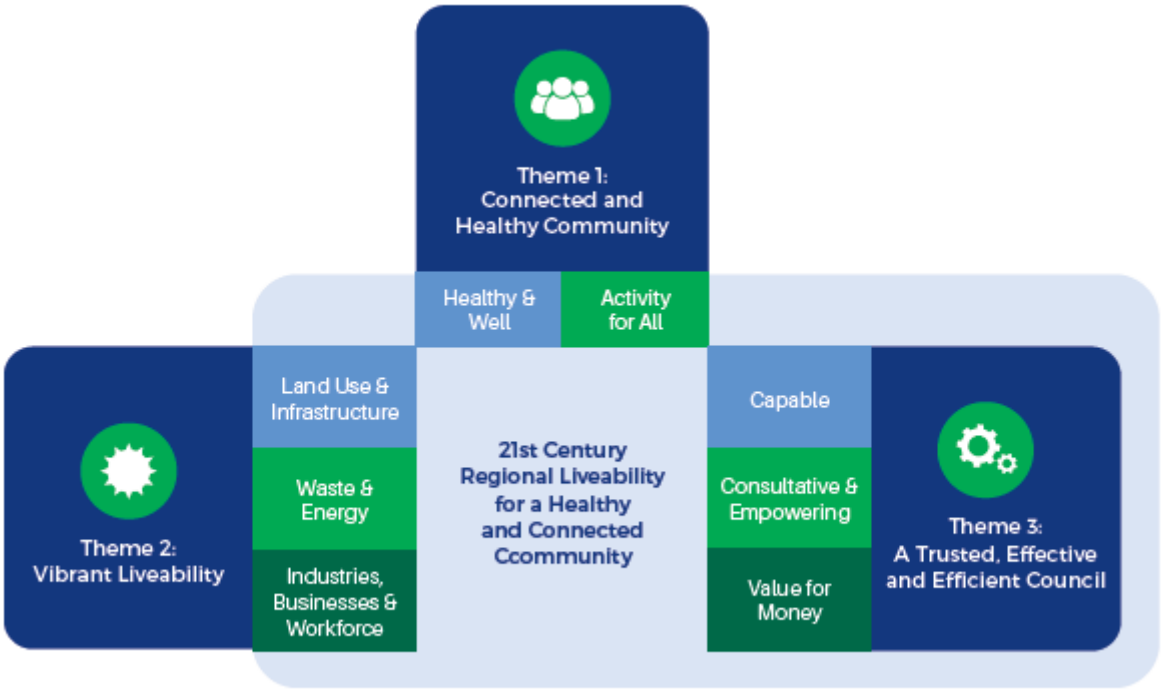
The 2014 DWMP Background Report estimated that "there are over 4,000 domestic wastewater systems across the Shire" growing by approximately 80 new systems each year. The 2014 DWMP initially set an Action of completing 500 inspections per year. This was subsequently reduced with agreement of the Water Authorities in a 2016 MOU to 200 per year.

3.3 Council Plan

Council recognises the OWMP is a key factor to achieving its aspirations for the Mansfield Shire and pledge to forge and nurture smart partnerships that contribute to greater long-term beauty, significance and sustainability.

The Mansfield Shire Council Plan 2021-2025 outlines Council's objectives under three themes:

- Theme 1: Connected and Healthy Community
- Theme 2: Vibrant Liveability
- Theme 3: A Trusted, Effective and Efficient Council



The Municipal Health and Wellbeing Plan provides the detail on key factors that contribute to better health and wellbeing outcomes and opportunities and actions to promote and encourage healthy living and better lifestyles.

Council is committed to leading, supporting and advocating for the best possible outcomes for all the Mansfield community.

3.4 Land Use Planning Context – Planning Scheme

The Mansfield Planning Scheme has been considered in developing this OWMP with a focus on areas identified for current and future residential development. The Mansfield Shire Domestic Wastewater Management Plan 2014 is a reference document with the Mansfield Planning Scheme.

For Council to consider a planning permit application for development, including subdivision, in the absence of a reticulated sewerage system, a land capability assessment proving that the land is capable of treating and retaining wastewater within the allotment boundaries is required.

The Mansfield Planning Scheme prescribes minimum lot size thresholds for development within particular zones as follows:

- Low Density Residential Zone (LDRZ) – 0.4 hectares
- Rural Living Zone, Schedule 1 (RLZ1) – 4 hectares
- Rural Living Zone, Schedule 2 (RLZ2) – 8 hectares
- Farming Zone (FZ) – 40 hectares
- Rural Conservation Zone (RCZ) – 40 hectares
- Rural Activity Zone (RAZ) – 100 hectares

The Township Zone (TZ) requires any subdivision to meet a number of requirements / clauses

based on the number of lots proposed. The minimum lot size within this zone would be subject to what is being proposed and how the applicant plans to ensure all wastewater can be managed on-site for each proposed lot. The RLZ requires a permit to subdivide land regardless of the minimum lot size (unlike other Council areas). However, smaller lot sizes may be permitted under specific circumstances (including the re-subdivision of existing lots where the number of lots is not increased).

Mansfield Shire has areas of land without access to reticulated sewer, and applications for development in those areas are assessed against the requirements of the OWMP. In addition to this, large sections of Mansfield Shire are within a Special Water Supply Catchment, with these areas included in one of the following overlays:

- Environmental Significance Overlay, Schedule 1 (ESO1) – Catchments at High Risk of Water Quality Impacts
- Environmental Significance Overlay, Schedule 2 (ESO2) – Catchments at Medium Risk of Water Quality Impacts

Applications to use, subdivide or consolidate land, to construct a building or construct or carry out works, or to demolish a building or works that are within a Special Water Supply Catchment Area listed in Schedule 5 of the *Catchment and Land Protection Act 1994* and which provides water to a domestic supply in these areas must obtain approval from Goulburn Murray Water.

These overlays are supported by the following strategies:

- Strategy 1: Ensure best practice Water Sensitive Urban Design (WSUD) techniques are used in new urban and rural development.
- Strategy 2: Prevent development in the catchment that is detrimental to water quality.
- Strategy 3: Discouraging further development in Special Water Supply Catchments, particularly new rural residential estates on the lakes' shores.
- Strategy 4: Provide a riparian buffer of at least 30 metres to development.
- Strategy 5: Discourage land uses in the upper catchments of the Broken, Goulburn, Howqua, Delatite and Big Rivers that would contribute to the degradation of downstream water quality.
- Strategy 6: Improve the quality of urban stormwater entering the catchment.

4. Review of 2014 DWMP

The earlier DWMP was developed based on risk management principles, sought to establish priorities and provide targeted implementation by identifying 66 actions.

Whilst many of these actions have been delivered, others remain to be completed and in reality were overly ambitious.

In consultation with the Water Authorities GVW & GMW, this review has reset priorities. No changes are proposed to the risk-based methodology. Legislative changes have introduced additional tools available to Council and EPA to require improvement to existing systems identified with deficiencies and for system maintenance works.

At the conclusion of this document is the updated Action Plan which will span the life of this new document. This component of the OWMP will guide policy and resourcing decisions by Council and senior management over this timeframe to guarantee its implementation.

Under the Catchment and Land Protection Act 1994, 95% of our municipality lies within a declared special water supply catchment. This Act and the Environmental Protection Act require that as systems are monitored and deficiencies identified that they are rectified.

This OWMP incorporates and builds upon Council's responsibilities for developing our OWMP as set out in clause 29 of the SEPP, which is preserved for two years commencing from July 2021.

This clause states that local councils need where relevant, to develop and implement an on-site wastewater management plan in conjunction with water authorities and communities that:

- reviews land capability assessments and available domestic wastewater management options to prevent the discharge of wastewater beyond allotment boundaries and prevent impacts on groundwater beneficial uses.
- identifies the preferred options, together with costs, funding needs, timelines, and priorities; and
- provides for the assessment of compliance of on-site domestic wastewater systems with permit conditions.

Our risk methodology marries traditional wastewater management risk analysis tools with risk factors affecting potable water supplies.

5. Revised Wastewater Management Risk Assessment

The 2014 DWMP detailed the approach to the management of existing and future development of on-site domestic wastewater management systems within open, potable water supply catchments, based on a peer reviewed scientific analysis methodology developed by industry experts.

This section of the OWMP details that methodology. Figure 1 provides a high-level overview of the four-staged risk analysis process, which commenced with a Shire-wide analysis and continues to progress down to that of an individual on-site wastewater system.

Figure 1 Our Four Stage Risk Analysis Methodology

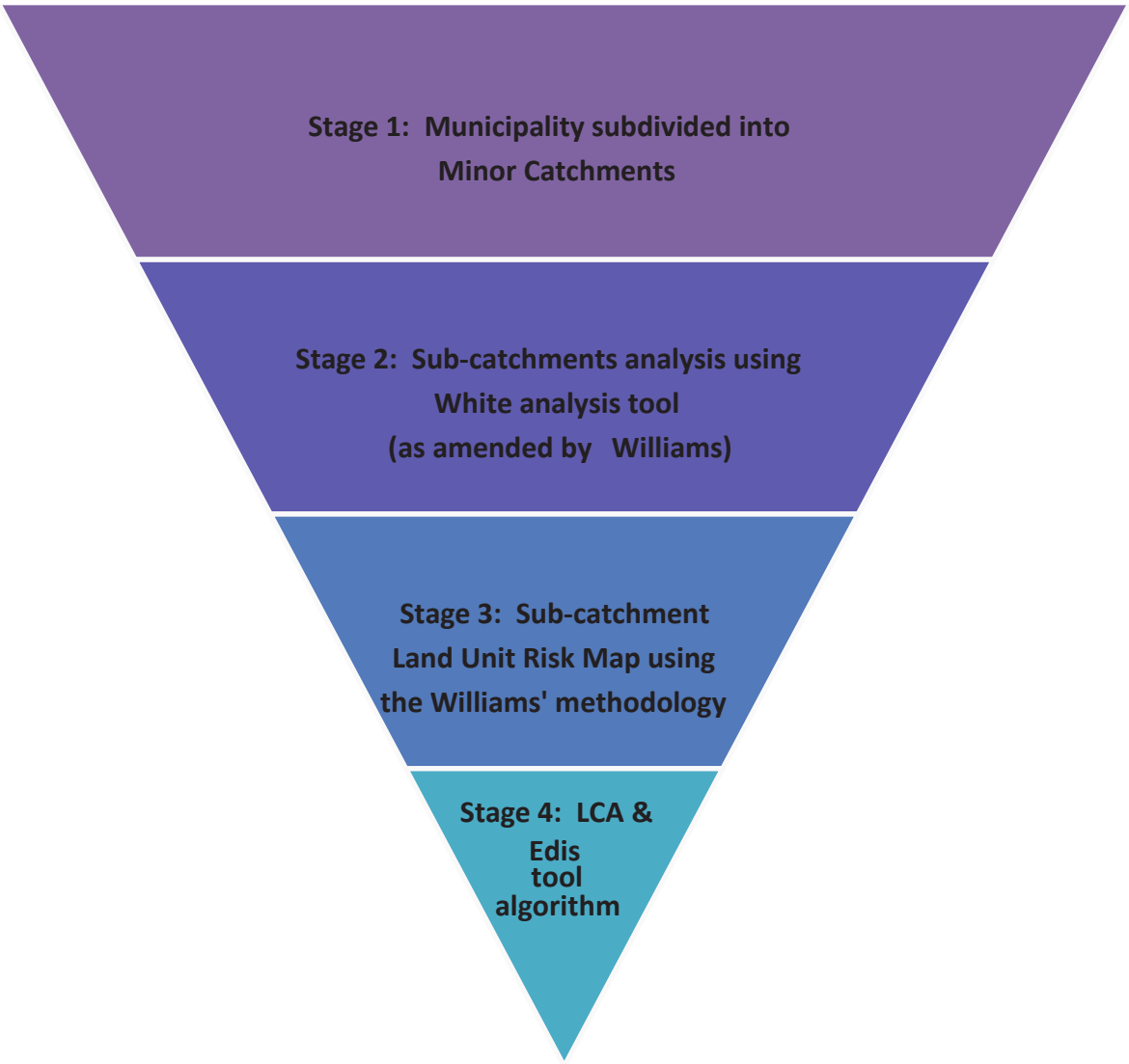
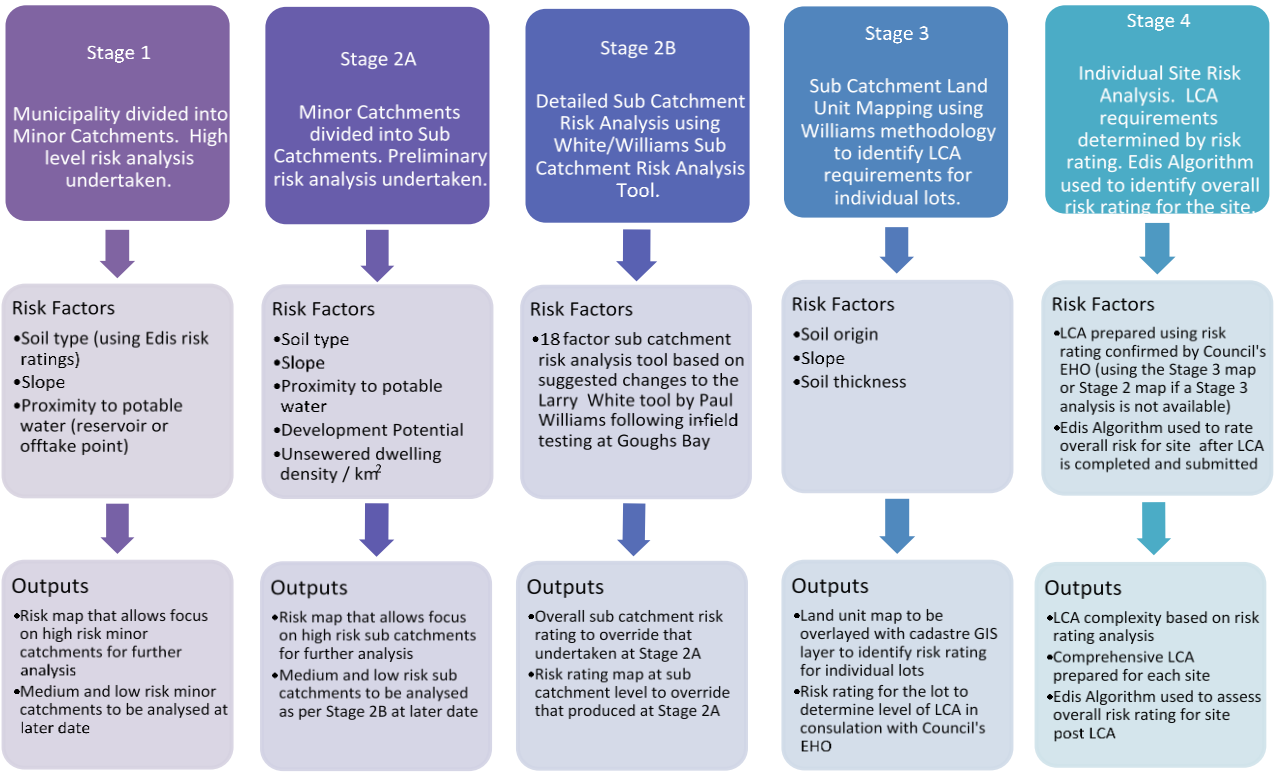


Figure 2 aims to provide an overview of how each step of the risk analysis methodology refines the risk analysis process. It also identifies the parameters applied and the outputs derived at each stage in the process.

