



# MANSFIELD SHIRE DOMESTIC WASTEWATER MANAGEMENT PLAN PILOT PROJECT

## Part 2 DOMESTIC WASTEWATER MANAGEMENT PLAN

Prepared by  
**Mansfield Shire Council**  
and adopted 19 August 2014



# TABLE OF CONTENTS

LIST OF ATTACHMENTS, FIGURES, TABLES AND MAPS.....	(iii)
GLOSSARY.....	(v)
<b>1. Introduction .....</b>	<b>1</b>
<b>2. Scope &amp; Aims .....</b>	<b>2</b>
<b>3. How this DWMP meets the Ministerial Guidelines .....</b>	<b>3</b>
<b>4. Risks Associated with On-Site Domestic Wastewater.....</b>	<b>7</b>
<b>5. Risk Analysis Methodology .....</b>	<b>9</b>
5.1 Preliminary Work.....	12
5.2 Stage 1 A Shire-wide Risk Analysis – Minor Catchments.....	12
5.2.1 Minor Catchment Risk Factor 1 – Distance to Reservoir and Potable Water Offtake Point.....	15
5.2.2 Minor Catchment Risk Factor 2 – Slope.....	15
5.2.3 Minor Catchment Risk Factor 3 - Soil.....	15
5.2.4 Stage 1 Risk Analysis Calculation.....	16
5.3 Stage 2A Dividing High Risk Minor Catchments into Sub Catchments and Assessing Levels of Risk.....	16
5.3.1 Stage 2A Risk Analysis Calculation.....	19
5.4 Stage 2B A Detailed Analysis of Sub Catchments.....	19
5.4.1 Findings from the Field Testing of the White Sub Catchment Risk Analysis Tool.....	19
5.4.2 Stage 2B Risk Analysis Calculation.....	21
5.5 Stage 3 Land Unit Risk Analysis of Sub Catchments.....	21
5.5.1 Stage 3 Risk Analysis Calculation.....	21
5.6 Stage 4 An Individual Site Risk Analysis.....	22
5.6.1 Stage 4 Risk Analysis Calculation – the Edis Algorithm.....	23
5.7 Recommendations.....	24
<b>6. Application of the Risk Analysis Methodology Across Mansfield Shire.....</b>	<b>25</b>
6.1 Stage 1 – Minor Catchment Risk Analysis Findings.....	25
6.2 Stage 2A – Sub Catchment Risk Analysis Findings.....	30
6.3 Stage 2B – Sub Catchment Risk Analysis Findings for the Goughs Bay Sub Catchment.....	32
6.4 Stage 3 – Land Unit Risk Analysis for the Goughs Bay Sub Catchment.....	33
6.5 Stage 4 – Individual Site Risk Analysis from within the Goughs Bay Sub Catchment.....	34

6.6	Description and Analysis of the Sub Catchments, Including DWMP Risk Management Strategies.....	35
6.6.1	Sub Catchment 1 Burnt Creek .....	35
6.6.2	Sub Catchment 2 Ford Drive.....	36
6.6.3	Sub Catchment 3 Owens Creek.....	38
6.6.4	Sub Catchment 4 Lower Delatite.....	39
6.6.5	Sub Catchment 5 Macs Cove.....	40
6.6.6	Sub Catchment 6 Bonnie Doon.....	42
6.6.7	Sub Catchment 7 Macmillan Point .....	43
6.6.8	Sub Catchment 8 Goughs Bay.....	44
6.6.9	Sub Catchment 9 Howqua Inlet.....	46
6.6.10	Sub Catchment 10 Jamieson .....	47
6.6.11	Sub Catchment 11 Paradise Point .....	49
6.6.12	Sub Catchment 12 Woolshed Creek .....	50
6.6.13	Sub Catchment 13 Mountain Bay.....	51
6.6.14	Sub Catchment 14 Bonnie Doon East.....	53
6.6.15	Sub Catchment 15 Peppin Point .....	54
6.6.16	Sub Catchment 16 Wappan .....	56
6.6.17	Sub Catchment 17 Maroondah Highway .....	57
6.6.18	Sub Catchment 18 Doolam Creek.....	58
6.6.19	Sub Catchment 19 Glen Creek .....	59
6.6.20	Sub Catchment 20 Dry Creek/Tallangalook .....	61
6.6.21	Sub Catchment 21 Howes Creek Road.....	62
6.6.22	Sub Catchment 22 Banumum Road.....	63
<b>7.</b>	<b>Land Capability Assessments .....</b>	<b>63</b>
7.1	Greenfield Development.....	64
7.2	Infill Development.....	64
<b>8.</b>	<b>Monitoring and Compliance .....</b>	<b>66</b>
8.1	Inspection Program.....	66
8.2	Compilation of a Comprehensive On-Site Domestic Wastewater Management System from Inspection Data.....	68
8.3	How to Measure the Success of the Inspection and Monitoring Program.....	69
<b>9.</b>	<b>Management of Existing On-site Systems.....</b>	<b>69</b>
9.1	Upgrades Through Redevelopment.....	70
9.2	Improved Community and Expert Awareness.....	71
<b>10.</b>	<b>DWMP Action &amp; Resource Plan.....</b>	<b>74</b>
10.1	2013-17 Mansfield Shire Council Plan Actions and Performance Measures Relevant to the DWMP.....	96

10.2	Council Plan Indicators Relevant to the DWMP.....	97
<b>11.</b>	<b>Monitoring, Auditing and Reviewing Our DWMP .....</b>	<b>98</b>
11.1	Monitoring and Reporting of the DWMP's Progress.....	98
11.2	Independent Audits.....	99
11.3	Reviewing and Updating the DWMP.....	100

## ATTACHMENTS

Attachment 1	<i>Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments</i> (April 2014) Dr Rob Edis
Attachment 2	<i>A Discussion Paper for the Initial Work Associated with the Preparation of a Shire Domestic Wastewater Management Plan</i> (April 2014) Larry White
Attachment 3	<i>Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments – A Review</i> (March 2014) Dr Robert H.M. van de Graaff, PhD, Van de Graaff and Associates Pty Ltd
Attachment 4	<i>Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub Catchments</i> (May 2014) Paul Williams, Paul Williams and Associates Pty Ltd
Attachment 5	Soil Orders in the Mansfield Shire Area (Table 3 from <i>Approaches for Risk Analysis of Development with On-Site Wastewater Disposal in Open Potable Water Catchments Dr Robert Edis April 2014</i> )
Attachment 6	Data for Stage 2A Sub Catchment Risk Analysis
Attachment 7	Developable Land Risk Factor Data for Stage 2A Sub Catchment Risk Analysis
Attachment 8	Stage 1 and 2 Risk Analysis Maps, Sub Catchment Maps depicting Developable Land by Lot Size and Age of Existing On-Site Domestic Wastewater Management Systems and Stage 3 Land Unit Risk Maps

## FIGURES, TABLES AND MAPS

Figure 1	Our Four Stage Risk Analysis Methodology
Figure 2	Overview of the Risk Analysis Hierarchy, Risk Parameters and Outputs
Figure 3	Stage 1 Shire-wide Risk Factors Identified by the TRG
Figure 4	Stage 2A Sub Catchment Risk Factors Identified by the TRG
Table 1	How this DWMP Meets the Ministerial Guidelines 2012
Table 2	Potential Risks Associated with Domestic Wastewater
Table 3	Potential Domestic Wastewater Threats
Table 4	Stage 1 Minor Catchments
Table 5	Stage 2 Sub Catchments Derived from High Risk Minor Catchments
Table 6	Stage 2A Sub Catchments Risk Factors and Parameters Identified by the TRG
Table 7	Stage 2B Sub Catchment Risk Analysis Tool for Measuring the Impact of Unsewered Development
Table 8	Land – Soil Risk Ratings
Table 9	Major Factors Influencing the Likelihood of Consequential Impacts of a Proposed On-Site Wastewater Management System

Table 10	Stage 1 Minor Catchment Risk Ratings
Table 11	Stage 2A Sub Catchment Risk Ratings
Table 12	Stage 2B Sub Catchment Risk Ratings for the Goughs Bay Sub Catchment
Table 13	Stage 4 Individual Site Assessment against the Edis Algorithm
Table 14	2013-17 Council Plan Actions Related to the DWMP
Table 15	Council Plan Indicators Relevant to the DWMP
Table 16	Proposed Format for Six Monthly Progress Reports
Table 17	Proposed Annual Report Format
Map 1	Minor Catchment Boundaries
Map 2	Distance To Reservoir / Potable Water Offtake Point Risk Factor
Map 3	Slope Risk Factor
Map 4	Soil Risk Factor
Map 5	Stage 1 Minor Catchment Risk Ratings
Map 6	Stage 2A Sub Catchment Risk Ratings
Map 7	Stage 3 Land Unit Map – Goughs Bay

## REFERENCE DOCUMENTS

## GLOSSARY

<b>1:40 HA GUIDELINE</b>	Guideline 1 of the Ministerial Guidelines for Permit Applications in Open, Potable Water Supply Catchments (November 2012)
<b>CODE OF PRACTICE</b>	Code of Practice – Onsite Wastewater Management, Environment Protection Authority (February 2013)
<b>DEPI</b>	Department of Environment and Primary Industries
<b>DTPLI</b>	Department of Transport, Planning and Local Infrastructure
<b>DWSC</b>	Declared Potable Water Supply Catchment under the Catchment and Land Protection Act 1994
<b>DWMP</b>	Domestic Wastewater Management Plan
<b>EDIS</b>	<i>Approaches for Risk Analysis of Development with On-site Wastewater Disposal in Open Potable Water Catchments</i> , Dr Rob Edis (April 2014)
<b>EHO</b>	Environmental Health Officer
<b>EPA</b>	Environment Protection Authority (Victoria)
<b>EPIHEMERAL WATERWAY</b>	Waterways that are only present after heavy rainfall
<b>GIS</b>	Geographical Information System
<b>GMW</b>	Goulburn Murray Water
<b>GREYWATER</b>	Water sourced from a shower, bath, hand basins, clothes washing machine, laundry troughs or kitchen
<b>GVW</b>	Goulburn Valley Water
<b>LPPF</b>	Local Planning Policy Framework (found in Planning Schemes)
<b>MAV</b>	Municipal Association of Victoria
<b>MINISTERIAL GUIDELINES</b>	Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments (November 2012)
<b>MSDWMPPP</b>	Mansfield Shire Domestic Wastewater Management Plan Pilot Project
<b>OLV</b>	Office of Living Victoria
<b>OVERLAND FLOW</b>	Path of the surface movement of runoff that is not a defined channel or waterway
<b>SEPP (W OF V)</b>	State Environmental Protection Policy (Waters of Victoria) 1988
<b>SEWAGE</b>	Combined grey and blackwater
<b>SPPF</b>	State Planning Policy Framework (found in Planning Schemes)
<b>STEERING COMMITTEE</b>	Mansfield Shire Domestic Wastewater Management Plan Pilot Project Steering Committee
<b>TRG</b>	Mansfield Shire Domestic Wastewater Management Plan Pilot Project Technical Reference Group
<b>WHITE</b>	<i>A Discussion Paper for the Initial Work Associated with the Preparation of a Shire Domestic Wastewater Management Plan</i> , Larry White (April 2014)
<b>WILLIAMS</b>	<i>Assessing the Efficacy of the Edis-White Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub Catchments</i> , Paul Williams, Paul Williams and Associates Pty Ltd (May 2014)

# 1. Introduction

---

This Domestic Wastewater Management Plan has been developed in accordance with the requirements of the:

- State Environmental Protection Policy (Waters of Victoria);
- State Environmental Protection Policy (Groundwaters of Victoria);
- Environment Protection Act 1970;
- Public Health and Wellbeing Act 2008; and the
- Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments 2012.