Figure 2 Overview of the Risk Analysis Hierarchy, Risk Parameters and Outputs



5.1 Preliminary Work

The identification and analysis of risk factors remains heavily based on geographical information. Council's Geographical Information Mapping System (GIS) is the primary tool used to map and analyse risk across the Shire.

A significant amount of initial mapping work was undertaken as a means of preparing a 'mapping module' for the DWMP, including purchase and integration of specialist software to plot and map all relevant aspects of wastewater management.

This includes, but is not limited to:

- collation of reservoir, township wastewater management plants and potable water offtake points from GMW and GVW.
- analysis of soil types, ridgelines, watersheds, declared catchment boundaries and other topographical features to divide Mansfield Shire into manageable sized land units called 'minor catchments' to form the basis of the first level of risk analysis.

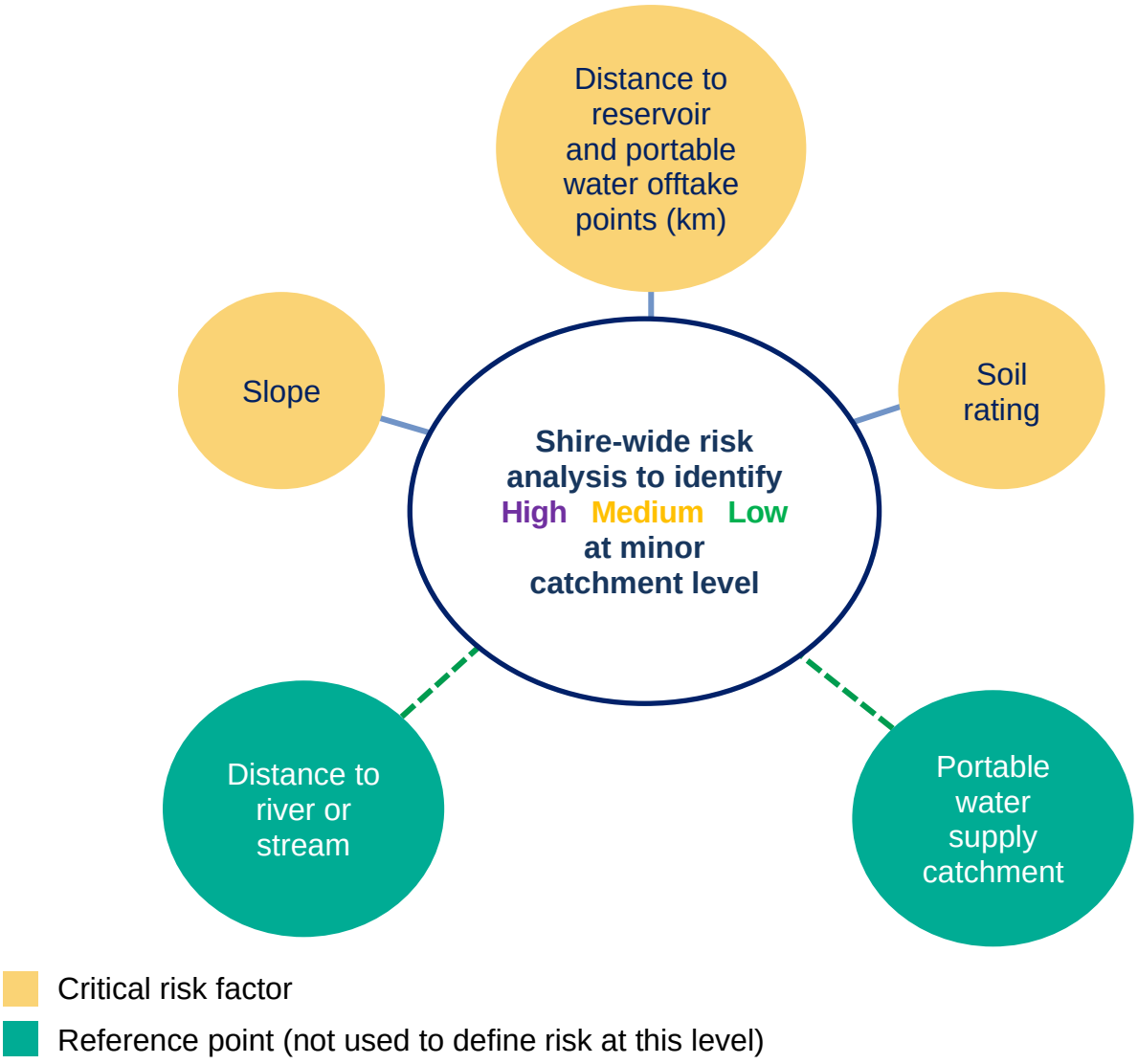
A completed action from the 2014 DWMP is the importing of on-site wastewater approvals issued by Council since 1995. This enlarged data has been used to inform risk assessment and management for the OWMP.

5.2 Stage 1 - A Shire-Wide Risk Analysis Methodology - Minor Catchments

The first step in the risk analysis process was a Shire wide analysis. A discussion around the factors of the sub-catchment risk analysis tool identified key risk factors essential in identifying risk levels at a large geographical scale.

Three key risk factors have been mapped and overlayed across the municipality (refer to Fig.3)

Figure 3 Stage 1: Shire-Wide Risk Factors Identified by the TRG



Two other factors were mapped for broader risk mapping context. Declared special water supply catchment boundaries and, sourced form DELWP, named streams and rivers.

Following analysis of topography, watersheds for major rivers and catchment boundaries the municipality was divided into manageable land units.

This resulted in the subdivision of the Shire into twenty sub-catchments as depicted in Map 1 and named in Table 4.

Minor catchments defined by ridgelines and watersheds within each declared catchment and special area plan. Sub-catchments identified by further analysis of ridgelines and watersheds within each minor catchment. See Table 4 listing the 20 identified minor catchments in the municipality

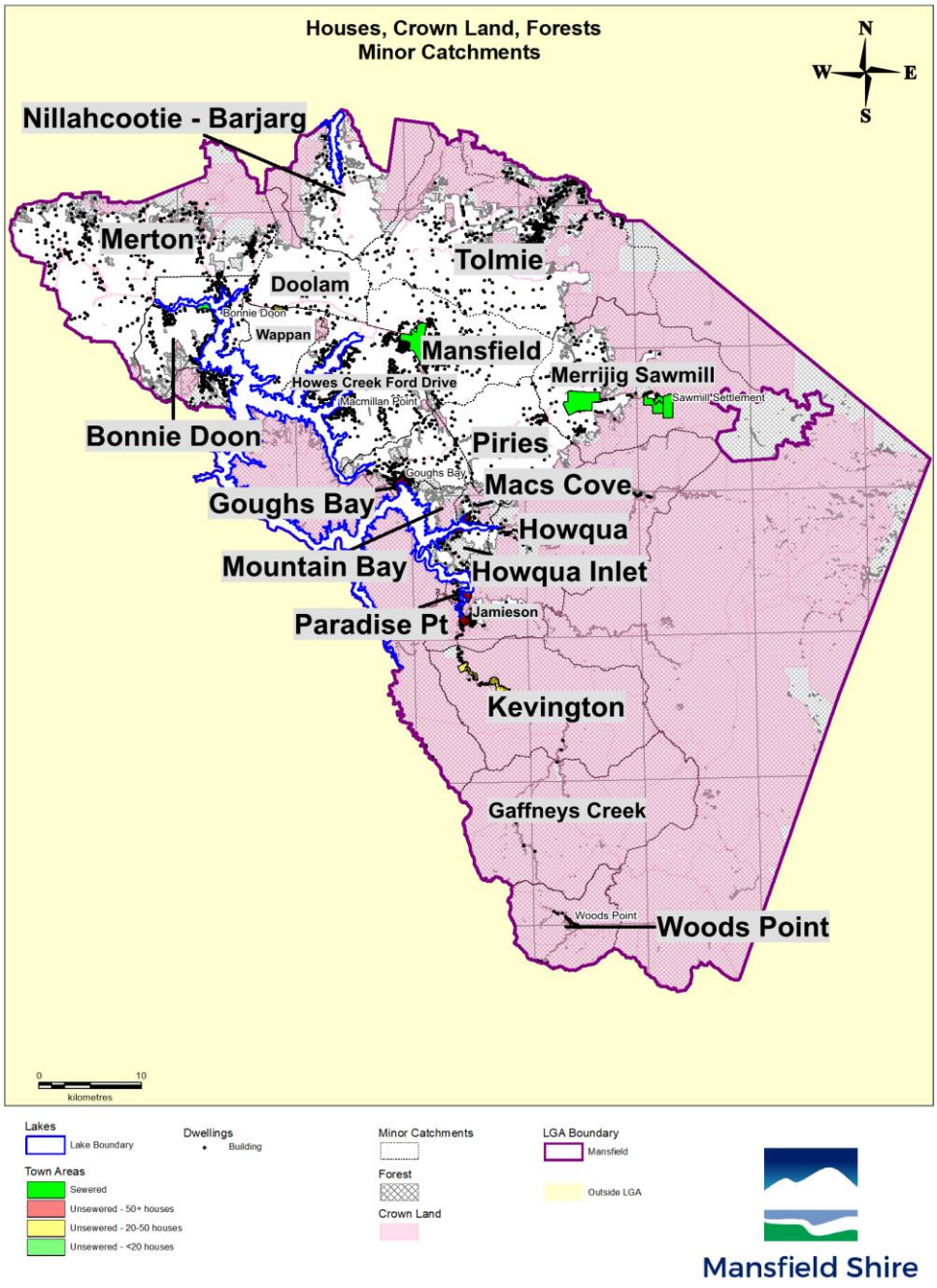
Stage 1 approved by Technical Reference Group (established for drafting the initial Council DWMP) 11/11/13 and revised 29/11/13

Please note that the area of land to the west of the Delatite Arm of Lake Eildon (The Pines) and along the Shire's north eastern boundary around Holland Creek have not been identified as a minor catchment as these areas are either Crown Land or are not a declared special water supply catchment.

Table 4 Stage 1 Minor Catchments

1 Goulburn Catchment – Merton	**11 Goulburn Catchment – Mountain Bay**
2 Goulburn Catchment – Central Bonnie Doon	**12 Goulburn Catchment – Macs Cove**
3 Goulburn Catchment – Bonnie Doon East	**13 Goulburn Catchment – Howqua**
4 Goulburn Catchment – Maindample	**14 Goulburn Catchment – Jamieson**
5 Broken Catchment – Nillahcootie	**15 Goulburn Catchment – Big River**
6 Broken and Goulburn Catchments – Tolmie	**16 Goulburn Catchment – Kevington**
7 Goulburn Catchment – Howes Creek	**17 Goulburn Catchment – Gaffneys Creek**
8 Goulburn Catchment – Central Mansfield	**18 Goulburn Catchment – Woods Point**
9 Goulburn Catchment – Goughs Bay	**19 Goulburn Catchment – Howqua Inlet**
10 Goulburn Catchment – Piries	**20 Goulburn Catchment – Upper Delatite**

Map 1 Stage 1: Minor Catchment Boundaries



Source: Mansfield Shire Council Geographical Information System

5.2.1 Minor Catchment Risk Factor 1 – Distance to Reservoir & Potable Water Offtake Point

Mapping data was derived from all water areas with a type of water body – lake. The GVW potable water take off points were mapped using information from Goulburn Valley Water.

Using the Edis-White Sub-catchment Risk Matrix, a 2 km buffer was applied to these assets to identify the high risk "purple" area, while a 15 km buffer was applied to create the medium risk "orange" area. The low risk "green" area was created by excluding the high and medium risk areas from the LGA polygon based on the following table:

Risk Factor	Low Risk (1)	Medium Risk (2)	High Risk (3)
Distance to reservoir or potable water offtake point (km) *	>15km	2-15km	<2km

5.2.2 Minor Catchment Risk Factor 2 – Slope

Slope data was derived from the 10 – 20m elevation data using GIS software and is based on 25m cells. The grid points estimating the slope are over a 25m x 25m area – this is derived via a surface based on the 10 and 20m contour data, created using 'Interpolation by Regularized Spline with Tension', and the slope is based on a first-order derivative from this surface. The raw slope data is in degrees. Data was not converted, but instead coloured according to inflection points of 10% and 20% (calculated into degrees).

The median slope was then calculated for each minor catchment (i.e., the number below which 50% of the grid point values are within that area) based on the 25m x 25m grid points and then classed on the <10%, 10-20% and >20% criteria.

The risk ratings for slope based on the Edis-White November 2013 sub-catchment analysis model as approved by the TRG are as follows:

Risk Factor	Low (1)	Medium (2)	High (3)
Slope	Grid points with median slopes <_ 10%	Grid points with median slopes between 10-20%	Grid points with median slopes >20%

5.2.3 Minor Catchment Risk Factor 3 – Soil

Soil data was downloaded from the Australian Soil Resource Information System (http://www.asris.csiro.au/downloads/NSG/asc.zip). The data is in an ESRI grid format, and covers all of Australia. A lookup table is provided for converting the codes in the grid to Australian Soil Classifications (ASC).

A subset of the grid data was made using GIS software to include the Mansfield LGA area.

This was converted to polygon data. Extra columns were added for the ASC codes and risk levels. The ASC codes were loaded into a Mapinfo table and an extra risk column was added. Risk ratings were then applied to the soil types using Table 3 from Edis April 2014.

Risk Factor	Low (1)	Medium (2)	High (3)
Soil type	Chromosols Ferrosols Dermosols	Vertosols Kurosols Kandosols Rudosols	Anthoposols, Organosols, Podosols, Hydrosols, Sodosols, Calcarosols and Tenosols

See Map 2, 3, and 4

5.2.4 Stage 1 Risk Analysis Calculation

The final risk rating for each minor catchment is based on the following weightings and calculation:

Low risk rating = 1 **Medium risk rating** = 2 **High risk rating** = 3

Overall minor catchment risk = (Distance to reservoir or potable offtake point risk rating x 2) + Slope risk rating + Soil risk rating

Proximity to a potable water source is, therefore, rated at twice the importance of soil and slope.

The following parameters are used to identify high, medium and low risk minor catchments:

Low risk minor catchment = Overall score of 5 – 6

Medium risk minor catchment = Overall score of 7 – 9

High risk minor catchment = Overall score equal to or greater than 10.

Map 5 and Table 10 depict these findings.

5.3 Stage 2A: Dividing High Risk Minor Catchments into Sub Catchments and Assessing Levels of Risk

The TRG agreed that the next step in the risk analysis process was to divide the high risk minor catchments into sub-catchments. This OWMP focusses on high risk minor catchments where there are clear existing risks requiring the more in-depth analysis and compliance regimes to protect the environment and public health while allowing for development consistent with Council's strategies and zoning to take place.

Once again watersheds, topography and key tributaries enabled our GIS Officer to divide the eight high risk Minor Catchments into Sub-catchments, resulting in the creation of twenty-two Sub-catchments, identified in Table 5.

Table 5 Sub-catchments Derived from High Risk Minor Catchments

1	Burnt Creek	**9**	Howqua Inlet	**17**	Maroondah Hwy
2	Ford Drive	**10**	Jamieson	**18**	Doolam Creek
3	Owens Creek	**11**	Paradise Pt	**19**	Glen Creek
4	Lower Delatite	**12**	Woolshed Creek	**20**	Dry Creek/Tallangalook
5	Macs Cove	**13**	Mountain Bay	**21**	Howes Creek
6	Bonnie Doon	**14**	Bonnie Doon East	**22**	Banumum Rd
7	Macmillan Point	**15**	Peppin Point		
8	Goughs Bay	**16**	Wappan		

The TRG, once again using the Edis-White November 2013 sub-catchment analysis tool as a basis, identified the following risk factors to undertake a more in-depth analysis of development and wastewater related risks within each Sub-catchment, known as a Stage 2A analysis:

- distance to reservoir or potable water offtake point;
- distance to waterway;
- slope;
- soil type;
- Mansfield Planning Scheme zoning; and
- housing density.

Data to assess each factor was then sourced and manipulated via our GIS. During this process it was decided that the Distance to Waterway factor was best analysed in the next level of risk analysis; that is when a detailed analysis of each individual sub-catchment was undertaken.

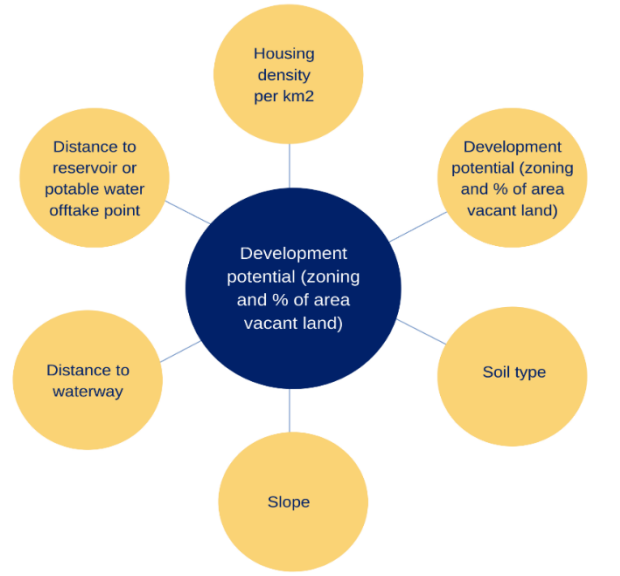
The development potential factor was determined by considering the zoning of the land under the Mansfield Planning Scheme (i.e., the minimum lot size permitted) and the area of vacant land to identify the percentage of the sub-catchment which was able to be developed.

Please note that ‘developable’ areas were limited to land zoned General Residential 1, Township and Rural Living (as well as the Special Use Zone in Mountain Bay).

Unsewered dwelling densities per square kilometre were calculated for the sub-catchment and for unsewered townships (zoned either General Residential 1 or Township).

As a conservative measure, the dwelling density risk factor was applied using the unsewered township dwelling density; for example at Macs Cove the overall sub-catchment dwelling density is 10.75 dwellings/km2 however within the unsewered township boundaries it is 367 dwellings/km2).

Figure 4 Stage 2A Sub Catchment Risk Factors Identified by the TRG



TRG - Technical Reference Group - comprised of Mansfield SC, GMW, GVW, Murrindindi SC & EPA
Stage 2 approved by TRG 29/11/13

Table 6 Stage 2A Sub-catchments TRG Risk Factors and Parameters

Risk Factor	Low (1)	Medium (2)	High (3)
Distance to reservoir or potable water offtake point	> 1 km	500 m – 1 km	< 500 m
Slope	Grid points with median slopes < or = 10%	Grid points with median slopes between 11 20%	Grid points with median slopes > 21%
Soil type	Chromosols Ferrosols Dermosols	Vertosols Kurosols Kandosols Rudosols	Anthoposols Organosols Podosols Hydrosols Sodosols Calcarosols Tenosols
Development Potential (developable vacant land as a % of total sub-catchment area)	< 5%	5 – 20 %	> 20%
Unsewered dwelling density (per km^2 of total sub-catchment area or where applicable unsewered township)	< 20 / km^2	20 – 40 km^2	> 40 / km^2

5.3.1 Stage 2A Sub-catchments Risk Analysis Calculation

The final Stage 2A risk rating for each sub-catchment is based on the following weightings and calculation:

Low risk rating = 1 **Medium risk rating** = 2 **High risk rating** = 3

Overall sub-catchment risk = Distance to reservoir or potable offtake point risk rating + Slope risk rating + Soil risk rating + Development potential + Unsewered dwelling density

The following parameters are used to identify high, medium and low risk minor catchments:

Low risk minor catchment = overall score of 8 or less

Medium risk minor catchment = overall score between 9 – 10

High risk minor catchment = overall score of 11 or more.

5.4 Stage 2B Detailed Analysis of Sub-catchments

The White discussion paper provides a detailed risk analysis tool to assess the potential risk of unsewered development to potable water quality at sub-catchment level.

While the TRG has chosen to select several factors to rate risk at minor and sub-catchment level, the more extensive range of factors outlined by White were applied in the field by Mr Paul Williams in the Goughs Bay and Howes Creek Road sub-catchments.

It should be noted that the field work and subsequent recommendations were informed by the peer review of Edis-White undertaken by Dr Robert van de Graaff.

5.4.1 Findings from the Field Testing of the White Sub-catchment Risk

Analysis Tool

Mr William's report, 'Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub-catchments' (May 2014) can be found in Attachment 4. The aims of the field work were to:

- Test the efficacy of the White sub-catchment risk analysis model and the Edis individual site risk analysis algorithm in the field in two locations known to Council and GMW as having significant growth potential; and
- Identify what (if any) refinements need to be made to the Edis-White risk analyses tools to reflect in-field experiences and local conditions; and
- Prepare a detailed sub-catchment analysis for both, including the production of a land unit map which identifies areas within these sub-catchments where unsewered development is potentially a high, medium or low risk to potable water, if not appropriately managed.

In relation to the White sub-catchment risk analysis tool Mr Williams made several recommendations arising from his field work and analysis of land capability data:

- Rainfall should be based on the 9th decile wet year. This provides an appropriate level of conservatism with respect to system design and performance in the context of being situated within a potable water supply catchment.
- Dr Robert Van de Graaff has demonstrated that renovation (i.e., treatment) continues in waterlogged and snow covered trenches. This would suggest that consideration of months where rainfall exceeds evaporation is not relevant and should, therefore, be deleted from the table.

- The subject of farm dams in a sub-catchment can be considered from two approaches. Environmental flows may be reduced in proportion to the number of farm dams, however, farm dams would also provide temporary storage and attenuation of nutrients should a surface surcharge of effluent occur. Farm dams should also be deleted.

As a result of Mr William's fieldwork findings, Council amended the White sub-catchment risk analysis tool as per Table 7. This revised sub-catchment analysis tool will continue be used to analyse sub-catchment risk by Council in the implementation of this OWMP.

Table 7 Stage 2B Sub-catchment Risk Analysis Tool for Measuring the Impact of Unsewered Development

	Low	Medium	High
The risk the sub-catchment may pose to the quality of reservoir waters			
Distance to reservoir	> 1km	500m – 1km	< 500m
The risk posed from the present unsewered development in the sub-catchment to water quality in the existing stream			
Unsewered dwelling density (dwellings / km^2 of total sub-catchment area)	< 10	10 – 20	> 20
Median age of septic tank systems (years)	< 10	10 – 25	> 25
Predominant type of septic systems	Standard	Upgraded	Split (blackwater only)
Availability of town water	No		Yes
Proportion of township blocks undeveloped (percentage)	< 5%	5 – 25 %	> 25%
Unsewered towns present	No		Yes
Town size (total number of dwellings)	< 20	20 – 50	> 50
Rainfall mm / year (9th Decile)	< 600	6–0 - 900	> 900
The risk posed from natural and non-residential development situations in the sub-catchment to water quality in the existing stream			
Area of bush/forest (% of total area of sub-catchment)	> 30 %	5 – 30 %	< 5 %
Drainage line length / km^2 (sourced from DELWP maps)	< 1 km	1 – 3 km	> 3 km

	Low	Medium	High
The risk posed from natural and non-residential development situations in the sub-catchment to water quality in the existing stream			
Outflow frequency of existing stream	Rare (Other drainage line with no bed or banks)	Seasonal (Ephemeral waterway)	Constant (Permanent waterway)
Area of Crown Land (% of total area of sub-catchment)	> 30 %	10 – 30 %	< 10 %
Area under agriculture (% of total area of sub-catchment)	< 10 %	10 – 50 %	50 – 100%
Township sewerage treatment plant	No		Yes
Large scale unsewered tourist facilities (i.e., in excess of 5000 litres of effluent/day)	No		Yes
Other unsewered infrastructure (e.g., commercial land uses)	No		Yes
Intensive animal industry	No		Yes

It should be noted that this risk analysis tool analyses parameters relating directly to domestic wastewater management as well as other factors that provide a better overview of land use and potential other activities taking place within a sub-catchment that may adversely impact on beneficial uses (as identified in SEPP WoV).

These factors include the presence of unsewered tourist facilities with outputs exceeding 5000L/day (therefore licensed by the EPA and not Council), the percentage of Crown Land in the sub-catchment and the presence of any intensive animal industry in the area.

This broader view of activities within a sub-catchment is in keeping with the philosophy espoused by the Ministerial Guidelines and regional strategies developed in recent years by the GBCMA.

5.4.2 Stage 2B Risk Analysis Calculation

The final Stage 2B risk rating for each sub-catchment was/is based on the following weightings and calculation:

Low risk rating = 1 **Medium risk rating** = 2 **High risk rating** = 3

The calculation is completed by adding all of the values together.

The following parameters are used to identify high, medium and low sub-catchments:

Low risk sub-catchment = Overall score of <30

Medium risk sub-catchment = Overall score of –0 - 40

High risk sub-catchment = Overall score greater equal to or greater than 40.

5.5 Stage 3 Land Unit Risk Analysis of Sub-catchments

The Williams discussion paper stated that a simple methodology could be devised to enable Council to divide a sub-catchment into land units to identify risk at yet a smaller scale. The model was created by collating data from numerous land capability assessments (i.e., soil tests and on-site hydraulic tests) and the field work in the Goughs Bay and Howes Creek sub-catchments commissioned by Mansfield Shire Council.

The land mapping tool is based on the premise that the soil characteristics relevant to effluent disposal capability are:

- Thickness of the profile (including presence of a topsoil horizon);
- Profile hydraulic properties (including colloid stability); and
- Nutrient uptake and pathogen attenuation ability.

The land unit mapping tool will be used in this OWMP to identify the LCA requirements for an individual site. Where a Stage 3 land unit map analysis has been completed by Council the land unit map will be used by Council's EHO.

5.5.1 Stage 3 Risk Analysis Calculation

The factors and parameters outlined in Table 8 can be used as a basis for land-soil risk rating units within a sub-catchment. The ratings used to weight risk factors are the same as those applied in Stages 1 and 2 of our risk analyses above, namely:

Low risk rating = 1 **Medium risk rating** = 2 **High risk rating** = 3

Table 8 Land – Soil Risk Ratings

Parent Material	Metasediments			Colluvium			Alluvium	
Soil origin	Residual			Colluvial			Alluvial	
Slope	> 12%	< 12%		> 10%	< 10%		-	< 6%
Thickness	< 1.4m	> 1.4m		< 1.4m	> 1.4m		-	> 1.4m
Base risk rating	Limiting	1		Limiting	1	2	-	1
Non-dispersive	-	1		-	2		-	1
Dispersive	-	2	3	-	3		-	2

Source: *'Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub-catchments' Paul Williams (May 2014)*

A 'Limiting" rating means the soil is not appropriate for traditional septic system with trench dispersal.

The final risk rating calculation is derived from dispersive properties of the soil (note that for a dispersive residual soil the results of in field testing will determine the risk rating) and is based on the following parameters:

Low risk rating = 1 **Medium risk rating** = 2 **High risk rating** = 3

5.6 Stage 4 Individual Site Risk Analysis

The final level of risk analysis suggested by our experts Edis, White and Williams is that for an individual site, which is undertaken after a land capability analysis in support of a new development or subdivision. Table 9 outlines the factors Edis believed had a major influence on the level of risk posed by an on-site system.

Table 9 Major Factors Influencing the Likelihood of Consequential Impacts of a proposed On-Site Wastewater Management System

Risk rating for values of individual site factor (R)			
	Low	Medium	High
Distance to reservoir	> 15 km	2 – 15 km	< 2 km
Soil type rating *	1	2	3
Distance to river	> 80 m	40 – 80 m	< 40 m
Distance to stream	> 80 m	40 – 80 m	< 40 m
Distance to drain	> 40 m	10 – 40 m	< 10 m
Lot size	> 10 ha	2 – 10 ha	0.2 – 2 ha
Density (houses/km^2)	< 20 / km^2	20 – 40 / km^2	> 40 / km^2
LCA rating	1 –2	2 –3	3 - 4
System fail rate**	< 5 %	5 – 10 %	> 10 %

Source: *Approaches for Risk Analysis of Development with On-Site Wastewater Disposal in Open, Potable Water Catchments (Dr Robert Edis April 2014)*

* Attachment 5 provides Table 3 from the Edis April 2014 Paper used to classify soil types into risk rating 1, 2 and 3 categories for the purpose of the algorithm

** System fail rates will initially be based on the LCA's expert and EHO's experience and local knowledge prior to the monitoring program providing more data.

5.6.1 Stage 4 Risk Analysis Calculation – The Edis Algorithm

Each factor is given a low, medium and high risk rating based on the following rationale:

- a low risk rating of a factor reflects the range in which there is no consequential impact on water quality to be expected;
- a medium risk rating represents the range in which the factor may influence the risk to water quality, though as a minor component of the overall risk; and
- a high risk rating represents a major influence on the risk a development poses to water quality.

The conclusion of Edis, which was supported by Dr van de Graaff's Peer Review and Paul Williams' field work, was that the risk factors have a differing level of importance, or weighting, and that the interaction between factors must also be considered.

This means that an individual development proposal may have medium or high-risk ratings for some individual factors but these may be of low weighting, or overall consequence. Some of the

key risk factors that should be given more weighting include soil type, distance to waterways, dwelling density and likelihood of the on-site system failing. The overall risk rating identified by an LCA is also seen by Edis to be a critical factor as it is based on in-field testing of an individual site's capacities and hence should be weighted accordingly.

Edis developed the following algorithm which weights the risk factors according to their potential impact on a potable water catchment:

$$\mathbf{(Rn)} = (R_{\text{Distance to reservoir/offtake point}} + R_{\text{Soil type rating}}) \times (R_{\text{Distance to river}} + R_{\text{Distance to stream}} + R_{\text{Distance to drain}} + R_{\text{Lot size}}) + (2 \times R_{LCA}) + (3 \times R_{\text{System fail rate}} \times R_{\text{Density}})) / 10$$

The overall risk rating for an individual site is based on the following algorithm value:

Low Risk individual site rating: An Rn value less than 2.5

Moderate Risk individual site rating: An Rn value of 2.5 – 5

High Risk individual site rating: An Rn value greater than 5.

Council required this algorithm to be tested in the field within the Shire to test its accuracy and efficacy. This work was undertaken by Paul Williams, who made the following conclusion:

"The proposed algorithm has been trialled using data from 40 land capability assessments from the Howes Creek and Goughs Bay sub-catchments including some extra-catchment data for comparison purposes.