These documents charge Council and other key stakeholders, such as regional water corporations, the Environment Protection Authority and land owners/residents with the responsibility of ensuring that potable water supplies, waterway health and other beneficial uses (as defined by the SEPP Waters of Victoria) are not adversely affected by domestic wastewater discharges.

To this end Council has worked in partnership with Murrindindi Shire Council (who share responsibility for the management of land around Lake Eildon with us), Goulburn Murray Water, Goulburn Valley Water, the Environment Protection Authority and the Office of Living Victoria to prepare this document.

The Mansfield Shire Council Domestic Wastewater Management Plan Pilot Project Background Document (*the Background Document*) provides the foundation for this Plan in that it identifies the key considerations, issues and opportunities that we must address in this document. Accordingly this DWMP must be read in conjunction with the Background Report.

Input from several experts in the form of Dr Robert Edis, Mr Larry White, Dr Robert van de Graaff and Mr Paul Williams has been an integral part of this project, centred around the risk analysis tool which forms the backbone of our DWMP.

Indeed, this Plan is based upon a detailed and comprehensive risk analysis methodology, which is the first of its type in the new policy environment created by the *Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments*, launched by the Hon. Peter Walsh, Water Minister, at Mansfield in November 2012.

Our risk methodology marries traditional wastewater management risk analysis tools with risk factors affecting potable water supplies. This is essential for our Shire given that 95% of our municipality lies within a declared special water supply catchment under the Catchment and Land Protection Act 1994.

These new *Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments (November 2012)* are relevant to this document not only in that they prescribe the new requirements for a DWMP but they also require a far higher level of integration of Council's strategic/statutory planning and environmental health (and collaboration with our Project Partners' organisations) to better manage the impacts of future development and domestic wastewater management on potable water supplies.

As a result this DWMP will become a key strategic and statutory planning tool to guide future development across Mansfield Shire, as well as informing long term planning policy and overlay controls.

It's findings have been informed by the extensive consultation undertaken with our Project Partners; Goulburn Murray Water (GMW), Goulburn Valley Water (GVW), Murrindindi Shire Council (MuSC), the Environment Protection Authority (EPA), Department of Environment and Primary Industries (DEPI) / Office of Living Victoria (OLV) and numerous other councils across Victoria. The results of our three online surveys (detailed in the Background Report) and discussions with Council and its Environment Advisory Committee have also been an integral part of this plan's development.

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

Importantly, the responsibility for implementing actions will not be limited to Council alone. Our Project Partners and land owners/residents all play a vital role in the fulfilment of the initiatives recommended by this document. These ongoing partnerships are a true reflection of the fact that no one party can comprehensively address wastewater management issues within declared potable catchment areas alone.

Indeed the need for inter agency cooperation is highlighted by one of the key issues arising out of the Background Report, that is the large number of old systems across the Shire which no where meet today's design standards. As discussed in the Report, the tools available to Council to achieve improvements to these systems are incredibly limited. Hence incremental improvement over time may well be all that we can achieve if other options such as broader community wastewater infrastructure are investigated by our partners and found to be unviable. It is considered that community education in relation to the ongoing care and management of on-site systems must be a fundamental component of this Plan.

## 2. Scope & Aims

---

This DWMP focuses on:

- analysing the risks associated with domestic wastewater in open, potable water catchments across Mansfield Shire (Sections 5 – 6); and
- to identify initiatives and priorities addressing these risks (Sections 7 – 11).

Given that Lake Eildon, the principal reservoir within the Goulburn Catchment, forms the border between the Mansfield and Murrindindi Shires, this document (and the Background Report) also mentions issues and initiatives relating to Murrindindi. This is recognition that wastewater issues defy municipal boundaries and hence our management strategies need to do so as well.

The context within which this DWMP operates has already been firmly established by the Background Report, along with the condition of the Goulburn and Broken Catchments and our waterways. Information has already been provided about development and population trends and will not be repeated in this document.

The purpose of this Plan is to detail the risk analysis methodology that has been applied to our Shire. Our three tiered risk analysis identifies 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 Council and our Project Partners. This multi barrier, multi agency approach is consistent with that espoused by recent State and Regional water quality and catchment management related strategies.



The primary aims of this DWMP are to:

- ✓ scientifically analyse risk factors across the shire to identify areas of high, medium and low risk of domestic wastewater adversely impacting on potable water supplies, public health, local amenity, the environment and other beneficial uses;
- ✓ provide a detailed analysis of each sewerred and unsewerred township, including an analysis of the Goughs Bay sub catchment based upon the Edis-White risk analysis model (see Section 6), 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 Section 10, Action and Resource Plan;
- ✓ specify land capability assessment and wastewater management requirements for differing types of proposals within high, medium and low risk areas to ensure resources of land owners, consultants and Council are dedicated to areas of highest risk;
- ✓ engage with land owners/residents, installers and designers to improve understanding about the installation, operation and maintenance of on-site systems;
- ✓ detail education, training and process improvement initiatives that will ensure Council meets its statutory obligations in relation to domestic wastewater management;
- ✓ outline proactive compliance initiatives to ensure that the requirements of Permits to Install and Certificates to Use domestic wastewater management systems and Section 173 Agreements (under the *Planning and Environment Act 1987*) are met by land owners/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 and Murrindindi Planning Schemes as a means of ensuring land capability and domestic wastewater risk management issues are integrated into day to day statutory, and longer term strategic, planning decisions;
- ✓ stipulate the timelines, and resources required, to implement all actions and initiatives; and
- ✓ provide a monitoring and auditing framework to track the implementation of the DWMP's Action and Resource Plan, including the provision of reports to our community and Project Partners.

### 3. How this DWMP Meets the Ministerial Guidelines

---

As stated in the Introduction, this DWMP is designed to meet the requirements for a Plan under Guideline 1 of the *Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchment Areas (November 2012)*. The following table summarises how each of the Guideline's requirements are met, and which section of both this document, and the Background Report, demonstrates Council has a compliant DWMP.

**Table 1 How this DWMP Meets the Ministerial Guidelines 2012**

Guideline Requirement	Relevant Sections in DWMP Background Report and DWMP
<p>The DWMP incorporates, and builds upon Council's responsibilities for developing DWMP's set out in clause 32(2)(e) of the SEPP.</p> <p>This clause states that local councils need to: Where relevant, develop and implement a domestic wastewater management plan in conjunction with water authorities and communities that:</p> <p>(i) 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;</p> <p>(ii) identifies the preferred options, together with costs, funding needs, timelines and priorities; and</p> <p>(iii) provides for the assessment of compliance of on-site domestic wastewater systems with permit conditions.</p>	<p>In response to (i):</p> <ul style="list-style-type: none"> <li>• The requirements of the SEPP Waters of Victoria are outlined and discussed in Section 10.2.2.1 of the Background Report;</li> <li>• Paul William's '<i>Assessing the Efficacy of the Edis Risk Assessment Algorithm Using Data from Howes Creek Road and Goughs Bay Sub Catchments</i>' (May 2014) reviews forty land capability assessments against the algorithm to assess its efficacy;</li> <li>• Section 7.4.3 of the Background Report outlines the results of the land capability expert online survey, where the five most active LCA experts within Mansfield Shire were asked questions about the LCA process and how it can be improved;</li> <li>• LCA results form part of the Edis individual site risk analysis tool and are given significant weight in the algorithm which gives a site a final risk rating (refer to Section 5.6);</li> <li>• Section 7 of this DWMP, Land Capability Assessment Requirements, specifies minimum standards for LCA's in high, medium and low risk sites to improve the quality of LCA's and ensure comprehensive analyses are undertaken for high risk sites;</li> <li>• Section 10 of this DWMP, Action &amp; Resource Plan, identifies the need to prepare LCA templates to facilitate the LCA process, achieve consistency in LCA's and to implement the risk analysis tool for an individual site;</li> </ul> <p>In response to (ii):</p> <ul style="list-style-type: none"> <li>• Section 10, Action &amp; Resource Plan, identifies the preferred options to address wastewater management issues, along with an assessment of the nature and extent of resources and funding required to implement each action;</li> <li>• The Action Plan is contingent on Water Corporations assisting with resources and funding to implement some actions;</li> <li>• State Government funding opportunities can also be explored as a supplementary funding source at the time each action is implemented;</li> <li>• The Action Plan identifies timelines for the implementation of each action over the five year life of this DWMP.</li> </ul> <p>In response to (iii):</p> <ul style="list-style-type: none"> <li>• Sections 8 and 10 of this DWMP outline how all on-site systems will be inspected over the five year life of this DWMP commencing with high risk areas;</li> </ul>

	<ul style="list-style-type: none"> <li>• Recommendation 23 highlights the need to inspect all sites subject to a Section 173 Agreement under the Planning and Environment Act 1987 relating to on-site wastewater systems, which is reflected in Action 5.1.7;</li> <li>• Section 10, Action &amp; Resource Plan, identifies a series of inspection related actions to be implemented over the life of this Plan to ensure compliance with the Code of Practice and permit conditions.</li> </ul>
<p>The DWMP must be prepared or reviewed in consultation with all relevant stakeholders including:</p> <ul style="list-style-type: none"> <li>• Other local governments with which catchments are shared;</li> <li>• EPA; and</li> <li>• Local water corporations.</li> </ul>	<ul style="list-style-type: none"> <li>• Our Project Partners are Goulburn Murray Water, Goulburn Valley Water, Murrindindi Shire Council, Office of Living Victoria and the Environment Protection Authority;</li> <li>• The Background Report considers broader catchment issues, for example it discusses stream quality, wastewater infrastructure, growth patterns and planning scheme controls in Murrindindi Shire along the Goulburn River and around Lake Eildon;</li> <li>• Our Project Partners have representatives on the DWMP Steering Committee and Technical Reference Group, both of which have met a number of times over the past 12 months. Communication channels with Project Partners have been strong throughout the duration of the process;</li> <li>• Each individual section of the Background Report was circulated to all Project Partners for comment. These comments were then incorporated into a revised draft which was then distributed for review prior to being sent to our local Water Corporations' General Managers for final approval;</li> <li>• Our Project Partners have met with our scientific experts on a number of occasions to explore their expert advice and risk analysis model;</li> <li>• Section 10, Action &amp; Resource Plan, identifies the responsibilities of our Project Partners in assisting with the implementation and funding of the DWMP;</li> <li>• Section 11, Reporting, Monitoring and Auditing our DWMP's Progress, provides for the process of the review of the DWMP.</li> </ul>
<p>The DWMP must comprise a strategy, including timelines and priorities, to:</p> <ul style="list-style-type: none"> <li>• prevent discharge of wastewater beyond property boundaries; and</li> <li>• prevent individual and cumulative impacts on groundwater and surface water beneficial uses.</li> </ul>	<ul style="list-style-type: none"> <li>• Section 10 of the Background Report reviews various Acts, Ministerial Guidelines, Strategies and Policies that underline the need to implement programs to mitigate the discharge of wastewater beyond property boundaries;</li> <li>• Section 7, Land Capability Assessment, outlines minimum standards for future assessments to ensure wastewater is not discharged beyond boundaries and that the system complies with the EPA's <i>Code of Practice</i>;</li> <li>• Sections 8 and 9 provide for education, inspection and compliance programs to provide ongoing monitoring of on-site systems to address issues of off-site discharge over the life of this Plan;</li> <li>• Sections 5 and 6 provide outline the Shire's thorough and scientific risk analysis model which provides the foundation for this DWMP and is aimed at assessing, addressing and preventing individual and cumulative adverse impacts on surface water beneficial uses identified in the SEPP Waters of Victoria;</li> <li>• Section 10, Action &amp; Resource Plan, outlines how the risk analysis tool will be applied across the Shire over the life of the plan.</li> </ul>