Our trialling has shown that appropriate emphases have been placed on the distance to surface waters, soil capability and density of development and associated factors, generally." (pg. 7)

6. Application of the Risk Analysis Methodology across Mansfield Shire

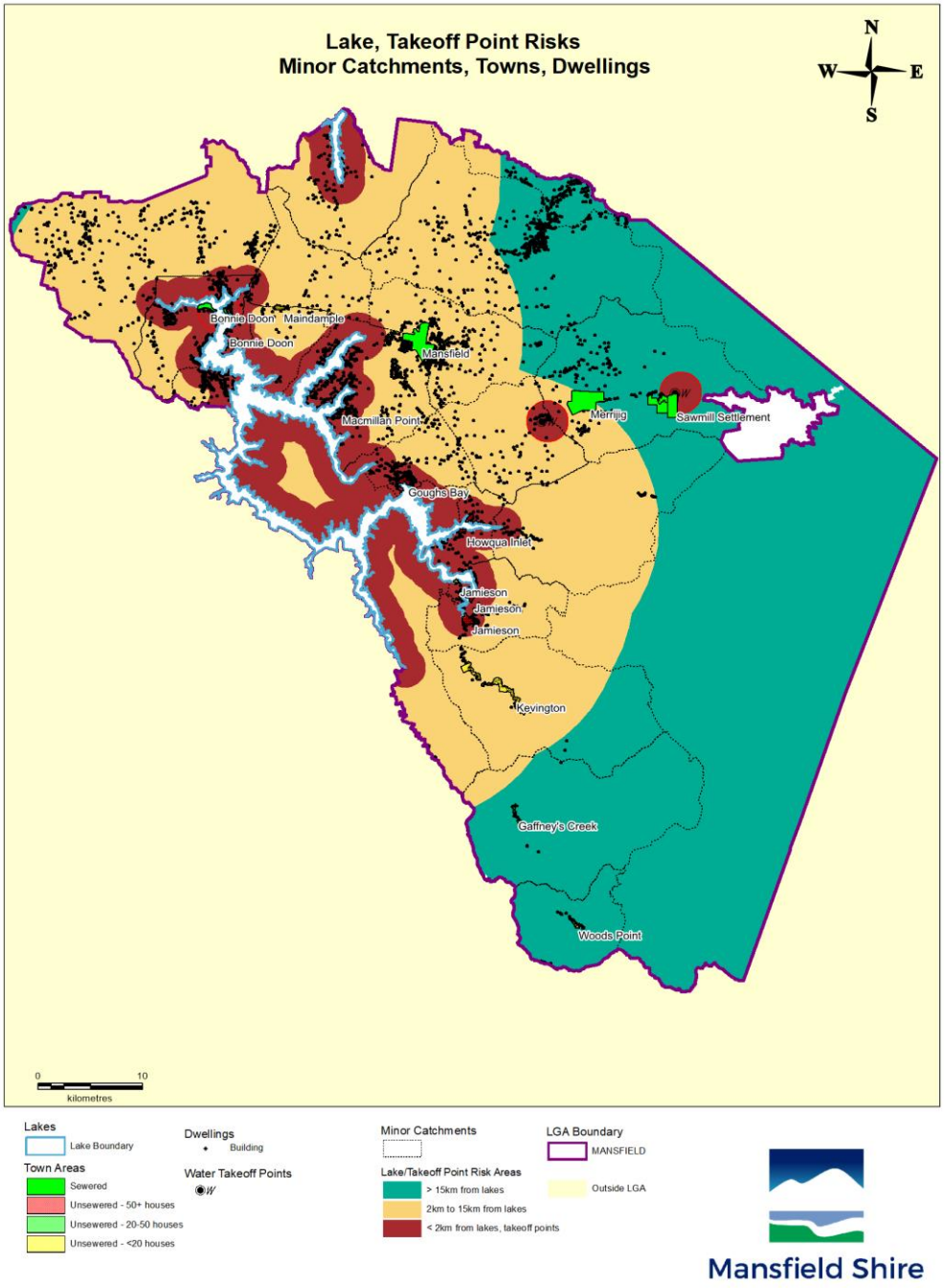
This section outlines the results of the application of the risk analysis methodology.

A complete, four staged example is provided for the Goughs Bay Sub-catchment as a means of providing an example as to how the entire risk analysis process works.

As outlined in the Action and Resource Plan, Council will continue to work through the completion of the risk analysis framework for high and medium risk areas over the five year life of this OWMP.

6.1 Stage 1 – Minor Catchment Risk Analysis Findings

Map 2 Distance to Reservoir/Potable Offtake Point Risk Factor

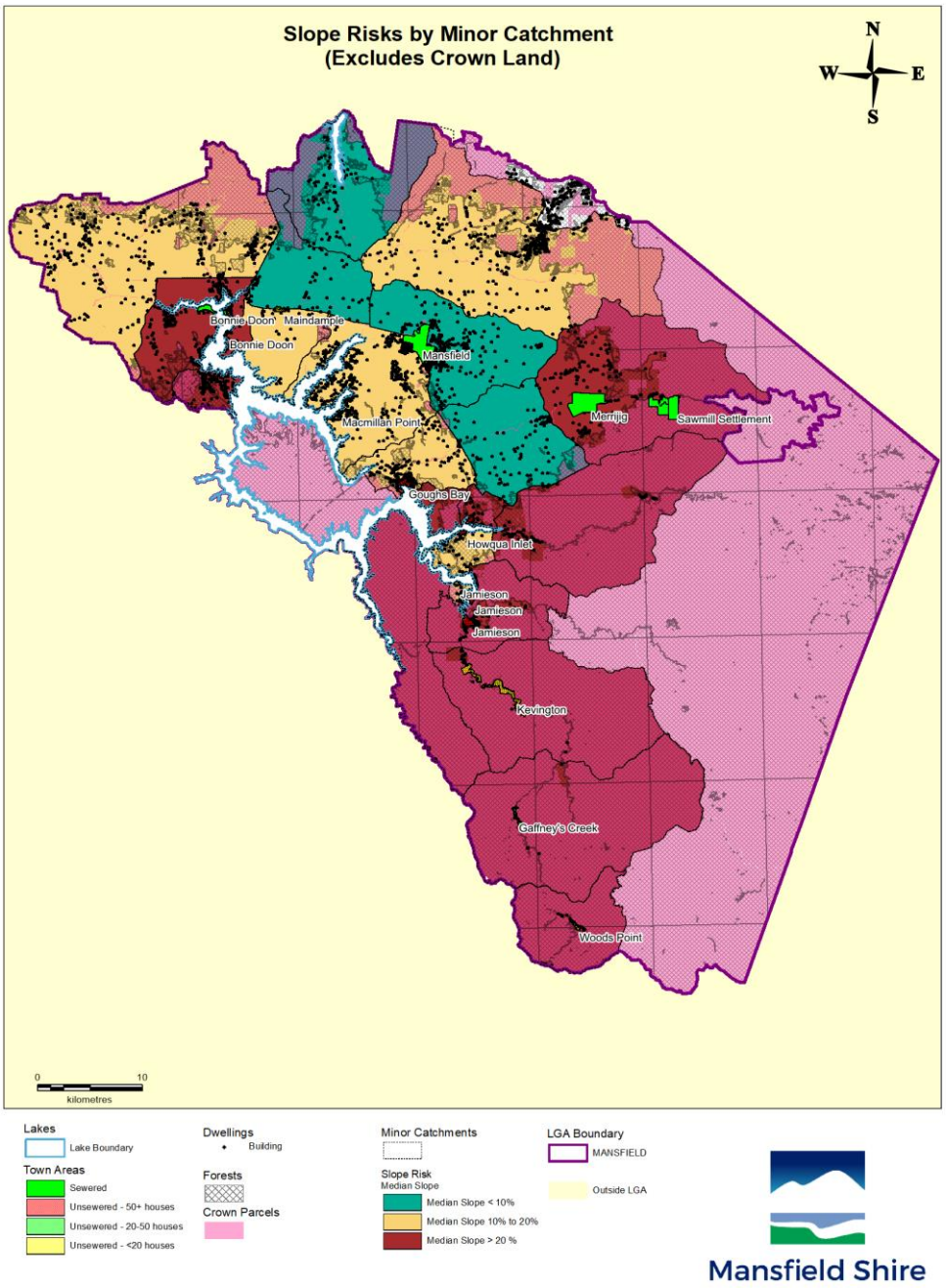


Source: Mansfield Shire Geographical Information System

Map 2 clearly depicts the key potable water assets within Mansfield Shire; Lake Eildon and the potable off take points at Sawmill Settlement and Piries (which supplies the Mansfield township). The black shading represents a concentration of existing unsewered dwellings.

In turn, Map 3 clearly defines the Mansfield plain, located at the centre of the Shire, along with the steeply sloping areas at the northern and southern most points of Lake Eildon. Please note that the grey shaded areas represent the extensive amount of Crown Land within the Shire.

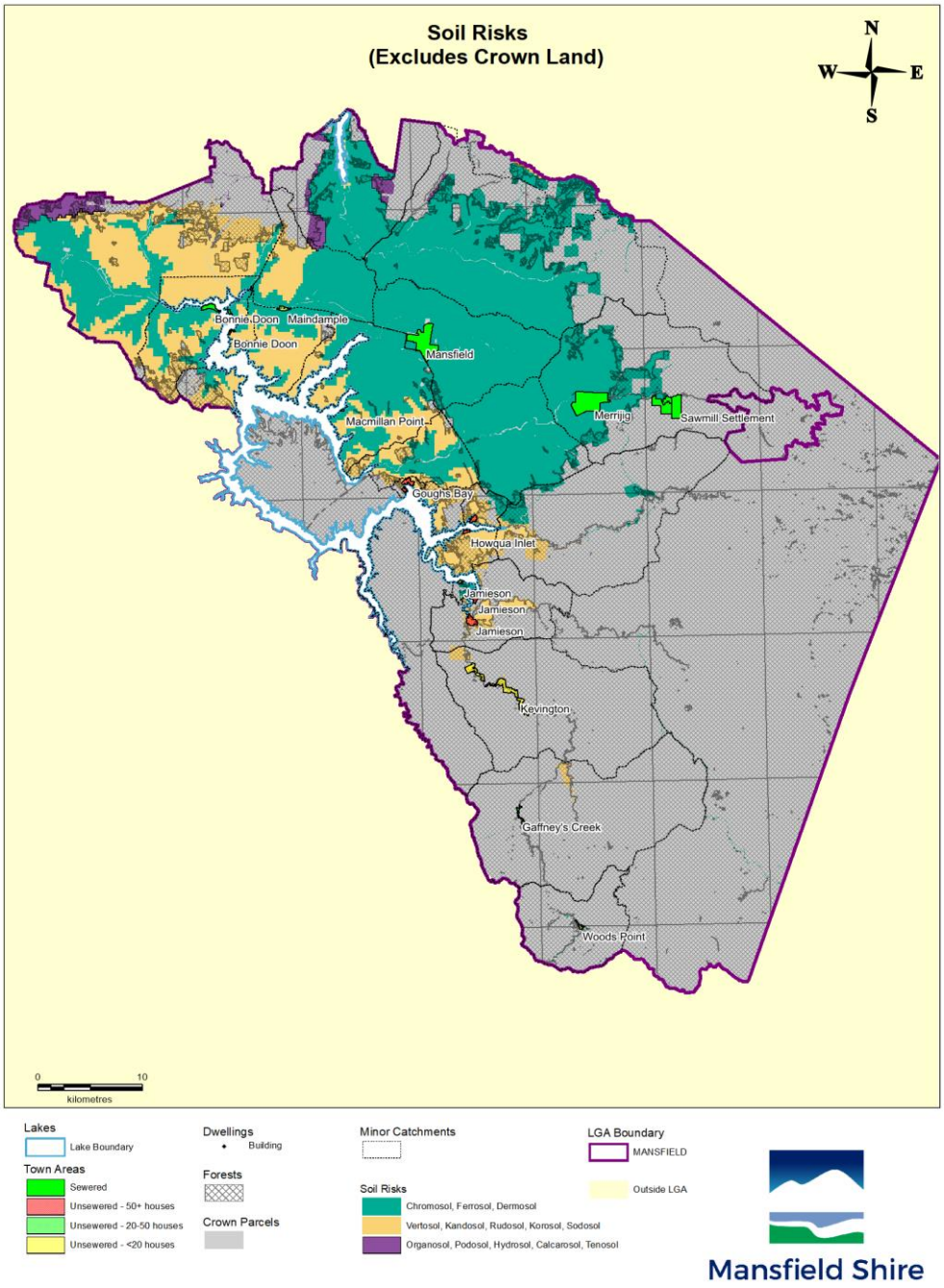
Map 3 Slope Risk Factor



Source: Mansfield Shire Geographical Information System

High risk soils are located on the northern and part of the eastern fringe of the Shire and not within localities that are subject to high development pressure, or indeed contain high levels of existing development. As can be expected the Mansfield plain, through to Merton in the west, has relatively rich soils that have low hydraulic conductivity and relatively good nutrient uptake and pathogen attenuation properties.

Map 4 Soil Risk Factor



Source: Mansfield Shire Geographical Information System

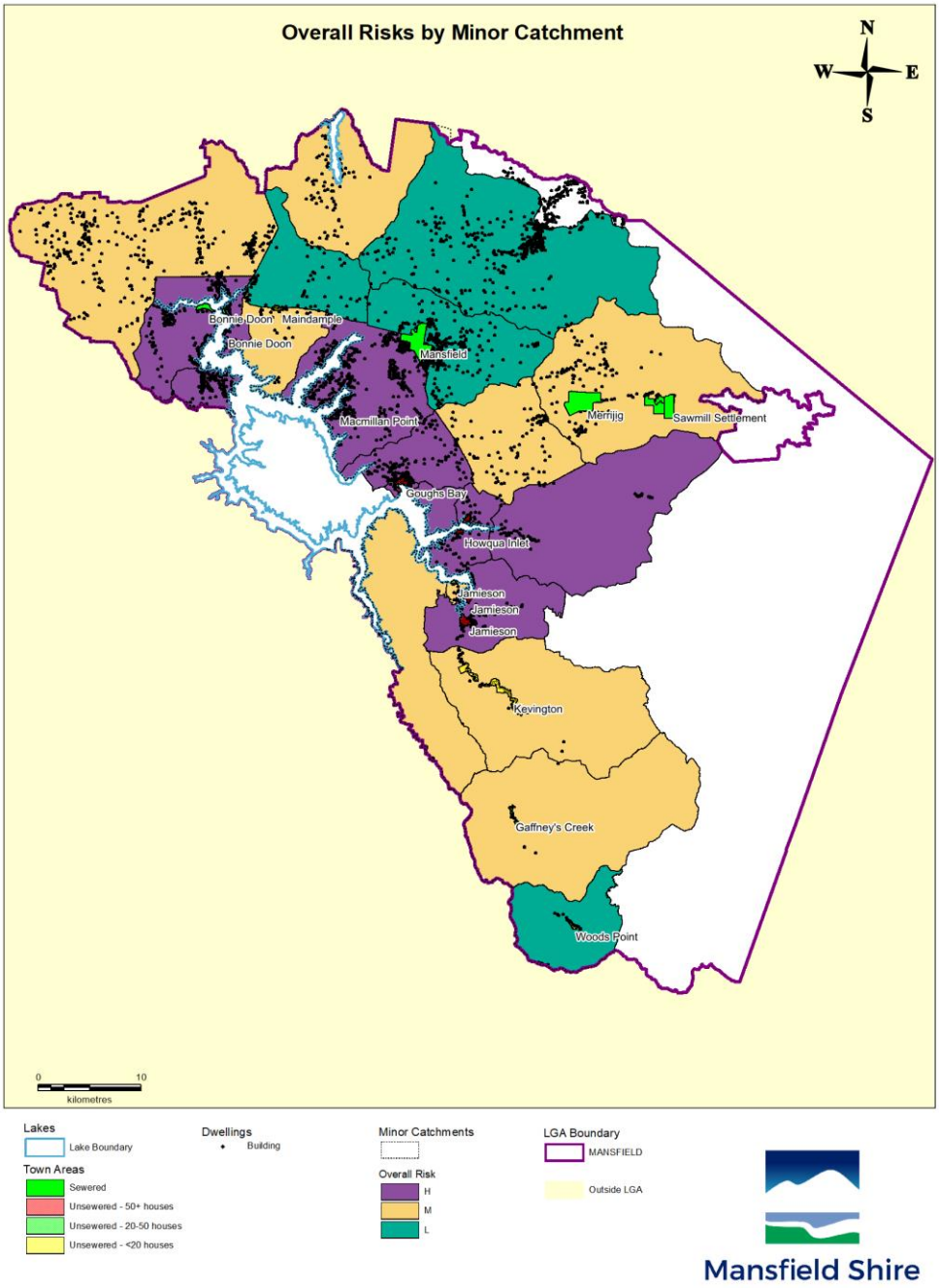
The three risk factors were overlayed and applied across the municipality and rated in accordance with the algorithm outlined in Section 5.6.1. The table below outlines the ratings for each of the twenty Minor Catchments. Map 5 depicts the final risk rating for all minor catchments.

Table 10 Stage 1 Minor Catchment Risk Ratings

Minor Catchment	Distance to Reservoir or Potable Water Offtake Point	Soil Risk	Slope Risk	Overall Risk Score
1 Goulburn Catchment – Merton	4	2	2	**8**
2 Goulburn Catchment – Central Bonnie Doon	6	2	3	**11**
3 Goulburn Catchment – Bonnie Doon East	6	1	2	**9**
4 Goulburn Catchment – Maindample	4	1	1	**6**
5 Broken Catchment – Nillahcootie	6	1	1	**8**
6 Broken and Goulburn Catchments – Tolmie	2	1	2	**5**
7 Goulburn Catchment – Howes Creek	6	2	2	**10**
8 Goulburn Catchment – Central Mansfield	4	1	1	**6**
9 Goulburn Catchment – Goughs Bay	6	2	2	**10**
10 Goulburn Catchment – Piries	6	1	1	**8**
11 Goulburn Catchment – Mountain Bay	6	2	3	**11**
12 Goulburn Catchment – Macs Cove	6	2	3	**11**

Minor Catchment	Distance to Reservoir or Potable Water Offtake Point	Soil Risk	Slope Risk	Overall Risk Score
13 Goulburn Catchment – Howqua	6	2	3	**11**
14 Goulburn Catchment – Jamieson	6	2	3	**11**
15 Goulburn Catchment – Big River	4	2	3	**9**
16 Goulburn Catchment – Kevington	4	2	3	**7**
17 Goulburn Catchment – Gaffneys Creek	2	3	3	**8**
18 Goulburn Catchment – Woods Point	2	1	3	**6**
19 Goulburn Catchment – Howqua Inlet	6	2	2	**10**
20 Goulburn Catchment – Upper Delatite	6	1	3	**9**

Map 5 Stage 1 Minor Catchment Risk Ratings



Source: Mansfield Shire Geographical Information System

6.2 Stage 2A – Sub-catchment Risk Analysis Findings

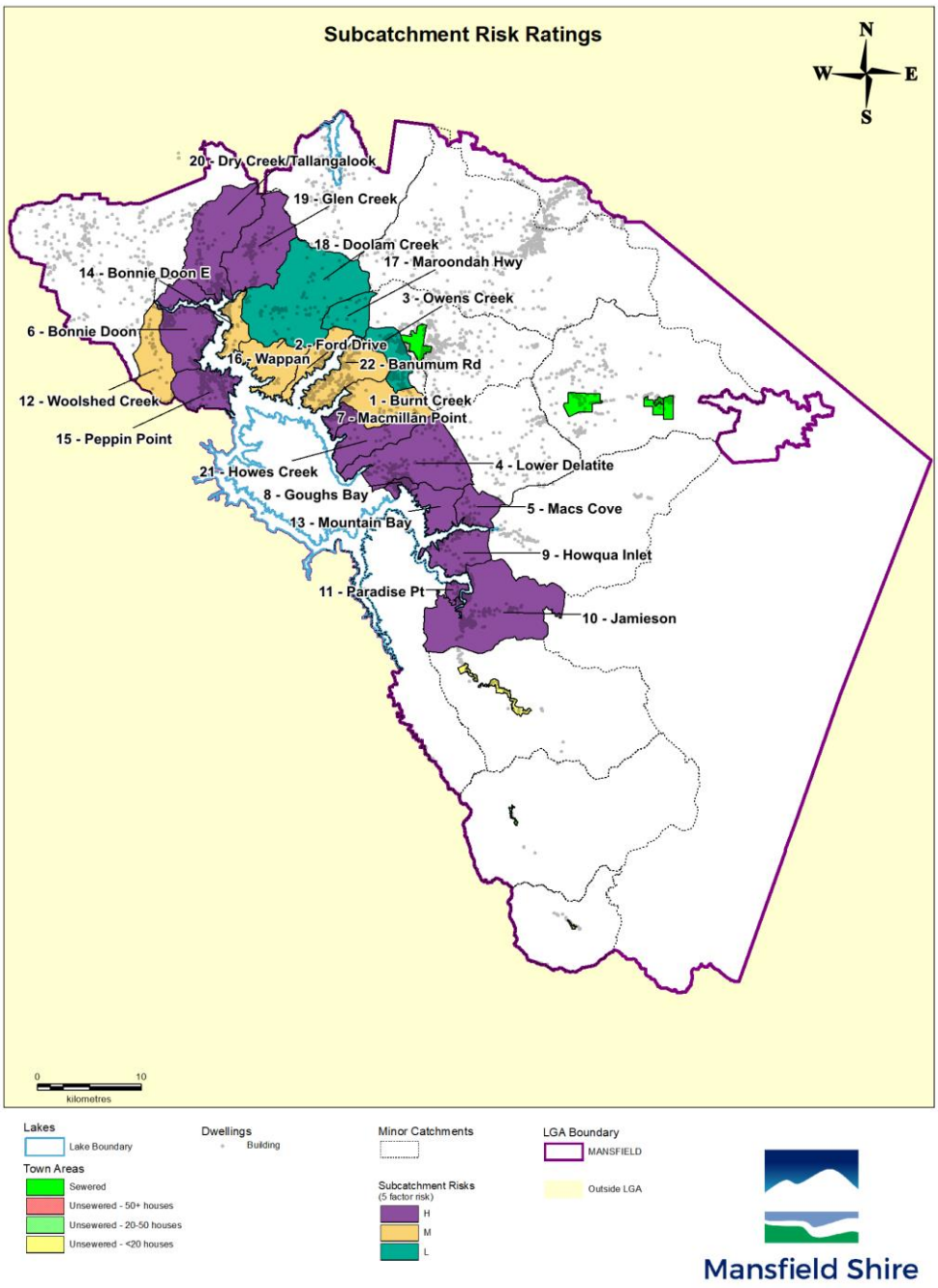
Attachments 6 and 7 provide the data used to calculate the dwelling density risk and development potential factors. Map 6 depicts the overall sub-catchment risk rating derived from the five factors. Detailed Sub-catchment maps, depicting the location of existing on-site systems by age and developable land can be found in Attachment 8.

Table 11 Stage 2A Sub-catchment Risk Ratings

	Sub-catchment	Soil Risk Rating	Slope Risk Rating	Proximity to reservoir or potable water offtake rating	Unsewered Dwelling Density Rating	Development Potential Rating	Total
1	Burnt Creek	1	2	3	1	3	10
2	Ford Drive	1	2	3	1	2	9
3	Owens Creek	1	1	2	1	3	8
4	Lower Delatite	2	2	3	1	3	11
5	Macs Cove	2	3	3	3	3	14
6	Bonnie Doon	2	3	3	1	2	11
7	Macmillan Point	2	2	3	3	2	12
8	Goughs Bay	2	2	3	3	3	13
9	Howqua Inlet	2	2	3	3	1	11
10	Jamieson	2	3	3	3	3	14
11	Paradise Point	1	2	3	3	2	11
12	Woolshed Creek	2	3	2	1	2	10
13	Mountain Bay	2	3	3	1	3	12
14	Bonnie Doon East	2	2	3	2	1	10
15	Peppin Point	2	3	3	1	3	12

	Sub-catchment	Soil Risk Rating	Slope Risk Rating	Proximity to reservoir or potable water offtake rating	Unsewered Dwelling Density Rating	Development Potential Rating	Total
16	Wappan	2	3	3	1	1	10
17	Maroondah Hwy	1	1	3	1	1	7
18	Doolam Creek	1	1	2	2	2	8
19	Glen Creek	2	3	2	1	3	11
20	Dry Creek/Tallangalook	2	3	2	1	3	11
21	Howes Creek	2	2	3	1	3	11
22	Banumum Rd	2	1	3	1	3	10

Map 6 Stage 2A Sub-catchment Risk Ratings



Source: Mansfield Shire Council Geographical Information System

6.3 Stage 2B – Sub-catchment Risk Analysis Findings for the Goughs Bay Sub-catchment

The field work undertaken by Paul Williams has allowed a full assessment of the Goughs Bay Sub-catchment to be undertaken as a means of providing a complete example of the risk methodology's application, which will be carried through to all sub-catchments over the life of this OWMP.

Table 12 Stage 2B Sub-catchment Risk Analysis – Goughs Bay

Risk Factor	Rating
Distance to reservoir	3
Unsewered dwelling density (dwellings / km^2 of total sub-catchment area)	3
Median age of septic tank systems (years)	3
Predominant type of septic systems	3
Availability of town water	1
Proportion of township blocks undeveloped (percentage)	3
Unsewered towns present	3
Town size (total number of dwellings)	3
Rainfall mm / year (9th Decile)*	3
Area of bush/forest (% of total area of sub-catchment)	3
Drainage line length / km^2 (sourced from DELWP maps)	1
Outflow frequency of existing stream	1
Area of Crown Land (% of total area of sub-catchment)	3
Area under agriculture (% of total area of sub-catchment)	1
Township sewerage treatment plant	1
Unsewered tourist facilities	3
Other unsewered infrastructure (e.g., commercial land uses)	3
Intensive animal industry	1
Total	**42**

* Bureau of Meteorology 9th decile rainfall data from a station within Mansfield Township was used for this factor.

Overall risk rating value for the Goughs Bay Sub-catchment = 42

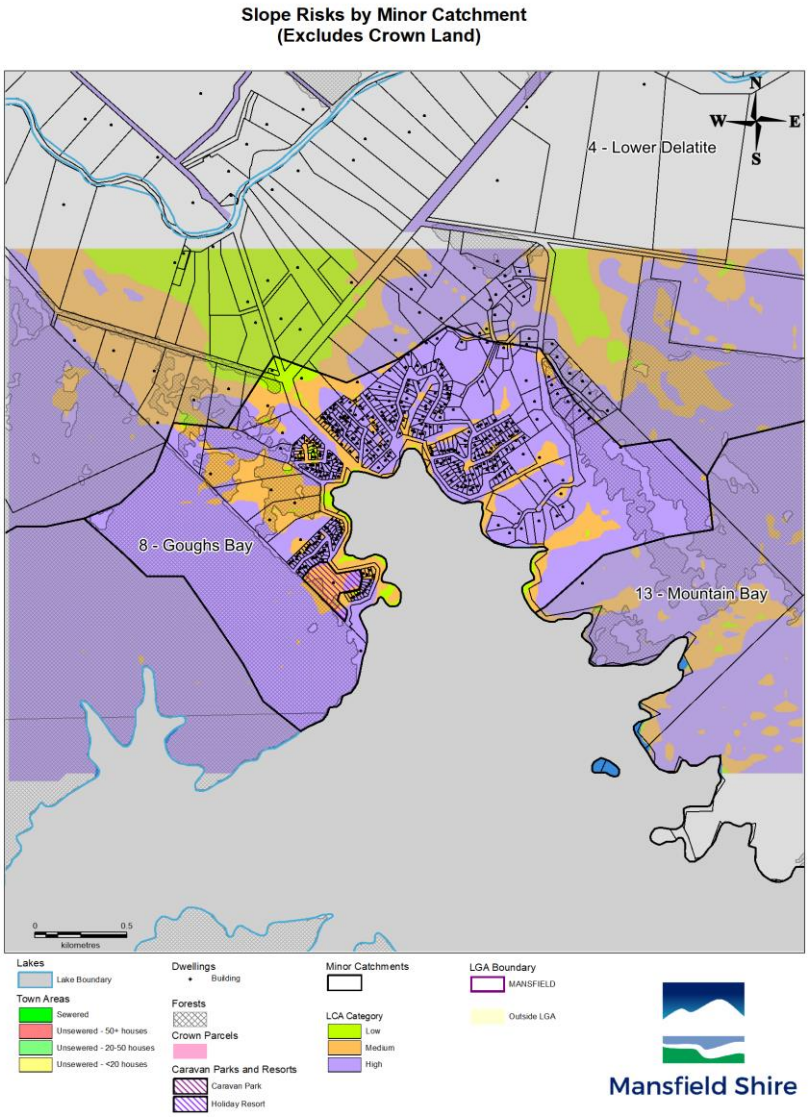
The Goughs Bay Sub-catchment is, therefore, rated as a ***High Risk Sub-catchment.***

6.4 Stage 3 A Land Unit Risk Analysis of the Goughs Bay Sub-catchment

Paul Williams has developed land unit maps for seven Sub-catchments, including Goughs Bay, which will be used by Council to identify the LCA requirements for an individual lot.

These maps can be found in Attachment 8 for Sub-catchments 1, 2, 3, 7, 8, 21 and 22. Where a lot contains more than one risk rating, it is recommended that the more conservative, or higher rating, be used to determine LCA requirements, unless a site is clearly dominated by one risk rating and only contains a small portion of another. Council's EHO may use discretion as to what risk rating applies should several apply to a site.

Map 7 Stage 3 Land Unit Map – Goughs Bay



6.5 Stage 4 Individual Site Risk Analysis from within the Goughs Bay Sub-catchment

Council commissioned Paul Williams to test the Edis Algorithm on individual sites for which he had prepared a LCA in the recent past. His discussion paper outlined these results in Table 2. Below are some examples from the Goughs Bay Sub-catchment lifted from this table as a means of demonstrating how the algorithm works.

Table 13 Stage 4 Individual Site Assessments against the Edis Algorithm

RRESERVOIR	**R**SOIL	**R**RIVER	**R**STREAM	**R**DRAIN	**R**LOT SIZE	**R**DENSITY	**R**LCA	**R**SYS FAIL	**R**N
3	3	1	1	3	3	3	3	3	**7.2**
3	2	1	1	3	2	2	3	2	**5.3**
3	2	1	1	1	3	2	3	3	**5.1**
3	2	1	1	3	2	2	3	2	**5.3**
3	3	1	1	3	3	3	3	3	**7.2**

Source: "Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub-catchments (May 2014) Paul Williams pg. 10

All sites were found to have a high risk rating according to the algorithm, which aligned with the original risk rating of the LCA.

6.6. Description and Analysis of the Sub-catchments, including OWMP Risk Management Strategies

The purpose of this Section of the OWMP is to provide an overview of each of the twenty-two sub-catchments identified in Section 5.3 (Table 5). Attachment 7 contains Sub-catchment maps relating to vacant developable land (categorised by lot size) and the location and age of existing on-site domestic wastewater management systems. Major unsewered tourist facilities (such as caravan parks) are also shown on these maps.