<p>The DWMP must provide for:</p> <ul style="list-style-type: none"> <li>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 Code.</li> </ul>	<ul style="list-style-type: none"> <li>Sections 8, 9 and 10 provide for various strategies and initiatives to monitor the condition and management of on-site treatment systems;</li> <li>Refer to (iii) above for more detailed commentary.</li> </ul>
<ul style="list-style-type: none"> <li>the results of monitoring being provided to stakeholders as agreed by the relevant stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Section 11, Reporting, Monitoring and Auditing our DWMP's Progress, provides for the process for the reporting of results from inspection and compliance programs to stakeholders;</li> <li>The reporting process has been developed in consultation with our Project Partners and where required the Department of Health.</li> </ul>
<ul style="list-style-type: none"> <li>enforcement action where non-compliance is identified.</li> </ul>	<ul style="list-style-type: none"> <li>Section 8 and 10 provide for the inspection and monitoring program. While the initial phase of this program is to focus on building Council's on-site system database and educating land owners / residents about system maintenance, it is recommended that letters be sent to land owners where it is evident that maintenance is required;</li> <li>Follow up inspections to ensure that the required maintenance has been undertaken will then assess whether further action is required to bring the system into compliance;</li> <li>The inspection program to assess compliance with Section 173 Agreements will enable enforcement provisions of the Planning and Environment Act to be applied where required.</li> </ul>
<ul style="list-style-type: none"> <li>a process of review and updating (if necessary) of the DWMP every 5 years.</li> </ul>	<ul style="list-style-type: none"> <li>Section 11, Reporting, Monitoring and Auditing our DWMP's Progress, provides for the process of the review of the DWMP, as agreed to by our Project Partners.</li> </ul>
<ul style="list-style-type: none"> <li>independent audit by accredited auditor (water corporation approved) of implementation of the DWMP, including of monitoring and enforcement, every 3 years.</li> </ul>	<ul style="list-style-type: none"> <li>Section 10, Action &amp; Resource Plan, outlines a series of actions to support the auditing of the DWMP such as the development of a database to monitor the progress of each action and to track initiatives such as the inspection program;</li> <li>As per Section 11 a suitably accredited auditor will be appointed to independently review the implementation of this DWMP.</li> </ul>
<ul style="list-style-type: none"> <li>the results of audit being provided to stakeholders as soon as possible after the relevant assessment.</li> </ul>	<ul style="list-style-type: none"> <li>Section 11 provide for the systematic and administrative frameworks for the reporting of audit results to our Project Partners and other relevant stakeholders such as the Department of Health.</li> </ul>
<ul style="list-style-type: none"> <li>councils are required to demonstrate that suitable resourcing for implementation, including monitoring, enforcement, review and audit, is in place.</li> </ul>	<ul style="list-style-type: none"> <li>Section 10, Action &amp; Resource Plan, identifies the nature and level of resources and funding required to implement each action;</li> <li>Section 11's reporting requirements ensure there are linkages to Council's adopted budget and ongoing expenditure to provide evidence that the required resources to implement Council's component of the DWMP.</li> </ul>

## 4. Risks Associated with On-Site Domestic Wastewater

---

The DWMP Background Report provides an extensive overview of the current state of our declared special water supply catchments, how domestic wastewater is currently managed across the Shire and the intricate layers of legislation, policy and strategies that influence this DWMP.

The fundamental purpose of any DWMP is the identification and management of risk. By its very nature wastewater is a toxic substance, containing high levels of nutrients and harmful micro-organisms. This is why regulations have been in place for many decades to ensure it is appropriately treated and managed, whether it be via a reticulated sewage system servicing a large number of premises or individual on-site systems that treat wastes from a single property.

As is highlighted by current State and regional water legislation, policies and strategies, such risks are heightened when wastewater is being generated within a declared potable catchment and also where groundwater networks supply potable drinking water.

Water and health related legislation, State Environmental Protection Policies, Ministerial Guidelines and various strategies clearly state that while councils have the primary responsibility for overseeing the management of the risks relating to on-site domestic wastewater systems, others play an important role.

Water Corporations, such as GVW, have the responsibility to provide for and maintain reticulated systems and other alternative treatment infrastructure to ensure communities are adequately serviced. They are also responsible for the supply (and treatment) of potable water via reticulated networks (where available).

Furthermore GMW, as the managers of storage facilities such as Lake Eildon and Lake Nillahcootie, has responsibilities to monitor and manage potential environmental and public health issues.

The EPA is the environmental regulator across Victoria with other departments and agencies playing supporting roles, such as the Department of Health, Department of Environment and Primary Industries and the Office of Living Victoria.

The Water Corporations mentioned above, along with statutory authorities such as the GBCMA and, North East Water all have specific delegated responsibilities for the management of catchments and water services within our region.

Lastly, land owners, managers and residents play a pivotal role in wastewater management given they are charged with ensuring their system operates efficiently and effectively at all times and that, when required, they link into reticulated sewage infrastructure.

Table 2 provides a summary of the risks posed by domestic wastewater to the community, the environment and to Council based on the range of legislation, SEPP's, strategies and policies outlined in Section 10 of the DWMP Background Report. Impacts can be both short and long term.

**Table 2 Potential Risks Associated with Domestic Wastewater**

Risks to	Arising from
<p>Beneficial Uses as defined by the SEPP Waters of Victoria:</p> <ul style="list-style-type: none"> <li>• Water suitable for human consumption</li> <li>• Water suitable for agriculture</li> <li>• Water suitable for the consumption of fish, crustaceans and molluscs</li> <li>• Water based recreation</li> <li>• Aquatic ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Excess nutrients leading to excessive plant growth and potential algal blooms (which can be toxic to humans/livestock/fauna and potentially affecting the consumption of fish/crustaceans/molluscs and recreational use of waterways);</li> <li>• Increased sediment (turbidity) in waterways (reduced plant growth, impact on aquatic life and potable water quality);</li> <li>• Changes to oxygen levels and the pH of water (affecting potable water quality, aquatic health and suitability of water for agriculture);</li> <li>• Increased presence of harmful micro-organisms (eg E coli and other gastric bugs) which are a threat to human/waterway health, livestock, water based recreation and the consumption of aquatic animals;</li> <li>• Potential impacts on the quality of water in aquifers / groundwater networks used for both human and agricultural consumption.</li> </ul>
<p>Our Economy</p> <ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Tourism</li> <li>• Liveability</li> <li>• Future population growth</li> </ul>	<ul style="list-style-type: none"> <li>• The majority of water stored in Lake Eildon and Lake Nillahcootie is used for irrigation and water for livestock, thus any adverse water quality issues, such as blue-green algal blooms, could have serious implications for agriculture within the Goulburn and Broken Catchments;</li> <li>• Water based recreation is a fundamental part of Mansfield and Murrindindi Shires' tourism sector. Past blue green algal blooms have resulted in warnings not to use Lake Eildon for water based recreation and against consuming fish and aquatic life sourced from it;</li> <li>• The liveability / amenity enjoyed by residents and visitors relies heavily on our environmental features/attractions. Issues arising from poor water quality, algal blooms etc could impact on these qualities;</li> <li>• The application of the 1 dwelling per 40 hectares dwelling density, under the Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments (2012) demonstrates the potential for future population growth and housing construction to be stymied due to perceived inappropriate and insufficient domestic wastewater management. Housing development within rural living zones is an important driver in ensuring the viability of our smaller communities as well as driving much of our building trades. A return to a strict 1 in 40 hectare dwelling density in rural zones would constrain this growth.</li> </ul>
<p>Council's Statutory Duties and Reputation</p> <ul style="list-style-type: none"> <li>• Legal duty to implement and enforce legislation</li> <li>• Potential liability issues if it does not do so</li> <li>• Damage to Council's reputation and standing in the community if it does not adequately manage or respond to public health and environmental issues</li> </ul>	<ul style="list-style-type: none"> <li>• Council is provided with clear direction by State legislation that it must adequately manage domestic wastewater generated by on-site systems;</li> <li>• There have been a handful of legal cases in Victoria against Councils where this management has been found to be inadequate and resulted in adverse impacts on beneficial uses;</li> <li>• Council must also consider legislation, the SEPP's and State/regional policies when acting as a Planning Authority or a Responsible Authority under the Planning and Environment Act. As such, strategic land use policies and decisions must advance the implementation of these documents;</li> <li>• An inadequate response to the management of domestic wastewater by Council could potentially mean the return of the 1 dwelling per 40 hectare density across the entire Mansfield Shire.</li> <li>• The Memorandum of Understanding between Council and GMW is based upon the development of a DWMP and proactive management of domestic wastewater. Failure to achieve either could mean the end of the MOU and a return to a blanket application of the 1:40 hectare dwelling density.</li> </ul>

The former Draft Mansfield Shire Domestic Wastewater Management Plan, commissioned by Council and prepared by Infocus Management Pty Ltd in 2006, provides a useful summary of the potential domestic wastewater threats and is replicated in Table 3. It is an efficient means of ‘distilling’ the threats identified by various State/regional and local strategies, guidelines and policies.

**Table 3 Potential Domestic Wastewater Threats**

Potential Threat	Likely Cause	Potential Impacts
Failed systems with offsite discharge (Note that systems servicing holiday homes can have a high rate of failure due to long periods of inactivity and significant loading over a short period of time. Given the high proportion of holiday homes in unsewered areas across the Shire, this is a significant threat)	<ul style="list-style-type: none"> <li>• Damaged effluent disposal drains/trenches;</li> <li>• Increased loading from extensions to dwellings;</li> <li>• Design criteria not complied with;</li> <li>• Faulty instillation;</li> <li>• New works and activities impacting on dispersal envelope;</li> <li>• System age;</li> <li>• Septic tank full.</li> </ul>	Nutrients Pathogens Odour Visual Amenity Oxygen depleting material Local land degradation (erosion) Pollution of waterways
Discharge of treated effluent off site	<ul style="list-style-type: none"> <li>• Permitted systems</li> </ul>	Pollution of waterways Visual amenity
Discharge of treated effluent on-site	<ul style="list-style-type: none"> <li>• Permitted systems</li> </ul>	Pollution of groundwater Visual amenity
Reuse of treated wastewater	<ul style="list-style-type: none"> <li>• Permitted reuse of water</li> <li>• Low water supply</li> <li>• Poor management by resident/land owner</li> </ul>	Pathogens Odour
Discharge of untreated sullage offsite (direct and indirect)	<ul style="list-style-type: none"> <li>• Poorly maintained systems               <ul style="list-style-type: none"> <li>○ septic tank full</li> <li>○ dispersal envelope damaged;</li> </ul> </li> <li>• Approval for off-site sullage discharge (ie pump out);</li> <li>• Systems with insufficient dispersal area/drain length to cope with wastewater volumes and poor soil absorption.</li> </ul>	Nutrients Pathogens Odour Visual amenity Oxygen depleting material Local land degradation (erosion) Pollution of waterways
Ineffective enforcement and regulation of on-site systems	<ul style="list-style-type: none"> <li>• Failure of landowners and residents to comply with Permit to Use conditions;</li> <li>• Lack of connections to sewer;</li> <li>• Ineffective Council databases to identify all systems and track compliance;</li> <li>• Lack of comprehensive education and compliance systems.</li> </ul>	Increased incidence of preventable pollution and environmental degradation Increased risks to public health Liability

## 5. Risk Analysis Methodology

---

This DWMP details an approach to the management of existing and future development of on-site domestic wastewater management systems within open, potable water supply catchments that is based on a peer reviewed scientific analysis methodology developed by industry experts and tested in two sub catchments identified by the Pilot Project Steering Committee as being high risk.

The technical papers prepared by Dr Robert Edis, Larry White, Dr Robert van de Graaff and Paul Williams can be found in Attachments 1 – 4. A more detailed account of the origins of these papers and their content can be found in the Background Report which supports this DWMP (Section 8.4).

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

**Figure 1 Our Four Stage Risk Analysis Methodology**

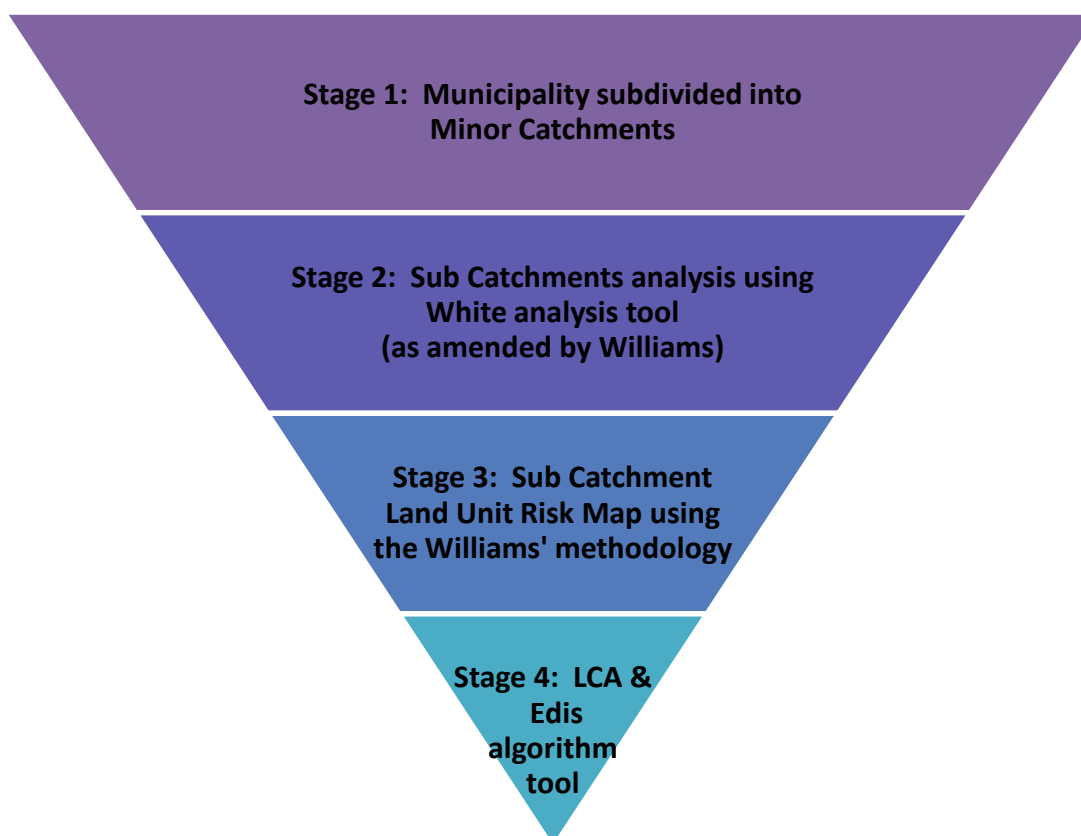
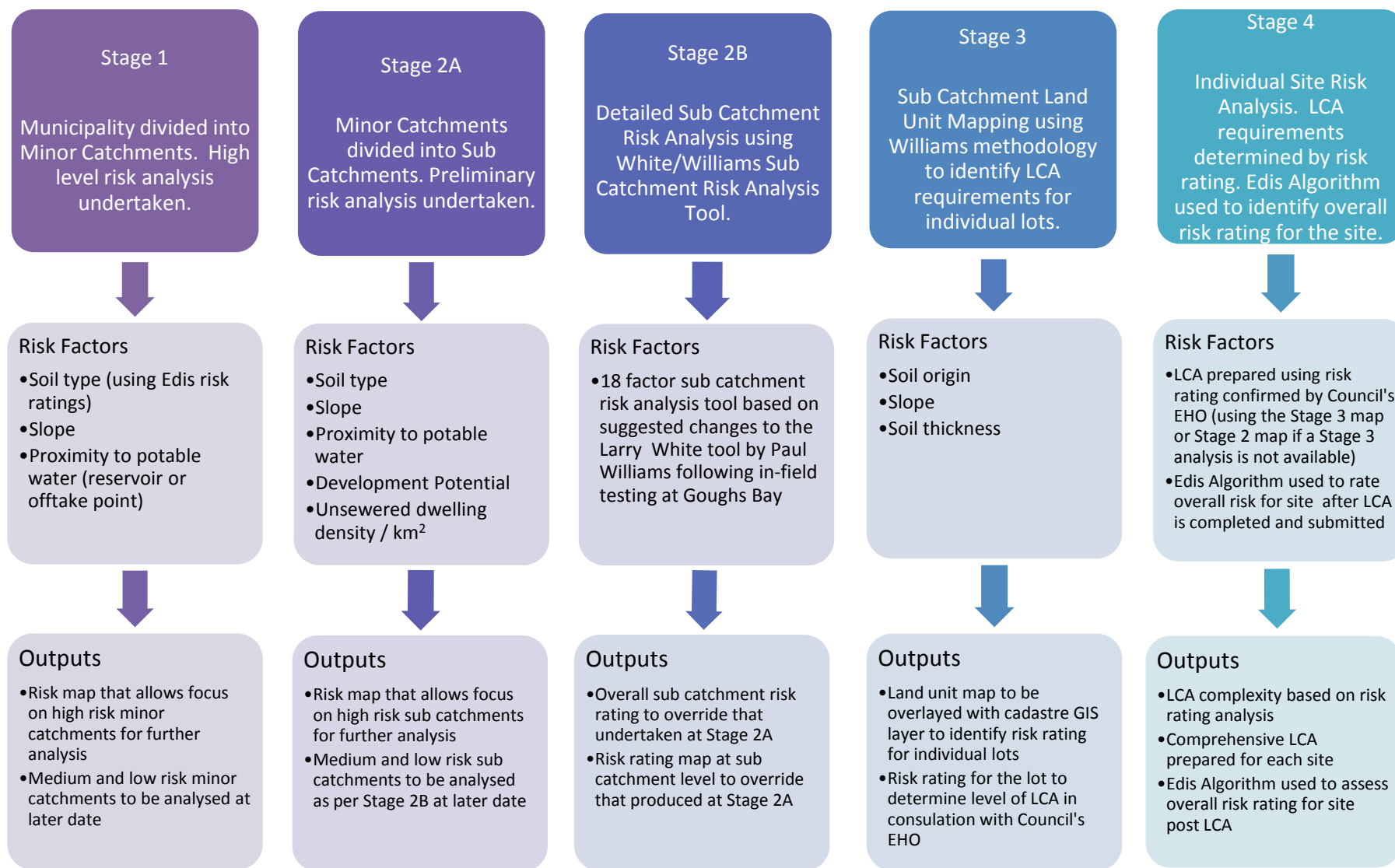


Figure 4 aims to provide an overview of how each step of the risk analysis methodology refines the risk analysis process. It also identifies the parameters applied and the outputs derived at each stage in the process.



**Figure 4 Overview of the Risk Analysis Hierarchy, Risk Parameters and Outputs**



## 5.1 Preliminary Work

The identification and analysis of risk factors is based heavily on geographical information. As such our Geographical Information Mapping System (GIS) has been 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 this DWMP, including:

- the purchase, and integration, of 1 metre contour mapping on our GIS system;
- plotting of all existing dwellings outside sewerage areas;
- mapping of declared special water supply catchment boundaries;
- integration and manipulation of DPI/DEPI soil type data;
- integration and refinement of DEPI tri-level waterway hierarchy data for rivers, creeks and unnamed waterways (including discussions with the GBCMA as to whether or not we had captured all named waterways);
- collation of reservoir, township wastewater management plants and potable water offtake points from GMW and GVW;
- analysis of 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;
- importation of on-site wastewater approvals (and their location) issued by Council since 1995 into our GIS mapping system.

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

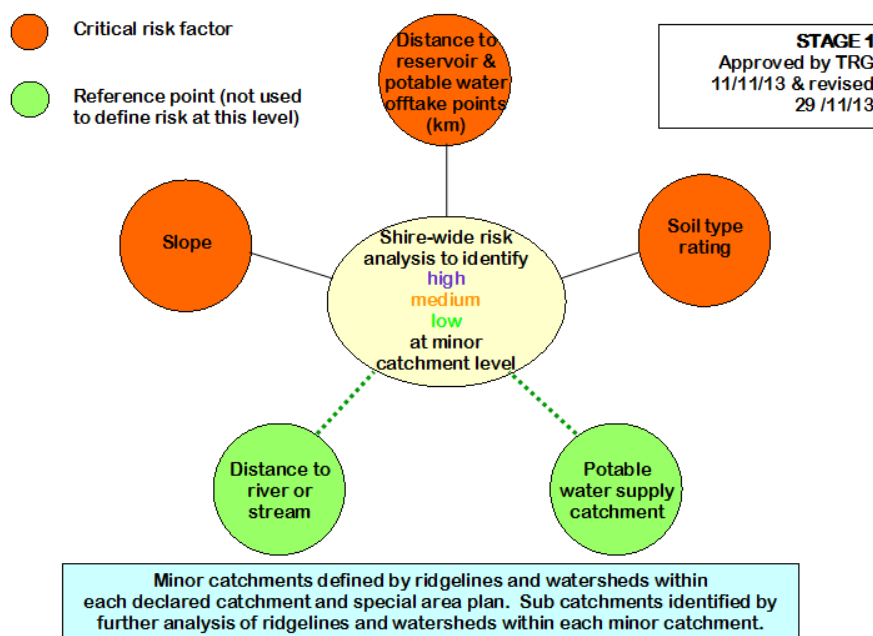
The Technical Reference Group, after considering the original Edis and White Discussion Paper (November 2012) agreed that the first step in the risk analysis process was a shire-wide analysis. To this end a discussion around the factors of the sub catchment risk analysis tool was held to identify the key risk factors which would be essential in identifying risk levels at a large geographical scale.

The conclusion was that the following three key factors be mapped and overlaid to identify risk across the municipality (refer to Figure 2):

- distance to reservoir or potable water offtake point;
- soil type; and
- slope.

Two other factors were mapped on a shire wide scale to provide a broader context for this risk mapping exercise; including named streams and rivers sourced from DEPI and also the declared special water supply catchment boundaries.