6.6.1. Sub-catchment Physical Characteristics

Specifics of density, lot area and numbers of on-site systems numbers are presented in Table 14. Risks associated with each sub-catchment has been summarised in Table 16

Table 14 Sub-catchment Geographic Criteria and Property Constraints as of 2021

	Sub-catchment	Total lots in sub-catchment	Non-resident rate payers %	Total Developable vacant lots	< 800 m^2	801– 1000 m^2	1001 – 2000 m^2	2001m^2 – 40Ha	> 40 ha	No of on-site systems	Known age of on-site systems (yrs)				Area of sub-catchment (km^2)	Unsewered dwelling density / km^2
											5	5-20	>20	Un-known		
1	Burnt Creek	110	22%	56	1	0	2	16	37	58	6	31	10	14	26.49	2.19
2	Ford Drive	72	38%	32	1	0	0	7	24	40	3	12	8	17	13.03	3.07
3	Owens Creek	229	6%	120	14	2	20	54	30	111	22	54	22	23	15.75	7.05
4	Lower Delatite	201	33%	83	4	1	0	29	49	115	9	52	21	38	49.38	2.37
5	Macs Cove	209	45%	69	2	12	22	14	19	143	6	20	37	80	12.74	11.22
6	Bonnie Doon^	398	16%	145	22	11	22	29	61	87	5	21	19	216	35.28	2.44
7	Macmillan Point	119	57%	14	1	0	1	5	7	103	2	27	18	57	5.62	18.33
8	Goughs Bay ^	410	58%	79	10	16	28	23	2	329	32	57	78	169	3.2	103.13
9	Howqua Inlet ^	218	65%	70	1	5	9	28	27	147	3	25	27	98	19.46	7.66
10	Jamieson ^	527	45%	221	51	15	51	82	22	310	5	73	61	172	77.28	4.02
11	Paradise Point	79	62%	17	4	4	0	4	5	63	1	10	10	42	2.84	22.18
12	Woolshed Creek	58	48%	24	0	0	0	2	22	33	2	11	7	14	23.04	1.43
13	Mountain Bay	16	33%	15	0	0	0	3	12	1		1			15.00	0.07
14	Bonnie Doon East^	190	39%	46	8	7	6	14	11	100	3	14	9	121	10.02	10.08

	Sub-catchment	Total lots in sub-catchment	Non-resident rate payers %	Total Developable vacant lots	< 800 m^2	801– 1000 m^2	1001 – 2000 m^2	2001m^2 – 40Ha	> 40 ha	No of on-site systems	Known age of on-site systems (yrs)				Area of sub-catchment (km^2)	Unsewered dwelling density / km^2
											5	5-20	>20	Un-known		
15	Peppin Point ^	165	53%	51	1	0	0	27	23	118	6	40	20	51	20.54	5.60
16	Wappan	37	33%	34	1	0	0	10	23	5			4	1	22.29	0.22
17	Maroondah Hwy	57	23%	45	0	0	0	8	37	12		3		9	13.52	0.89
18	Doolam Creek	446	12%	334	23	13	62	37	200	113	11	39	12	51	76.54	1.48
19	Glen Creek	154	37%	92	1	0	1	21	69	62	5	25	9	25	40.39	1.54
20	Dry Creek/Tallangalook	187	35%	93	4	0	5	31	53	94	7	33	17	42	47.77	1.97
21	Howes Creek	74	40%	53	1	0	1	14	37	23	3	7	5	8	21.65	1.06
22	Banumum Rd^	235	32%	76	3	0	3	21	49	158	14	53	38	56	24.92	6.34

^ Unsewered caravan park or resort

NOTE: Each ^ sub-catchment has one caravan park, apart from Bonnie Doon which has two.

Within Mansfield Shire, each sub-catchment typically has a significant proportion of allotments under 1000m2. These allotments are least likely to be capable of containing wastewater on-site, increasing the wastewater system density.

Goughs Bay has a significant higher dwelling density in comparison to the other sub-catchments, however it should be noted that the majority of catchments have a high proportion of non-resident rate payers.

There is also a high proportion of systems older than 20 years. The majority of these (and likely a high proportion of the system not known to Council) are conventional septic tanks with sub-surface disposal. System installed prior to 1980 would likely consist of 'split' systems capturing backwater only with some level of offsite discharge.

6.6.2. System Types

In 2014 it was estimated that approximately 4,000 septic tank systems were located within the Municipality. From the implementation of the DWMP in 2015, as at October 2021, 230 new septic system had been installed in unsewered areas within the Shire.

Table 15 provides a breakdown of on-site system types for the key 22 unsewered sub-catchments. Continued assessment and compliance inspection updates will develop the certainty of these records.

Table 15 Sub-catchment System types

	Sub-catchment	No. of systems	Septic Tank (ST)	Secondary Treatment (STP)	Composting Toilet (COM)	Worm Farm (WF)	Septic Tank and Sand Filter	Reed Bed	Unknown
1	Burnt Creek	58	36	4		3	1		14
2	Ford Drive	40	19	3			1		17
3	Owens Creek	111	46	31		1	8		25
4	Lower Delatite	115	56	11	1	2	4	1	40
5	Macs Cove	143	43	8		5	2		85
6	Bonnie Doon	87	40	4					43
7	Macmillan Point	103	39	6				1	57
8	Goughs Bay	329	118	35	1		3	1	171
9	Howqua Inlet	147	35	6		1	3	1	101
10	Jamieson	310	115	10			4	4	177
11	Paradise Point	63	14	4				1	44
12	Woolshed Creek	33	16	3					14
13	Mountain Bay	1							1
14	Bonnie Doon East	100	7	7			1		75
15	Peppin Point	118	52	12			1		53
16	Wappan	5	4						1

	Sub-catchment	No. of systems	Septic Tank (ST)	Secondary Treatment (STP)	Composting Toilet (COM)	Worm Farm (WF)	Septic Tank and Sand Filter	Reed Bed	Unknown
17	Maroondah Hwy	12	3						9
18	Doolam Creek	113	34	23		3	2		51
19	Glen Creek	62	32	4		1			25
20	Dry Creek/Tallangalook	94	47	4		1			42
21	Howes Creek	23	13	1			1		8
22	Banumum Rd	158	81	17			4		56

It can be seen that the majority of known systems are traditional septic tank and adsorption trench systems. More recently, new Permit to Installs have included a high proportion of secondary treatment systems. It is likely that a large proportion of the older septic tank systems are expected to include a reasonable number of separate toilet and sullage system – known as 'split systems' with some level of off-site discharge.

The number of secondary treatment systems (including sand filters) will continue to grow as existing on-site systems are replaced and new unsewered development occurs. While these technologies are necessary on many sites to meet EPA Code of Practice requirements and overcome land capability constraints, they do inevitably require higher levels of maintenance to ensure effective operation. Scheduled maintenance is required more frequently for secondary treatment systems and was a condition of the system's Certificate of Approval.

It is recommended that on-site wastewater management system data continue to be refined and developed to enable Council to maintain an active register of higher risk existing on-site systems. Ideally, this should be linked with spatial (GIS) mapping layer that enables Council to clearly identify hotspot areas that may warrant higher levels of operational oversight.

6.6.3. Supply Catchment Issues and Risks

Poor soil, slope and lot size are major considerations for the installation of appropriately designed operated septic tank systems.

Of specific concern across the Shire are watercourses (permanent and intermittent) and the impact of low permeability soils, combined with topography and climate. The challenges presented by these make both the constructability and operational reliability of septic tank to trench / bed system demanding.

Table 16 provides a snapshot of the LCA requirement based on specific areas of concern (see column 2).

The table provides clear information as to which Land Unit Map stage should be applied for risk ratings for individual lots. The table also clearly outline issues and risks relating to each of the sub- catchments.

Table 16 Supply Catchment Issues and Risks

	Sub-catchment & LCA Requirement	Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks	
1	**Burnt Creek** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	• Burnt Creek, a medium level river/creek according to DELWP, flows directly into Lake Eildon at the sub-catchment's western boundary;	• Proximity of some vacant residential lots to Lake Eildon, although all are over 4000m2. • Presence of pre 1990 septic systems (particularly split systems only treating blackwater);
2	**Ford Drive** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	• Rural Living Zone 1 area adjacent to Lake Eildon; • Proximity of some vacant residential lots to Lake Eildon, although all are over 4000m2.	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater);
3	**Owens Creek** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	Owens Creek (which feeds into Lake Eildon) is located in the northern part of the sub-catchment, a medium river/stream according to DELWP. The creek flows directly into Lake Eildon at the north westernmost point of the sub-catchment; • Rural Living Zone 1 subdivision to northern end of the sub-catchment;	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater); • Four vacant lots zoned for residential development less than 2000m2.
4	**Lower Delatite**	The Delatite River bisects the sub-catchment (which feeds into Lake Eildon), a high level river according to	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater), many of which are located on lots adjoining the Delatite;

	LCA Requirement: High	DELWP. The Delatite flows directly into Lake Eildon on the western boundary of the sub-catchment; • Rural Living Zone 1 along southern boundary of sub-catchment;	• High proportion of holiday homes and significant seasonal increases in population.
5	**Macs Cove** **LCA Requirement: High**	• A low level stream/river, as identified by DELWP, bisects the sub-catchment and runs directly into Lake Eildon; • The township is zoned General Residential 1; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• High proportion of ageing on-site systems on lots less than 1000m2; • 46 vacant infill lots zoned for residential development, 32 of which are under 2000m2; • High proportion of holiday homes and significant seasonal increases in population.
6	**Bonnie Doon** **LCA Requirement: High**	• Sewered areas zoned General Residential 1 and a Rural Living Zone 1 to the north east corner of the sub-catchment; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• High proportion of holiday homes and significant seasonal increases in population; • Two unsewered caravan parks/resorts.
7	**Macmillan Point** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	• Rural Living Zone 1 along entire western border adjacent to Lake Eildon; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• The subdivision of around 45 lots less than 1000m2 with a high proportion of ageing on-site systems adjacent to Lake Eildon; • High proportion of holiday homes and significant seasonal increases in population.

8	**Goughs Bay** **LCA Requirement: High**	• Township zoned General Residential 1 and Low Residential and adjacent to Lake Eildon (some rural living along sub-catchment boundary); • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• High proportion of ageing on-site systems on lots less than 1000m2; • 100 vacant infill lots zoned for residential development, 64 of which are under 2000m2; • High proportion of holiday homes and significant seasonal increases in population. • Unsewered caravan park.
9	**Howqua Inlet** **LCA Requirement: High**	Township zoned General Residential 1 adjacent to Lake Eildon; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• High proportion of ageing on-site systems on lots less than 1000m2; • 15 vacant infill lots zoned for residential development under 1000m2; • High proportion of holiday homes and significant seasonal increases in population.
10	**Jamieson** **LCA Requirement: High**	• The Jamieson and the Goulburn Rivers join to the west of Jamieson township, identified as high level rivers by DELWP, with several medium level connector rivers/streams within the sub-catchment. The Goulburn runs directly into Lake Eildon at the northern boundary of the sub-catchment; • Township zoned General Residential 1 adjacent to the Jamieson and Goulburn Rivers, with a Low Density Residential zone to the east of the township and several pockets of Rural Living 1 zoned land to the north east and north west (some areas adjacent to Lake Eildon);	• High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system; • High proportion of ageing on-site systems on lots less than 1000m2; • 114 vacant lots zoned for residential development, 77 are lots less than 1000m2; • High proportion of holiday homes and significant seasonal increases in population; • Unsewered caravan park.

11	**Paradise Point** **LCA Requirement: Medium**	• General Residential 1 zoned subdivision adjacent to Lake Eildon and Mixed Use Zone in the south eastern corner of the sub-catchment (the Jamieson Brewery); • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• Concentration of ageing on-site systems on lots less than 1000m2 at Paradise Point; • High proportion of holiday homes and significant seasonal increases in population.
12	**Woolshed Creek** **LCA Requirement: Medium**	• Woolshed Creek bisects the northern half of the sub-catchment, a medium level stream according to DELWP. The creek flows directly into Lake Eildon at the sub-catchment's northern boundary	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater), although existing lots are in excess of 4000m2 and located within a Farming Zone; • Some unsewered dwellings will be holiday homes and therefore subject to seasonal use only.
13	**Mountain Bay** **LCA Requirement: High** ***Refer 6.7 considerations***	• Schedule 1 provides for the development of a range of tourism, commercial and residential activities; wastewater management will be a key consideration when assessing any of these proposals as per Clause 9 of the Schedule.	
14	**Bonnie Doon East** **LCA Requirement: Medium** ***Refer 6.7 considerations***	• Two areas of General Residential 1 zoned land immediately adjacent to Lake Eildon – one area is sewered and the other to the south in James Street is unsewered; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater); • Knowledge of grey water being discharged into the stormwater system;	• Concentration of over 50 ageing on-site systems on lots less than 1000m2 in the James Street subdivision; • High proportion of holiday homes and significant seasonal increases in population; • Unsewered caravan park, however the Bonnie Doon Hotel in the northern section of the sub-catchment is sewered.
15	**Peppin Point**	• Around 70% of land is zoned Rural Living 1, with a number of lots with lakeside frontage;	• High proportion of holiday homes and significant seasonal increases in population;

	LCA Requirement: High	• High proportion of pre 1990 septic systems (particularly split systems only treating blackwater);	• Unsewered caravan park.
16	**Wappan** **LCA Requirement: Medium**	• A low order stream/river (according to DELWP) bisects the sub-catchment and flows directly into Lake Eildon on the south western boundary of the sub-catchment;	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater).
17	**Maroondah Highway** **LCA Requirement: Low** ***Refer 6.7 considerations***	• Presence of pre 1990 septic systems (particularly split systems only treating blackwater).	
18	**Doolam Creek** **LCA Requirement: Low** ***Refer 6.7 considerations***	• Residential lots in central Maindample are zoned Township; • Presence of pre 1990 septic systems (particularly split systems only treating blackwater);	• Twenty six ageing septic systems on lots less than 1000m2; • Twenty eight vacant lots zoned for residential development under 2000m2
19	**Glen Creek** **LCA Requirement: High**	• Glen Creek bisects the sub-catchment, a medium level river/stream according to DELWP. The creek runs directly into Lake Eildon at the southern end of the sub-catchment; • Around 50% of land is zoned Rural Living 1;	• Relatively high proportion of all systems are pre 1990 (particularly split systems only treating blackwater); • High proportion of holiday homes and significant seasonal increases in population.
20	**Dry Creek/Tallangalook** **LCA Requirement: High**	• Dry Creek and several other creeks, all identified as low level creeks by DELWP traverse through the sub-catchment. Dry creek runs directly into Lake Eildon at the southern end of the sub-catchment; • Around 20% of land is zoned Rural Living 1, all of which is located at the southern end of the sub-catchment;	• High proportion of all systems are pre 1990 (particularly split systems only treating blackwater); • High proportion of holiday homes and significant seasonal increases in population.

21	**Howes Creek** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	• Howes Creek bisects the sub-catchment, identified as a low level creek by DELWP. The creek runs directly into Lake Eildon on the sub-catchment's western boundary; • Only a few lots are zoned for residential development (Rural Living 1);	• Some pre 1990 on-site systems (particularly split systems only treating blackwater); • High proportion of holiday homes and significant seasonal increases in population.
22	**Banumum Rd** **LCA Requirement: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**	• Around 70% of lots are zoned Rural Living 1, many with lakeside frontage; • High proportion of pre 1990 septic systems (particularly split systems only treating blackwater)	• High proportion of holiday homes and significant seasonal increases in population.