**Figure 2 Stage 1 Shire-Wide Risk Factors Identified by the TRG**



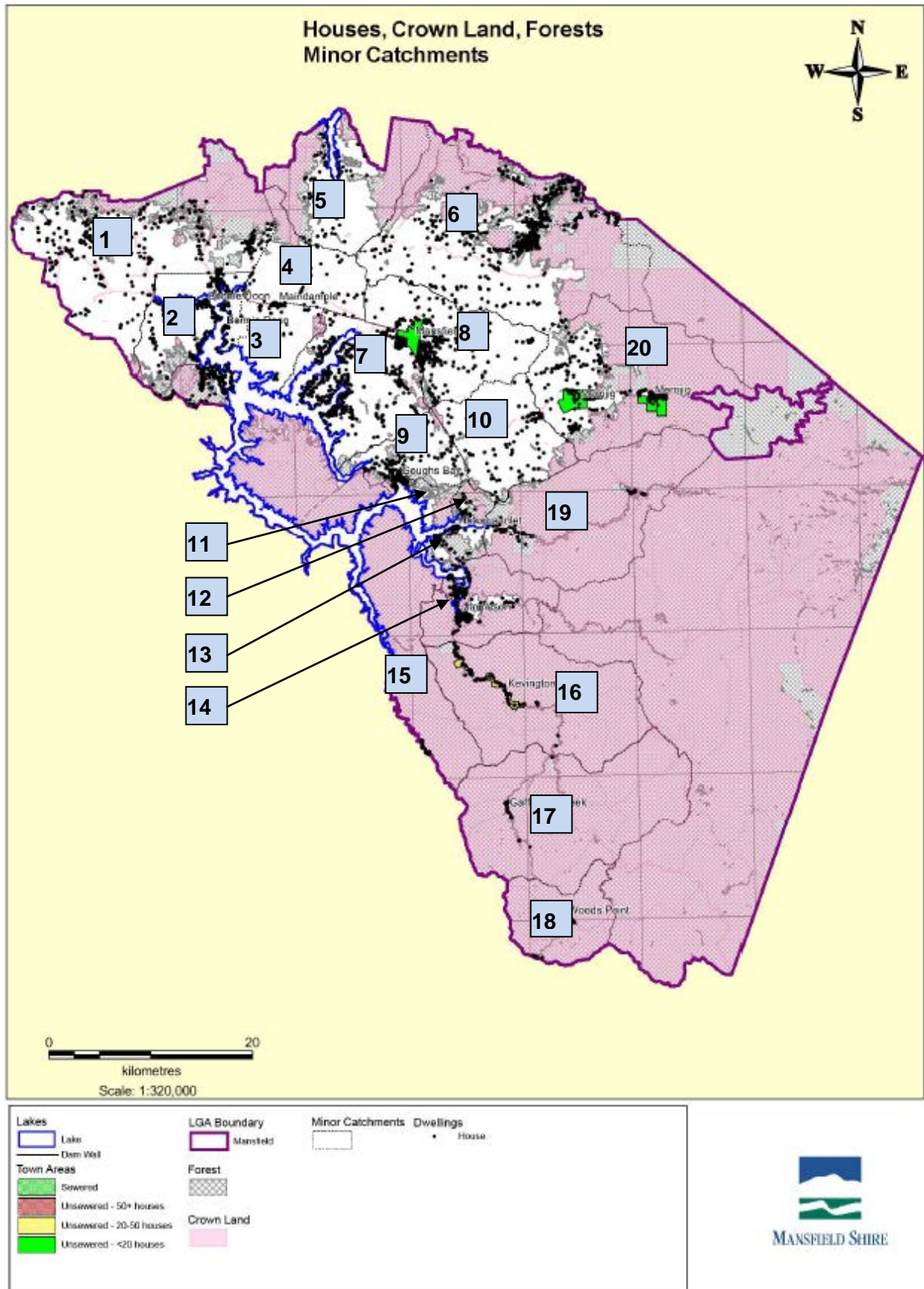
Following this discussion an analysis of topography, watersheds for major rivers and catchment boundaries was undertaken to divide the municipality into manageable land units so that the risk mapping could commence.

This resulted in the subdivision of the shire into twenty sub catchments as depicted in Map 1. Please note that the area of land to the west of the Delatite arm of Lake Eildon 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 – Mairdample	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 and Potable Water Offtake Point

Mapping data was derived from VMHYDRO->HY\_WATER\_AREA\_POLYGON and is all water areas with a type of wb\_lake (ie water body – lake). The GWV 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

\* Please note that the November 2013 version of the Edis-White version was used for this parameter and the TRG met on 11 November 2013 to develop the Minor Catchment risk analysis methodology. In January 2014 Edis and White amended this table to change this parameter after further discussion and feedback from peers and other experts.

### 5.2.2 Minor Catchment Risk Factor 2 – Slope

Slope data was derived from the 10 – 20m elevation data (VMELEV-> 10 – 20m contours) 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 (ie 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 Technical Reference Group are as follows:

Risk Factor	Low (1)	Medium (2)	High (3)
Slope	Grid points with median slopes < or = to 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 Ferosols Dermosols	Vertosols Kurosols Kandosols Rudosols	Anthoposols Organosols Podosols Hydosols Sodosols Calcarosols Tenosols

#### 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.

### 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 DWMP will focus 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:

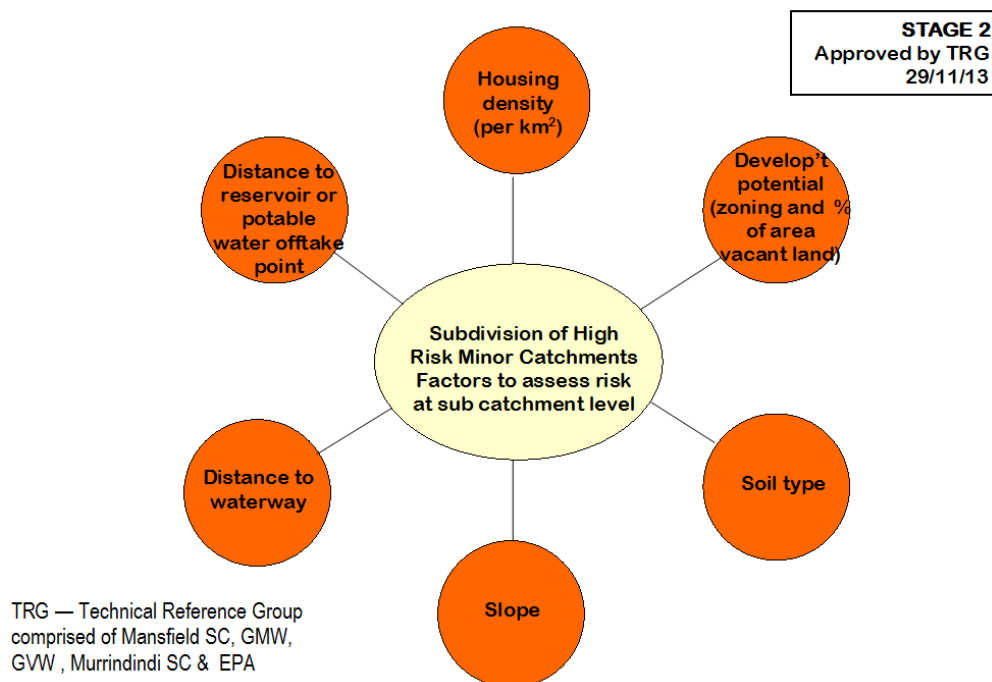
- distance to reservoir or potable water offtake point;
- distance to waterway;
- slope;
- soil type;
- Mansfield Planning Scheme zoning; and
- housing density.

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 (ie 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 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 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/km<sup>2</sup> however within the unsewered township boundaries it is 367 dwellings/km<sup>2</sup>).

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



The risk parameters for the five factors used to analyse our Sub Catchments, as per Table 4 from Edis-White, are defined as follows:

**Table 6 Stage 2A Sub Catchments Risk Factors and Parameters Identified by the TRG**

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 Ferralsols Dermosols	Vertosols Kurosols Kandosols Rudosols	Anthosols 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 <sup>2</sup> of total sub catchment area or where applicable unsewered township)	< 20 / km <sup>2</sup>	20 – 40 km <sup>2</sup>	> 40 / km <sup>2</sup>



### 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:

- i. 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;
- ii. 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
- iii. 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:

- i. Rainfall should be based on the 9<sup>th</sup> 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.
- ii. Dr Robert Van de Graaff has demonstrated that renovation (ie 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.

- iii. 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 has amended the White sub catchment risk analysis tool as per Table 7. This revised sub catchment analysis tool will be used to analyse sub catchment risk by Council in the implementation of this DWMP.

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

	Low	Medium	High
<b>The risk the sub-catchment may pose to the quality of reservoir waters</b>			
Distance to reservoir	> 1km	500m – 1km	< 500m
<b>The risk posed from the present unsewered development in the sub-catchment to water quality in the existing stream</b>			
Unsewered dwelling density (dwellings / km <sup>2</sup> 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	600 - 900	> 900
<b>The risk posed from natural and non residential development situations in the sub-catchment to water quality in the existing stream</b>			
Area of bush/forest (% of total area of sub catchment)	> 30 %	5 – 30 %	< 5 %
Drainage line length / km <sup>2</sup> (sourced from DEPI maps)	< 1 km	1 – 3 km	> 3 km
Outflow frequency of existing stream	Rare (Other drainage line with no bed or banks)	Seasonal (Ephemeral waterway)	Constant (Permanent waterway)
<b>The risk posed from natural and non residential development situations in the sub-catchment to water quality in the existing stream</b>			
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 (ie in excess of 500 litres of effluent/day)	No		Yes
Other unsewered infrastructure (eg 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 (and 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 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 30 - 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 (ie soil tests and on-site hydraulic tests) and the field work in the Goughs Bay and Howes Creek sub catchments commissioned by MSC.

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 DWMP to identify the LCA requirements for an individual site (see Section 7). 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 analysis 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 that the soil is not appropriate for a 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 land unit rating = 1**

**Medium risk land unit rating = 2**

**High risk land unit rating = 3.**

## 5.6 Stage 4 An 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 (LCA requirements for high, medium and low risk areas will be outlined in Section 7). 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 factors (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 <sup>2</sup> )	< 20 / km <sup>2</sup>	20 – 40 / km <sup>2</sup>	> 40 / km <sup>2</sup>
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:***

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

***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)*

## 5.7 Recommendations Arising from the Risk Analysis Methodology

The recommendations below outline how this DWMP will implement the risk methodology developed by our experts. Linkages to actions in the DWMP Action and Resource Plan are also provided.

### Recommendations:

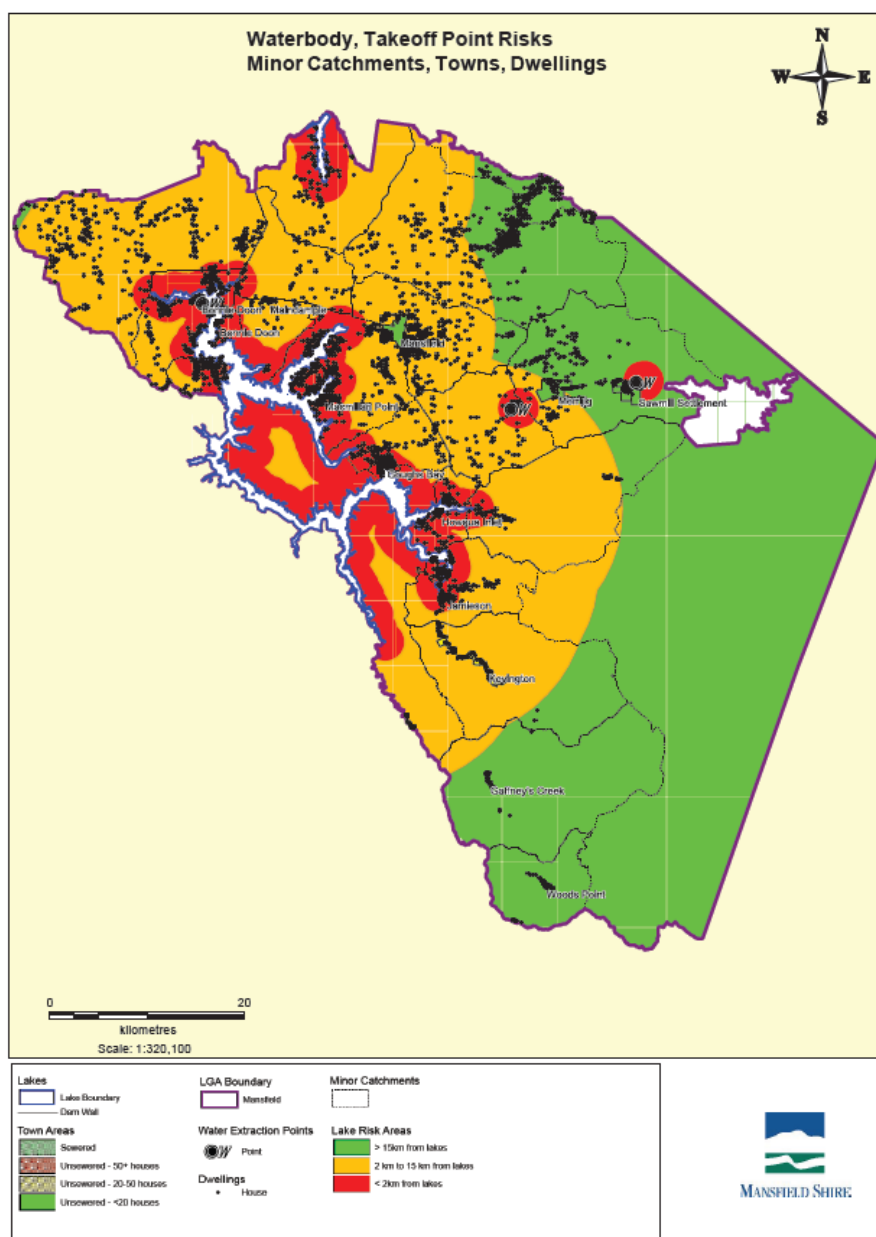
1. All twenty two sub catchments should be analysed as per the Stage 2B methodology over the life of this DWMP using Table 7, with attention first being paid to the completion of this analysis for high risk sub catchments (Action 1.1.1);
2. Once a Stage 2B risk analysis has been completed this overrides the Stage 2A risk rating given the former is a more comprehensive analysis of a broader range of risk factors operating across the sub catchment. (The initial application of the five risk factors by the TRG was a means of progressing the DWMP while the White Sub Catchment analysis tool was tested in the field by Paul Williams. In an ideal world the Stage 2 sub catchment risk analysis would not have been undertaken until the Williams work was completed, however the timelines for this Pilot Project DWMP did not allow for this to occur);
3. Once Recommendation 1 is implemented the high risk sub catchments (thirteen in total) should be further analysed by completing a Stage 3 analysis using the methodology outlined in Section 5.5 (see Action 1.2.1);
4. Once Recommendation 3 is complete, attention should be focussed on a Stage 3 risk analysis for medium risk sub catchments once all high risk sub catchment work has been completed (Action 1.2.2);
5. The Stage 3 Land Unit Risk Map is to be used by Council's EHO to determine the risk rating applicable to an individual site for the purpose of identifying the level of LCA required. For example if the Stage 3 Land Unit Map for Goughs Bay identifies a site to be high risk then a LCA to the high risk standard (as per Section 7) is required;
6. If a Stage 3 Land Unit Risk Map is not available for the sub catchment, then the risk rating applied at Stage 2 is to be applied by Council's EHO for the purpose of identifying the level of LCA required;
7. Where the Stage 3 Land Unit Risk Map shows that an individual site contains two different risk ratings Council should apply the higher risk rating for the purpose of identifying the complexity of LCA required (eg if a site has a low and medium rating then the medium risk level LCA is required);
8. The Stage 4 risk analysis methodology outlined in Section 5.6 should be used to assess the overall risk posed by each individual site where a new on-site system, or upgraded system, is proposed (Action 4.1.1);
9. Given the success of testing the Edis Algorithm at 40 sites across Mansfield Shire, the algorithm be used to rate the overall risk of a proposed on-site domestic wastewater management system adversely affecting potable water quality within a declared special water supply catchment. Each LCA should be accompanied by the final risk rating for the individual site using the Edis Algorithm (see Action 4.1.1);
10. As each individual site is rated using the Edis Algorithm, the final risk rating should be recorded on a Council database and mapped on the GIS as a means of building a more detailed risk profile within each sub catchment to inform the review of the DWMP (see Action 4.1.3);
11. Regardless of the risk analysis rating derived from Stages 3 and 4 Council should apply a Compliance and Monitoring system commensurate with the Stage 2 Sub Catchment risk rating given the sub catchment context is most appropriate for these programs.

# 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 DWMP.

## 6.1 Stage 1 - Minor Catchment Risk Analysis Findings

**Map 2 Distance to Reservoir/Potable Offtake Point Risk Factor**

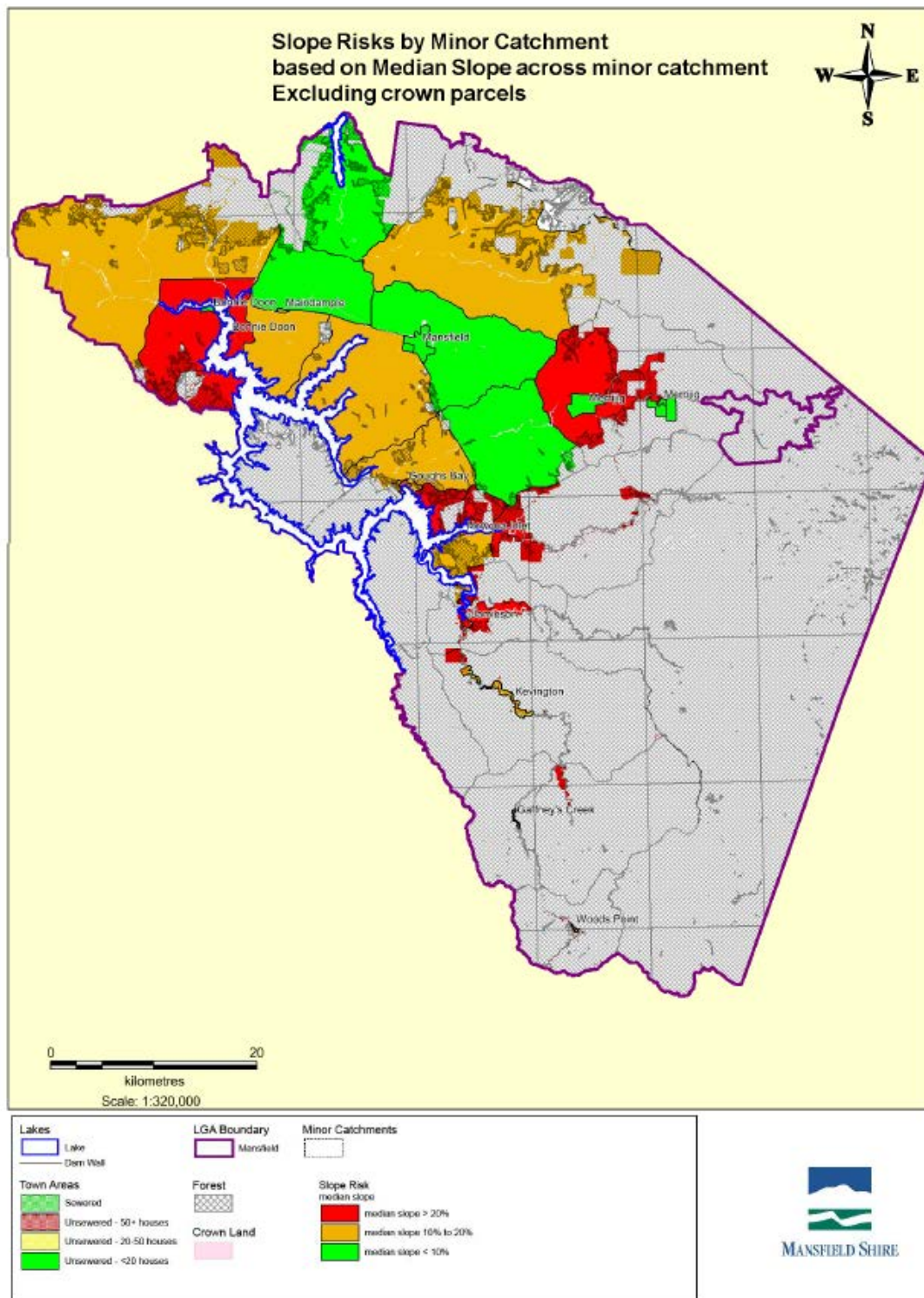


Source: Mansfield Shire Geographical Information System

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 plane, 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