6.7 Supplementary Sub-catchment Considerations

In addition to the issues and risks outlined in Table 16, these specific requirements must be referred to when making decisions concerning the sub-catchments listed.

Table 16A Specific Sub-Catchment Analysis Issues

No.	Sub-Catchment	Strategy, Description and Analysis
13	**Mountain Bay** *Discuss future wastewater management strategies for new development with the landowner and Project Partners*	The Mountain Bay Special Use Zone provisions The Mountain Bay Incorporated documents The approved Mountain Bay Development Plans The Mountain Bay Section 173 Agreements The Mountain Bay Concept Plan The Mountain Bay Detailed Concept Plan Septic Tank Effluent Disposal at Mountain Bay by Dr R van de Graaff Geology, Slope, Earthworks and Effluent Management at Mountain Bay by Goodz & Associates Engineering Services Report for Mountain Bay by HJ Macey.
14	**Bonnie Doon East**	1. Work with Project Partners to identify whether or not the extension of the reticulated sewer in the northern section of the sub-catchment can be extended to the Caravan Park and General Residential 1 subdivision in James Street. 2. Given the unsewered General Residential 1 zoned area represents a very small portion of the sub-catchment, the presence of a sewered General Residential 1 zoned area and the overall unsewered density of 9.5 dwellings per km2, a medium risk rating has been applied to unsewered dwelling density.
17	**Maroondah Hwy**	Work with Project Partners to identify whether or not the extension of the Malcolm Street sewer, which is directly to the east of this sub-catchment, is a viable alternative to on-site systems.
18	**Doolam Creek**	Given the unsewered Township zone area represents a very small portion of the sub-catchment and the overall unsewered density of 1.2 dwellings per km2, a medium risk rating has been applied to unsewered dwelling density.

7. Land Capability Assessments

A LCA is required when submitting a planning permit application with onsite wastewater containment, and when a Permit to Install or alter an on-site domestic wastewater system is required. Ideally the single LCA will satisfy both requirements

The risk an on-site system poses to water quality, public health and amenity (and the cumulative risk) is assessed through a land capability assessment (LCA). The current EPA Code of Practice outlines standards for the preparation of an LCA, including advice to an individual wanting to prepare an LCA. It describes a twelve stage 'best practice' process (*EPA Code of Practice – On- site Wastewater Management February 2013 page 34).*

The Code of Practice also provides that Council's Environmental Health Officer (EHO) and Wastewater Officer have the authority and can determine what comprises a satisfactory LCA under the Code. The purpose of this section is, therefore, to clarify the requirements for the preparation of an LCA in high, medium and low risk areas as defined by earlier risk analysis.

The philosophy behind the LCA requirements outlined in this Section is that Council, Water Corporation and a landowner/residents need to focus resources on the higher risk sub-catchments and sites, rather than requiring the same standard of LCA regardless of the overall risk posed by the additional on-site system(s) for wastewater management.

Higher risk areas are those where there is the greatest potential for an individual and/or cumulative adverse impact if not adequately managed. Given that Council, Water Corporations and landowners have a legal responsibility to ensure such risks are minimised, focusing our collective effort on higher risk areas is the adopted pragmatic approach.

The earlier DWMP Action and Resource Plan delivered a series of completed tasks by Council around the provision of LCA templates, local information and data to assist experts in preparing an effective and cost efficient LCA.

The recommendations of this OWMP, and earlier DWMP is that the twelve step EPA Code of Practice process, identified as 'best practice', will be adopted as a default standard applicable for **MEDIUM** risk sites.

A 'better than best practice' approach will continue to be required for sites identified as **HIGH** risk - see below. This is because Council and its Project Partners believe that a complete scientific analysis is required to comply with the requirements of the Environment Protection Act 2017 and SEPP Water of Victoria in relation to assessing cumulative impacts particularly for an additional on-site wastewater management system.

For **LOW** risk sites Council's EHO's will apply their discretion to determine how the Code can be met through the LCA process. This means that in practice, requirements such as an on-site permeability test and water/nutrient balances will not be required for identified and confirmed low risk sites. The Council's EHO will determine the requirements in consultation with the landowner and LCA practitioner based on the nature of the development proposal and the individual characteristics of the site. A medium or high risk LCA can however be lodged.

The LCA requirements for an individual site are to be determined by the risk rating derived from:

- the land unit map for the sub-catchment within which the site lies, prepared by Council in accordance with Stage 3 of the Risk Analysis Model; or

- if this land unit map is yet to be prepared by Council then the Stage 2A or 2B risk rating for the sub-catchment within which the site lies (identified in Table 11 and Map 6 in Section 6.2) must be used to determine the level of LCA; or
- where neither levels of risk analysis have been undertaken by Council, the risk rating at minor catchment level, i.e., at Stage 1 of the Risk Analysis Model, must be applied;

A LCA must be submitted at the planning permit application stage, or if no planning permit is required, with the application for a Permit to Install an on-site wastewater management system.

Land capability assessment for sites with a high risk rating: The LCA must be a design document and include all of the twelve stages outlined in Section 3.6.1 of the EPA's Code of Practice – On-site Wastewater Management February 2013 including:

1. a feature survey which provides for the delineation of surface flow vectors and buffers;
2. an assessment of colloid stability, soil reaction trend and electrical conductivity of the relevant soil horizons;
3. an assessment of any required soil amelioration; and

The following must also be included in the LCA:

- an insitu permeability assessment;
- the production of a water and nutrient balance;
- an analysis of the site using the Stage 4 risk analysis model,
- the resulting overall risk rating using the Edis algorithm;

Land capability assessment for sites with a medium risk rating:

The LCA must be a design document and include all of the twelve stages outlined in Section 3.6.1 of the EPA's Code of Practice – On-site Wastewater Management February 2013 including 1, 2 & 3 above.
An analysis of the site using the Stage 4 risk analysis model must be undertaken, resulting in an overall risk rating using the Edis algorithm to confirm the Medium risk rating (or lower).

Land capability assessment for sites with a low risk rating:

If the site lies within a declared special water supply catchment an LCA must be provided. The LCA must be a design document however as Council has already undertaken a risk analysis of the area a less in-depth document will generally be appropriate.

An analysis of the site using the Stage 4 risk analysis model, resulting in an overall risk rating using the Edis algorithm must be included.

Subject to this outcome confirming Low risk rating, the need for an in situ permeability test and a water/nutrient balance test is waived - based on the consideration of the site's characteristics. This could be amended if the development proposed is considered to produce an increased volume of wastewater – greater than a typical dwelling.

For the handful of properties within the Shire that do not lie within a declared special water supply catchment Council's EHO will provide the initial assessment and advise of the design for the on-site wastewater application (for a modest dwelling scale of development) and prepare a report to satisfy the Code of Practice drawing on experience and local knowledge from other systems in use in the vicinity of the site. This will satisfy the Code of Practice this LCA report requirement.

By adopting this approach, Council will be using the most refined, detailed risk analysis undertaken within the locality to determine LCA requirements. This approach will also provide certainly for LCA practitioners and landowners as to what level of LCA is required.

For subdivision and similar purposes, a fully detailed LCA will always be required.

For excisions of existing development, a report on the performance of the existing wastewater system will be required – not an LCA. Any deficiencies must be addressed.

7.1 Expectations for New Development

It is important that Council continue to clarify expectations around how new development is to meet the requirements of the EPA Code of Practice.

New development is either one of two things; either 'greenfield development' which is defined as dwellings on land that remains vacant, (may have) been recently subdivided and where there are very few existing houses, or 'infill development' which is defined as existing subdivided lots in townships, and which are surrounded by existing dwellings.

7.1.1 Greenfield development

New greenfield development is expected to meet all of the standards specified by the Code of Practice, including the setback distances for primary and secondary treatment effluent disposal systems and irrigation areas from waterways and drainage lines and other sensitive environments.

New lots should not be created whereby wastewater setback reductions are necessary for development to occur. Specifically, an applicant must demonstrate within their LCA and proposal that full setbacks from water features and the like can be achieved in accordance with the Code - no reduction required (including those applicable to improved wastewater quality). Allowance must also be made for reserve and primary wastewater disposal areas.

7.1.2 Infill development

Infill development within existing unsewered townships shall, as a default, meet all Code of Practice Standards. The Code does, however, enable standards to be varied to the satisfaction of Council (and any determining referral authority such as GMW). The primary consideration is that over development of the site is to be avoided so as to avoid potential risks to human health and water quality off-site impacts resulting from the development. The LCA must be prepared to the standards outlined in this section based on the risk rating applying to the site.

Mitigating the risk of development of small lots will include consideration of limiting the proposed development in terms of the building footprint and number of bedrooms (however described). The proposed development of the site should also make allowance for other expected site uses i.e., driveways/play areas and should not consist only of wastewater disposal areas and building footprint.

7.1.3 Minor development

On infrequent occasions there may be valid justification for waiving the need for the lodgement of an LCA and the expense of obtaining the detailed LCA. Such occasions would require the endorsement of the Senior Environmental Health Officer.

- be minor development not requiring the issue of a Planning Permit and / or
- be development that has limited wastewater generation – such as the provision of improved

amenity facilities (flush toilet) at a worksite on a farm allotment or similar and

- be unconstrained by available space, site selection criteria, and setback distances.

All other components of lodging and assessment of the proposal continue to apply – see LCA requirement for Low Risk Rating sites and sites not within a declared special water supply catchment for further guidance.

7.1.4 Existing Development/Wastewater System Improvements

On infrequent occasions there may be valid justification for not requiring the need for the lodgement of an LCA and the expense of obtaining the detailed LCA.

Examples of these are:

- development unchanged – improvement to existing wastewater system with limited options available
- redevelopment of dwelling etc. is minor in nature such as relocation of a facility within a dwelling or ensuite provided to an existing bedroom, nil increase in wastewater generation and evidence of existing wastewater system performance satisfying standard requirements for a system of that age (and on-site containment).

Where an existing dwelling is undertaking modest improvement work or the wastewater system is undergoing redevelopment or significant improvement works, there must be a LCA lodged that is a design document and include an analysis of the site using the Stage 4 risk analysis model similar to that applied for a site with an overall low risk rating.

8. Monitoring and Compliance

Council acknowledges that significant improvements can be made to its current monitoring and compliance program. While there is an existing (but admittedly limited) proactive post installation inspection program, the Action Plan will outline Council's commitment to augmenting existing resources to ensure that a comprehensive inspection and monitoring program can be developed.

Our past surveys indicated that that older systems (i.e., pre 1990) are those which have the potential to pose the highest risk to public health, the environment and water quality. As such older systems in high risk areas continue to be the initial focus of the inspection program. This means that systems which pose the highest risk to beneficial uses and public health are those where resources will initially be directed.

8.1 Inspection Program

A proactive, comprehensive inspection program is supported by the land capability experts and on-site installers/service technicians who completed our earlier online surveys.

A particular need to ensure landowners were compliant with approved system management plans and maintenance schedules was highlighted; our experts felt that compliance with these plans was relatively poor, particularly without active monitoring and enforcement.

The suggestion that an annual environmental charge or on-site licensing fee be introduced to pay for the monitoring and inspection program is something that Council and its project partners must discuss further.

Where the inspection identifies a problematic site where there are few options to address the existing system's performance (either due to financial hardship or the lot size/characteristics), other pragmatic options should be explored with the land owner (including the installation of water

saving devices and imposing limits on number of persons able to be accommodated) to mitigate wastewater volume as much as practicable and retention of wastewater (after Improved treatment) to the maximum extent possible.

Other options such as storage for off-site disposal would be considered as an 'option of last resort'.

Once all known existing on-site systems have been inspected the inspection cycle should be based around compliance with EPA Code of Practice requirements (including desludging of systems every three years, servicing of treatment plants and sand filter systems).

The Council should use the inspection program as a vehicle for individual landowner/resident education through:

- one on one discussions between the Council Officer and landowner / resident about key features of their system, maintenance issues and how to keep their system operating efficiently;
- providing each landowner with a brochure on how to maintain a healthy on site system (that relates to the type of system they own);

One of the key messages to be delivered is that maintaining a system on a regular basis will help avoid large system repair bills as major malfunctions can be avoided.

8.2 Compilation of a Comprehensive On-site Domestic Wastewater Management System Database from Inspection Data

The inspection program is heavily reliant on a Council database to track the information collected through the inspection program. This has a number of benefits, including:

- the collation of on-site system data in the one location
- The creation of a complete database of on-site wastewater management systems in the Municipality has the ability to manage data including the identification that a system exists and its principal features and service life, to generate reminders to Council officers, land owners/residents that an inspection by a technician is due / overdue, or that maintenance is scheduled to be completed, and that an inspection report must be submitted to Council either every 3 months, 12 months or 3 years (depending on the system type and conditions of approval or Section 173 Agreement);
- Council Officers will be able to plan and track inspections over time to ensure maintenance and permit compliance issues are addressed by landowners/residents, which in turn will support any formal enforcement action if required;
- Officers will be able to continue the current pro-active inspection program where a Permit to Install has not progressed to a Certificate of Approval, with the trigger point for an inspection being when the Permit to Install has lapsed.
- Officers will be able to support owners and prospective purchasers with information regarding system type, configuration and compliance history.
- GPS coordinates or similar spatial data regarding a systems location added to our GIS System will assists Planners and Environmental Health Officers in making day to day decisions and provide valuable data for long term strategic planning and infrastructure provision (GPS coordinates for new system components should also be obtained during the post installation inspection);

Work will need to be undertaken to expand the fundamental components of a single database and to ensure that data can easily be downloaded into and recovered from Council's database.

8.3 How to Measure the Success of the Inspection and Monitoring Program

The primary measure of the inspection program's success is:

- the number of inspections completed,
- the issues identified and resolved and
- the subsequent creation of an accurate database and a GIS which shows the actual type and location of each on-site system.

The measure of the success rate of follow up letters/directions requesting and/or requiring that maintenance and improvements be undertaken to address issues of concern by the landowner/resident in a timely manner has been found during recent experience to be problematic.

Given the potential impact of existing on-site systems on potable water quality as one of the policy drivers for this OWMP there should be a quantitative measure relating to system performance within the sub-catchment. Additional education needs to be included with reports following the inspection program and after the defined window expires for required maintenance.

As the inspection and monitoring program will be an ongoing, rolling program, it is essential that the baseline parameters for performance are clearly defined.

9. Changed legislation and Existing On-site Systems

The data and maps for the 22 sub-catchments as presented earlier in this Plan serve to highlight one of the key issues that must be tackled by Council and our Project Partners – existing and often ageing on-site systems. The maps clearly show that systems designed to deal with black water alone prior to the 1980's are common in our unsewered townships; one can fairly safely say that the majority of systems within each settlement (including some installed after 1980) will not meet current EPA standards as they were installed years before.

As highlighted in Section 10 of the earlier Background Report, earlier legislation failed to provide Council with a comprehensive set of tools to address the issue of systems installed prior to modern day permit and certificate to use requirements. The nuisance provisions of the Public Health and Wellbeing Act 2008 was all that was available to a council to address an on-site system which was malfunctioning.

The new EPA 2017 and GED together with the EPA Regulations Part 5.7 OWMS Management Systems regulations 159 – 162 deal with operation and maintenance.

Reg. 159 The duties of landowners and occupiers " must take all reasonable steps"

- ensure system is operating so as to not pose risk….
- ensure the system is maintained in good working order (the regulation stipulates this applies to others than renters).