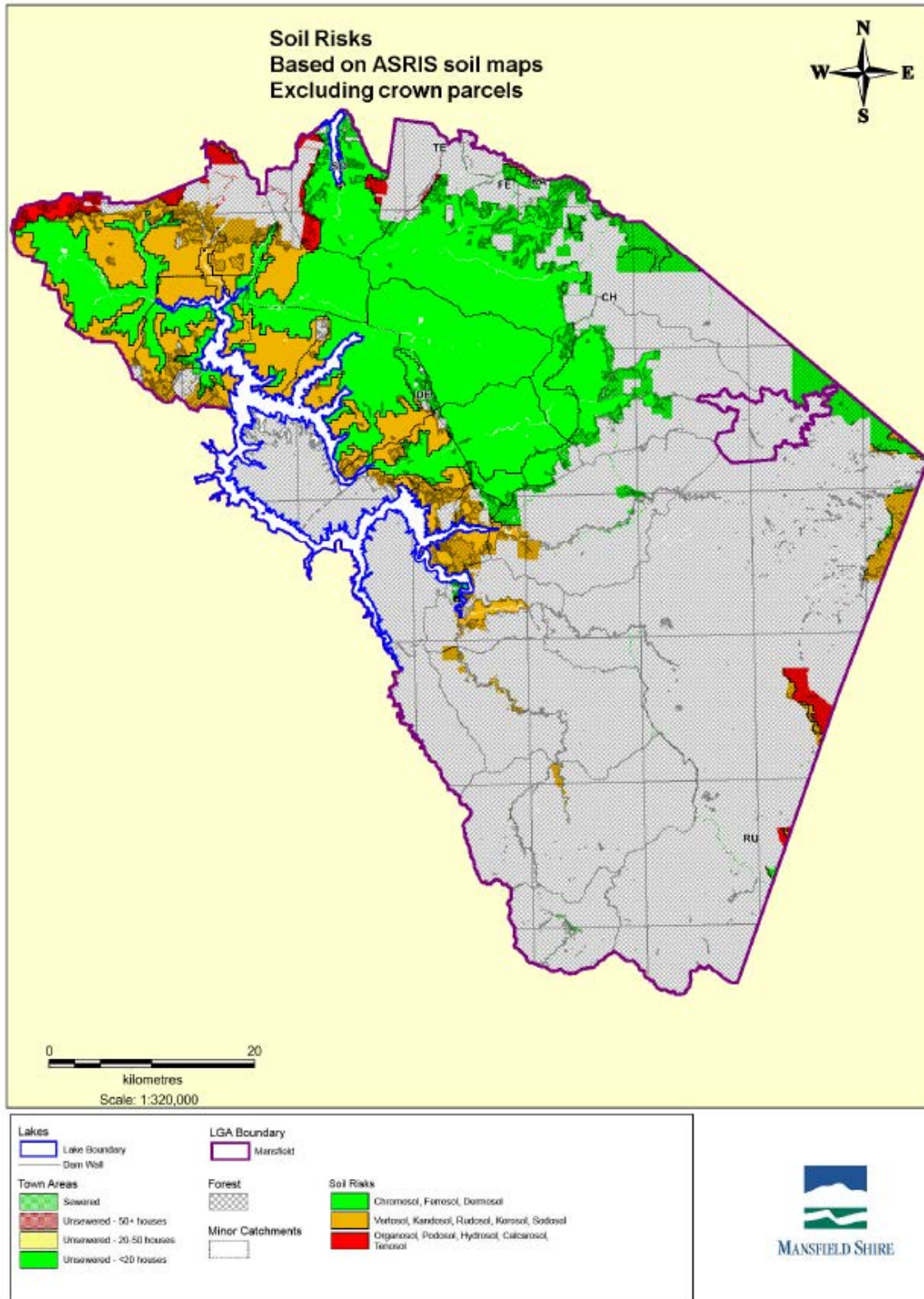


Source: Mansfield Shire Geographical Information System



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 plane, 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



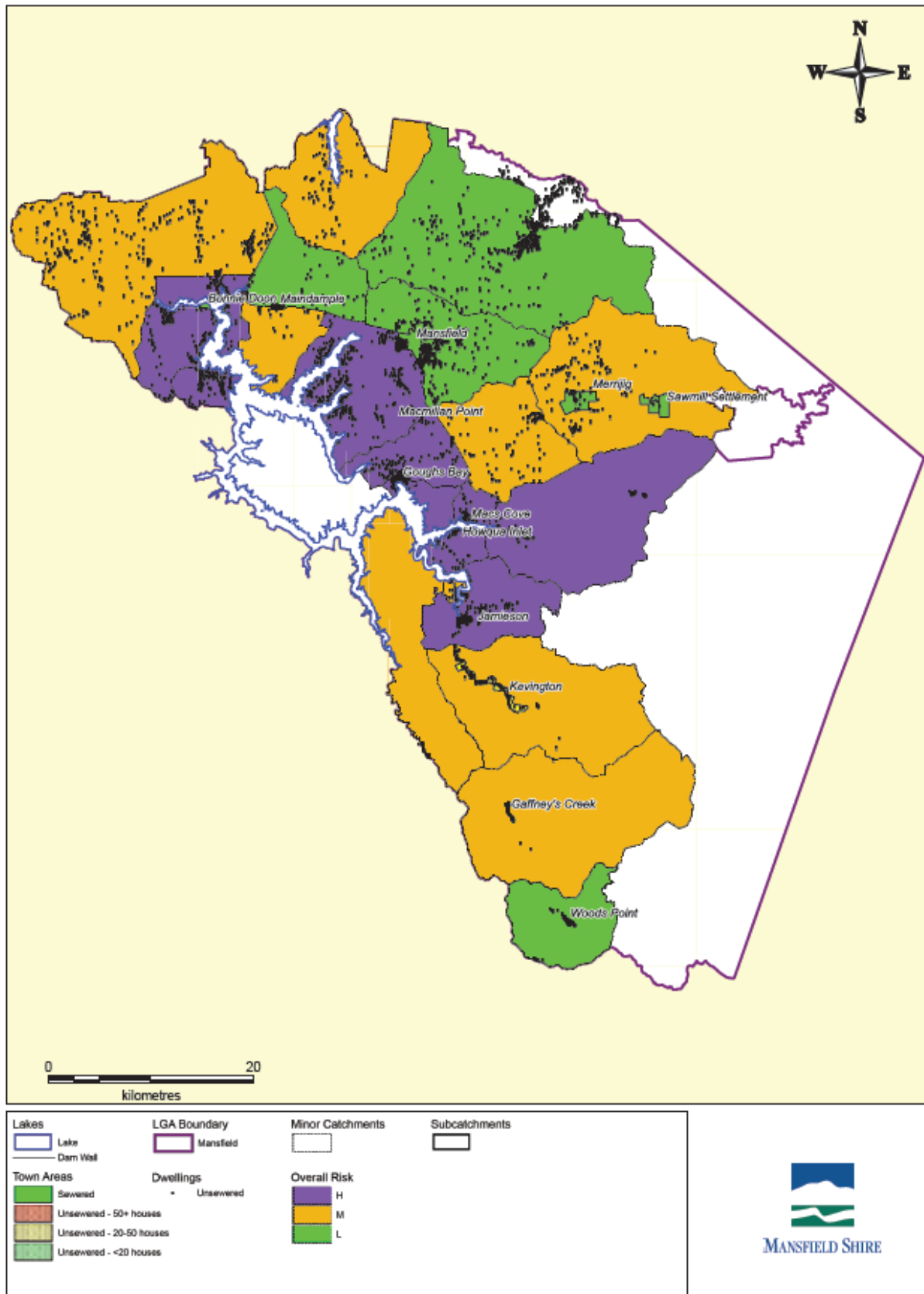
Source: Mansfield Shire Geographical Information System

The three risk factors were overlayed and applied across the municipality and rated in accordance to 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
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



©Mansfield Shire Council 2014 v9 06.05.14

Source: Mansfield Shire Council Geographical Information System

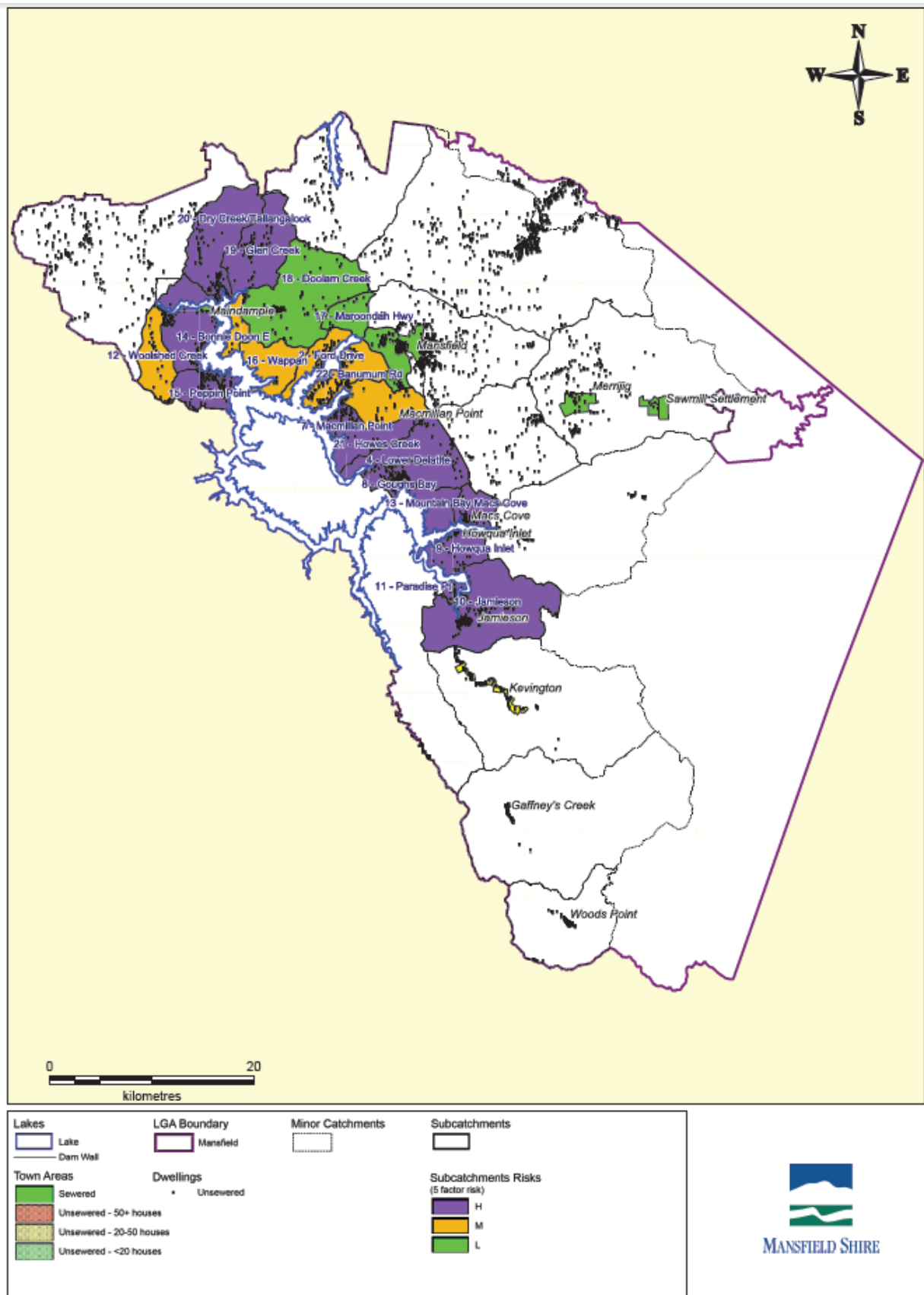
## 6.2 Stage 2A – Sub Catchment Risk Analysis Findings

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 8 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
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 DWMP.