This legislation applies from July 2021. Other provisions including Regulation 161 *(2) An owner or occupier must notify the council (in whose municipal district the system is located) as soon as practicable after the person becomes aware, or reasonably should have been aware, that the system poses a risk to human health or the environment, or is otherwise not in good working order.*

- The system poses a risk if any of the following apply (but is not limited to these circumstances):
- the absorption field of the system becomes sodden with wastewater pooling on the surface of the surrounding land
- there is wastewater runoff from the disposal area
- there is an odour of effluent emanating from or near the system
- the drain or toilet of the system is running slowly
- the grease trap of the system is full or blocked

161 (4) there are any other signs that indicate that the system poses a risk to human health or the environment or is otherwise not in good working order.

A notification under this Regulation must include the steps the person has taken or proposes to take, to ensure the system no longer poses a risk to human health and the environment and is returned to good working order.

Note: This requirement will apply on and after 1 July 2022 and clearly outlines:

A person in management or control of land on which an on-site wastewater management system is located must notify the council, in whose municipal district the system is located, as soon as practicable after the person becomes aware, or reasonably should have been aware, that the system poses a risk of harm to human health or the environment or is otherwise not in good working order.

This section of the OWMP outlines the strategies and possible solutions to address the significant challenge posed by ageing on-site systems in light of limited legislative powers.

9.1 Upgrades through Redevelopment

Ageing on-site systems reflect the ageing housing stock in our unsewered townships. Some dwellings in our townships date back to the Victorian period but most were constructed prior to the 1980's. Our ageing housing stock, added to the 'tree change' population trend highlighted in the earlier Background Report, means that there is pressure for the reconfiguration, extension and sometimes total redevelopment of existing dwellings.

While this provides the prime catalyst for Council to ensure a new system is installed to meet current day standards, there is a fundamental problem – many sites under 1000m2 may not have sufficient site area for a system that meets all of the EPA Code of Practice requirements.

Expensive investment may be prohibitive and scupper any redevelopment at all. There is a balance that needs to be found by Council and its Project Partners, with each site and each situation needing to be analysed on its own merits. Redevelopment may be permitted with constraints regarding bedroom capacity. Overall, the driving principle should be that any upgraded system will provide benefits when compared to the existing system.

Importantly, the approach outlined above is supported by the EPA's Code of Practice, which recommends that existing systems be upgraded where there is currently an offsite discharge. The Code states that where a LCA indicates that the property is too small to contain all the effluent on-site, in accordance with today's standards, a practical solution should be found. This may include discharging a smaller quantity of higher effluent into the stormwater network in wet weather, installing water saving hardware within the home or installing a pump out tank.

9.2 Redevelopment or Required Improvement

The approach adopted as our standard for redevelopment is that consents be given only when there is lodged a satisfactory outcome for containment of wastewater – with a supporting Land Capability Assessment. The overall aim will be to maximise the performance of each site with compliance of as many Code of Practice requirements as possible for each site.

It is considered to be far better to have a system that treats all wastewater discharged from the dwelling (whilst maybe not being able to meet setback requirements to water ways or reservoirs) rather than having an existing split system which treats black water alone and where the grey water is discharged directly onto the site and into the stormwater system (which in turn runs straight into local waterways and/or Lake Eildon). There must be a net benefit with regard to wastewater improvement works.

9.3 Improved Community and Expert Awareness

Community education is a fundamental part of any OWMP's implementation.

The philosophy of the inspection program shall be to *educate first then enforce*.

This OWMP aims to broaden its reach to build community awareness, understanding and compliance with the recently introduced GED.

The new EPA legislation has also introduced a mandatory requirement for landowners to educate tenants or those renting their dwelling with regard to:
If you are an owner or occupier of land where an OWMS is located, you must take reasonable steps to:

- operate the system so it doesn't pose a risk to human health or the environment
- maintain (except for residential renters) the system in good working order, including older legacy systems that may not meet current standards
- check for signs the system may be failing or isn't in good working order and notify council if it is responding to any system failures.

Results of a resident/landowner survey conducted in 2014 clearly showed that people do not think about their on-site system until something goes wrong.

A concurrent local installer/service technician survey result also found that landowners will sometimes ask for the installation to deviate from the approved plans, or that the landowner has reconfigured the system after it has been installed.

Current dealings with both installers and resident/landowners indicate the 2014 survey findings remain relevant today.

Given that almost 50% of the Shire's housing stock is owned by a non-resident ratepayer, it is considered important that a component of the education campaign be focused on this audience.

This OWMP will augment Council's brochure and online information source recommendations and community wastewater management engagement program.

Project partners Goulburn Murray Water and Goulburn Valley Water and by engagement with Murrindindi Council, Council will again schedule to meet regularly and seek to develop approaches to improve on-site wastewater management and awareness with local stakeholders.

10. OWMP Action Plan

Table 17 Actions Theme and Strategy

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources, Ease of Task	Success Indicator(s)
			1	2	3	4	5		
1	**Improved databases and systems**								
1.1 Tracking system for OWMP implementation	1.1.1 Creation of a database and reporting templates to track the implementation of the OWMP.	Senior Coordinator Community Safety, IT Unit	◆					Officer time from within existing resources	1.1 Tracking system for OWMP implementation
1.2 Improved databases to facilitate monitoring and compliance programs	1.2.1 Purchase and application of in field portable devices to assist the inspection and monitoring program.		◆	◆				Continue reviewing opportunities to implement	In-field technology operational.
1.3 Improved use of GIS capabilities	1.3.1 Creation of a GIS layer identifying location of existing and permitted on-site systems.	GIS Officer		◆				Continue implementation as part of above	GIS layer operational. GIS layer used on a daily basis by Planners, EHO's and Engineers.
1.4 Improved use of GIS capabilities	1.4.1 Development of a GIS layer identifying sub-catchments and level of risk using the Stage 2 risk methodology.	GIS Officer		◆				Officer time resources Easy task and low levels of resources required	GIS layer operational. GIS layer used on a daily basis by Planners, EHO's and Engineers.

2	**Development of LCA & Technical Standards**							
2.1 Development of technical standards for system maintenance standards.	2. Consult with LCA experts, local installers, the EPA, GMW and GVW to identify appropriate maintenance requirements for on-site systems for high, medium and low risk sites and different soil profiles.	Environmental Health Unit	◆	◆				Continue to implement	Technical standards agreed to, adopted and launched by Council.
3	**Monitoring and Compliance**								
3.1 Location and initial analysis of existing on-site systems	3.1.1 Audit of existing on-site systems in high risk sub-catchments to identify their GPS co-ordinate, system and efficacy, with priority given to pre 1990 systems.	Senior EHO (Coordinator Community Safety), EHO & WMO's	◆	◆	◆	◆	◆	Continue to implement New officer resource required (1 EFT) Administrative support also required (minimum 1 day per week) Easy task but high level of resources	200 sites inspected per annum. GIS updated with GPS coordinates
	3.1.2 Inspection of sites where a Section 173Agreement relating to wastewater management exists.	Senior EHO (Coordinator Community Safety) EHO & WMO's	◆	◆	◆	◆	◆	Continue to implement	All sites inspected in accordance with Section 173
	3.1.3 Audit of existing on-site systems in medium risk areas, faults identified, and landowners informed of required action.	Senior EHO (Coordinator Community Safety) EHO & WMO's					◆	Continue to implement Required resources as per 3.1.1	20 sites inspected per annum and GIS updated with GPS coordinates
	3.1.4 Audit of existing on-site systems in low risk areas.							Implement where issues identified	Only reactive inspections performed

4	**Improved community and expert awareness in relation to on-site wastewater management issues and water quality implications**							
4.1 Education campaign for Landowners / Residents and Visitors	4.1.1 Development and distribution of information sheets aimed at assisting landowners and residents to • properly maintain / manage their on-site system and • adopt responsible land management practices to protect water quality / waterway health.	Senior Coordinator Community Safety	◆	◆	◆	◆	◆	Operational but needs to be ongoing	Sign off from Council and Project Partners for education material. Publishing of material on Shire website.
4.2 Education campaign and regular, ongoing Council consultation with On-site system Installers and Service	4.2.1 Organisation of annual meeting between Project Partners and installers / service technicians.	Senior EHO Coordinator Community Safety/ EHO		◆	◆	◆	◆	Respond on an “as needed” basis.	Meeting held annually and well attended.
4.3 Education campaign and regular Council consultation with LCA experts	4.3.1 Organisation of annual meeting between Council officers, Project Partners and principal LCA Authors, including training on current issues.	Senior EHO Coordinator Community Safety/ EHO		◆	◆	◆	◆	Continue to implement	Meeting held annually and well attended
5	**Inter-agency infrastructure planning**								
5.1 Identification of infrastructure required to service growth communities and mitigate wastewater risks	5.1.1 Inter-agency working group with stakeholders to identify infrastructure issues for growth and high risk communities.	General Manager Infrastructure and Planning & Manager Planning and Environment		◆		◆		For discussion by working group (solutions focused)	Township Infrastructure Plan prepared for outlying communities (funding dependant).
6	**Planning Policy and Controls**								

6.1 Review Environment Significant Overlay	6.1.1 Establish a working party with Project Partners to review the ESO.	Manager Planning and Environment			◆	◆		Officer time from within existing resources. Easy task and low levels of resources required (subject to outcome).	Working Party established Council GMW and possibly Murrindindi Council to promote uniformity in approach, objectives and controls & review MOU
7	**Strong and Productive Relationships with our Project Partners**								
7.1 Coordination of strategic, statutory and wastewater management planning functions of Council and its Project Partners	7.1.1 Organise quarterly meetings with our Project Partners to discuss wastewater issues, water quality issues, strategic planning issues and progress of OWMP.	Senior Coordinator Community Safety, General Manager Infrastructure and Planning	◆					Officer time Easy task and low levels of resources required	
7.2 Monitoring and report on progress of OWMP's implementation	7.2.1 Establish six monthly and annual reporting/review process with Project Partners.(commence October 2022 - Annual Report April 2023)	Senior Coordinator Community Safety, General Manager Infrastructure and Planning	◆	◆				Officer time Easy task and low levels of resources required	
7.3 Review of OWMP in 5 years	7.3.1 Commence the 5 yearly review of the OWMP in consultation with Project Partners (July 2025 – May 2026)	Senior Coordinator Community Safety, General Manager Infrastructure and Planning			◆	◆		External resource required. **Continue to implement**	Review completed

11. Monitoring, Auditing and Reviewing Our OWMP

The Ministerial Guidelines require Council to outline how the OWMP's progress will be independently audited every two years, along with how the document will be reviewed and updated every five years.

11.1 Monitoring and Reporting of the OWMP's Progress

Given the number of initiatives and tasks contained within this Plan it is suggested that updates be provided to Council and its Project Partners every six months for the period prior to the planned Audit at the end of the second year.

An annual report and review process should also be undertaken to determine the status of each action and whether or not the Action Plan requires modification of initiatives to be implemented in the year ahead.

It is essential that our Project Partners contribute to the population of both the six monthly and annual reports to report on how they have met their responsibilities for implementing relevant actions. Both progress reports should be formally presented to Council for noting.

Quarterly meetings will also be held with our Project Partners as another vehicle to monitor the Plan.

11.2 Independent Audits

After two years, to review the progress of our OWMP, an independent auditor will be appointed by a completion of a Water Corporation approved expression of interest process.

The actual process and terms of reference for the two yearly Independent Audit are to be set by Council and its Project Partners. Review material and evidence of implementation must include both qualitative and quantitative data from all Project Partners.

The six monthly and annual progress reports are seen to be a useful basis for the presentation of information to the independent auditor but hard evidence demonstrating the progress of actions to date will also be required.

11.3 Reviewing and Updating the OWMP

The Action Plan clearly demonstrates that this Plan has a life of five years.

As outlined above, the annual reporting process will provide the basis for an assessment as to whether or not the Action and Resource Plan will need to be updated. This is a process which must be undertaken in consultation with our Project Partners.

12. GLOSSARY

1:40 HA GUIDELINE	Guideline 1 of the Ministerial Guidelines for Permit Applications in Open, Potable Water Supply Catchments (November 2012)
ASC	Australian Soil Classifications
CODE OF PRACTICE	Code of Practice – On-site Wastewater Management, Environment Protection Authority (February 2013)
DEPI	Department of Environment and Primary Industries
DELWP	Department of Environment, Land, Water and Planning
DTPLI	Department of Transport, Planning and Local Infrastructure
DWSC	Declared Potable Water Supply Catchment under the Catchment and Land Protection Act 1994
DWMP	Domestic Wastewater Management Plan
EDIS	*Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments,* Dr Rob Edis (April 2014)
EHO	Environmental Health Officer
EPA	Environment Protection Authority (Victoria)
EPHEMERAL WATERWAY	Waterways that are only present after heavy rainfall
GED	General Environmental Duty
GIS	Geographical Information System
GMW	Goulburn Murray Water
GREYWATER	Water sourced from a shower, bath, hand basins, clothes washing machine, laundry troughs or kitchen
GVW	Goulburn Valley Water
LCA	Land Capability Assessment
LGA	Local Government Area
LPPF	Local Planning Policy Framework (found in Planning Schemes)
MAV	Municipal Association of Victoria

MINISTERIAL GUIDELINES	Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments (November 2012)
MSDWMPPP	Mansfield Shire Domestic Wastewater Management Plan Pilot Project
OLV	Office of Living Victoria
OWMP	On-site Wastewater Management Plan
OVERLAND FLOW	Path of the surface movement of runoff that is not a defined channel or waterway
SEPP (W OF V)	State Environmental Protection Policy (Waters of Victoria) 1988
SEWAGE	Combined grey and blackwater
SPPF	State Planning Policy Framework (found in Planning Schemes)
STEERING COMMITTEE	Mansfield Shire Domestic Wastewater Management Plan Pilot Project Steering Committee
TRG	Mansfield Shire Domestic Wastewater Management Plan Pilot Project Technical Reference Group
WHITE	*A Discussion Paper for the Initial Work Associated with the Preparation of a Shire Domestic Wastewater Management Plan*, Larry White (April 2014)
WILLIAMS	*Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub-catchments, Paul Williams, Paul Williams and Associates Pty Ltd (May 2014)*

13. References

Mansfield Shire Council 2014 DWMP Background materials and attachments.

Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments (April 2014) Dr Rob Edis

A Discussion Paper for the Initial Work Associated with the Preparation of a Shire Domestic Wastewater Management Plan (April 2014) Larry White

Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments – A Review (March 2014) Dr Robert H.M. van de Graaff, PhD, Van de Graaff and Associates Pty Ltd

Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub-catchments (May 2014) Paul Williams, Paul Williams and Associates Pty Ltd

Soil Orders in the Mansfield Shire Area (Table 3 from Approaches for Risk Analysis of Development with On-Site Wastewater Disposal in Open Potable Water Catchments Dr Robert Edis April 2014)

Ministerial Guidelines for Planning Applications in Open, Potable Water Supply Catchment Areas, November 2012 (Department of Environment and Primary Industries)

State Environmental Protection Policy (Waters of Victoria) (Department of Sustainability and Environment)

Ministerial Guidelines for Planning Applications in Open, Potable Water Supply Catchment Areas, November 2012 (DEPI)

Code of Practice – On-site Wastewater Management, February 2013 (EPA)

Information Bulletin on Land Capability Assessment for On-site Domestic Wastewater Management, March 2003 (Publication 746.1 EPA)

Victoria Planning Provisions

Mansfield Shire Council Plan 2021-25

Municipal Strategic Statement (Mansfield Planning Scheme)

Local Planning Policy Framework (Mansfield Planning Scheme)