**Table 12 Stage 2B Sub Catchment Risk Analysis – Goughs Bay**

Risk Factor	Rating
Distance to reservoir	3
Unsewered dwelling density (dwellings / km <sup>2</sup> 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 <sup>2</sup> (sourced from DEPI 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 (eg commercial land uses)	3
Intensive animal industry	1
<b>Total</b>	<b>42</b>

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

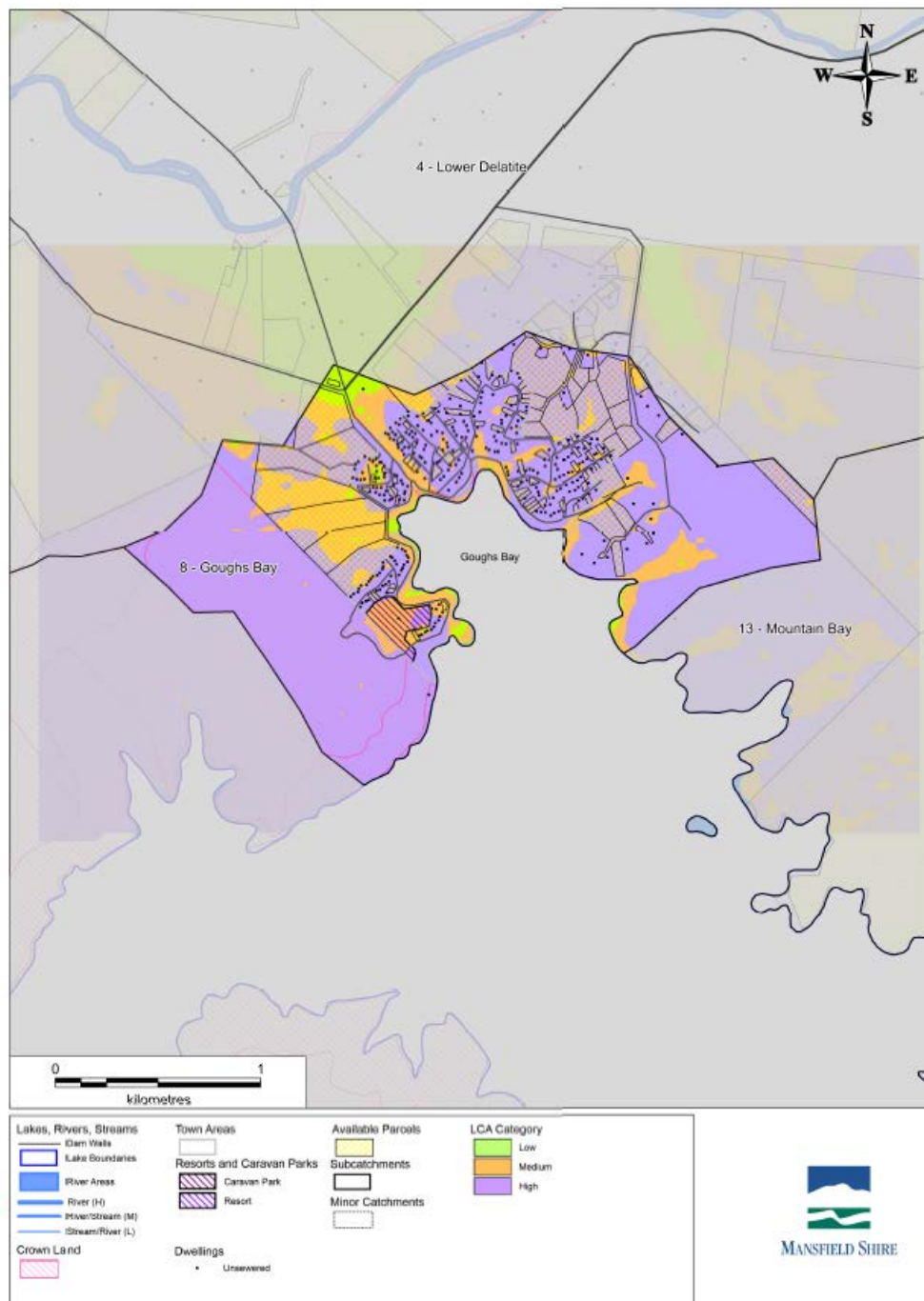
**Overall risk rating value for the Goughs Bay Sub Catchment = 42**

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**



©Mansfield Shire Council 2014 v9 29.05.14

## 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 (pg 10). 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	RSOIL	RRIVER	RSTREAM	RDRAIN	RLLOT SIZE	RDENSITY	RLCA	RSYS FAIL	RN
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 DWMP Risk Management Strategies

The purpose of this Section of the DWMP 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.

The ratings derived from the Stage 2A Sub Catchment Risk Analysis are provided as a means of clarifying the LCA requirements for land within each sub catchment prior to a Stage 2B and Stage 3 Land Unit Analysis Map being prepared by Council (which will progressively occur over the five year life of this DWMP as per Actions 1.1.1, 1.2.1 and 1.2.2 of the Action and Resource Plan).

An analysis of the key domestic wastewater and water quality issues is provided, along with the key management strategies to be implemented over the life of this DWMP to address them.

### 6.6.1 Sub Catchment 1 Burnt Creek (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	35	No. of on-site systems	48
< 800 m <sup>2</sup>	-	Age of on-site systems	21 pre 1990 systems 13 1990 – 2000 systems 14 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	18		
> 40 ha	17		
Total lots in sub catchment	107	Area of sub catchment (km <sup>2</sup> )	26.5
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 1.8 Unsewered township dwelling density N/A
Non resident ratepayers in corresponding 2011 Census Statistical District (Mairdample)	44%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	2	3	1	3	10

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

## Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Burnt Creek, a medium level river/creek according to DEPI, flows directly into Lake Eildon at the sub catchment's western boundary;
- Presence of pre 1990 septic systems (particularly split systems only treating blackwater);
- Proximity of some vacant residential lots to Lake Eildon, although all are over 4000m<sup>2</sup>.

## Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area as per Recommendation 15 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.2 Sub Catchment 2 Ford Drive (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	14	No. of on-site systems	38
< 800 m <sup>2</sup>	-	Age of on-site systems	Majority pre 1990 9 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	4		
> 40 ha	10		
Total lots in sub catchment	72	Area of sub catchment (km <sup>2</sup> )	13
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 2.9 Unsewered township dwelling density N/A
Non resident ratepayers in corresponding 2011 Census Statistical District (Mairdample)	44%	Unsewered caravan park or resort	No

## Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	2	3	2	1	9

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Rural Living Zone 1 area adjacent to Lake Eildon;
- Presence of pre 1990 septic systems (particularly split systems only treating blackwater);
- Proximity of some vacant residential lots to Lake Eildon, although all are over 4000m<sup>2</sup>.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area as per Recommendation 15 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the 2013 EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.3 Sub Catchment 3 Owens Creek (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	59	No. of on-site systems	84
< 800 m <sup>2</sup>	3	Age of on-site systems	46 pre 1990 11 2000 – 2004 systems 27 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	1		
2001 m <sup>2</sup> – 40 ha	47		
> 40 ha	8		
Total lots in sub catchment	180	Area of sub catchment (km <sup>2</sup> )	15.7
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 5.30 Unsewered township dwelling density N/A
Non resident ratepayers in corresponding 2011 Census Statistical District (Part Maindample and Part Mansfield)	16 – 44%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	1	2	1	3	8

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Owens Creek (which feeds into Lake Eildon) is located in the northern part of the sub catchment, a medium river/stream according to DEPI. 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 2000m<sup>2</sup>.

#### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the low risk round of inspections (Action 5.1.9);
- LCA required for a low risk area as per Recommendation 16 (Section 7);

- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- 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 (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

#### 6.6.4 Sub Catchment 4 Lower Delatite

Total developable vacant lots	60	No. of on-site systems	101
< 800 m <sup>2</sup>	2	Age of on-site systems	Majority pre 1990 22 post 2005 systems
801 – 1000 m <sup>2</sup>	1		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	28		
> 40 ha	29		
Total lots in sub catchment	198	Area of sub catchment (km <sup>2</sup> )	49.4
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 2.0 Unsewered township dwelling density N/A
Non resident ratepayers in corresponding 2011 Census Statistical District (Goughs Bay)	64%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	2	3	1	3	11

#### Stage 2B Land Capability Assessment Requirement: High

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- The Delatite River bisects the sub catchment (which feeds into Lake Eildon), a high level river according to DEPI. 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;

- Presence of pre 1990 septic systems (particularly split systems only treating blackwater), many of which are located on lots adjoining the Delatite;
- High proportion of holiday homes and significant seasonal increases in population.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.5 Sub Catchment 5 Macs Cove

Total developable vacant lots	46	No. of on-site systems	137
< 800 m <sup>2</sup>	2	Age of on-site system	Majority pre 1990 11 post 2005 systems (most of these on large lots outside the township)
801 – 1000 m <sup>2</sup>	15		
1001 – 2000 m <sup>2</sup>	25		
2001 m <sup>2</sup> – 40 ha	-		
> 40 ha	4		
Total lots in sub catchment	196	Area of sub catchment (km <sup>2</sup> )	12.7
		Area of unsewered township (km <sup>2</sup> )	0.3
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 10.75 Unsewered township dwelling density 367
Non resident ratepayers in corresponding 2011 Census Statistical District (Howqua/Macs Cove)	58%	Unsewered caravan park or resort	No

## Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	3	3	14

## Stage 2B Land Capability Assessment Requirement: High

### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- A low level stream/river, as identified by DEPI, bisects the sub catchment and runs directly into Lake Eildon;
- The township is zoned 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 1000m<sup>2</sup>;
- 46 vacant infill lots zoned for residential development, 32 of which are under 2000m<sup>2</sup>;
- High proportion of holiday homes and significant seasonal increases in population.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Improved stormwater management (Action 7.3.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.6 Sub Catchment 6 Bonnie Doon

Total developable vacant lots	36	No. of on-site systems	81
< 800 m <sup>2</sup>	1	Age of on-site systems	Majority pre 1990 The Bonnie Doon township and an area around Dawn Crescent, are sewerred
801 – 1000 m <sup>2</sup>	1		
1001 – 2000 m <sup>2</sup>	1		
2001 m <sup>2</sup> – 40 ha	9		
> 40 ha	24		
Total lots in sub catchment	348	Area of sub catchment (km <sup>2</sup> )	35.3
		Area of unsewered township (km <sup>2</sup> )	N/A (all properties in township area are on sewer)
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 2.29 Unsewered township dwelling density N/A
Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	Yes (2)

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	1	2	11

#### Stage 2B Land Capability Assessment Requirement: High

##### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Sewered areas zoned 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.

##### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);



- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Work with Project Partners to identify whether or not the extension of the township sewer, which is directly to the east of this sub catchment, is a viable alternative to on-site systems particularly for the rural living subdivision to the west of Bonnie Doon (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.7 Sub Catchment 7 Macmillan Point (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	18	No. of on-site systems	97
< 800 m <sup>2</sup>	2	Age of on-site systems	Majority pre 1990 12 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	1		
2001 m <sup>2</sup> – 40 ha	15		
> 40 ha	-		
Total lots in sub catchment	117	Area of sub catchment (km <sup>2</sup> )	5.6
		Area of unsewered township (km <sup>2</sup> )	0.04
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 17.3 Unsewered township dwelling density 900
Non resident ratepayers in corresponding 2011 Census Statistical District (Mansfield)	16%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	2	3	3	2	12

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- 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 1000m<sup>2</sup> with a high proportion of ageing on-site systems adjacent to Lake Eildon;
- High proportion of holiday homes and significant seasonal increases in population.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA for a high risk area required as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.8 Sub Catchment 8 Goughs Bay (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	100	No. of on-site systems	301
< 800 m <sup>2</sup>	11	Age of on-site systems	Majority pre 1990 31 post 2005 systems
801 – 1000 m <sup>2</sup>	16		
1001 – 2000 m <sup>2</sup>	39		
2001 m <sup>2</sup> – 40 ha	36		
> 40 ha	-		
Total lots in sub catchment	401	Area of sub catchment (km <sup>2</sup> )	3.2
		Area of unsewered township (km <sup>2</sup> )	
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 93.7 Unsewered township dwelling density 401
Non resident ratepayers in corresponding 2011 Census Statistical District (Goughs Bay )	64%	Unsewered caravan park or resort	Yes (licensed by the EPA)

## Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	2	3	3	3	13

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Township zoned 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 1000m<sup>2</sup>;
- 100 vacant infill lots zoned for residential development, 64 of which are under 2000m<sup>2</sup>;
- High proportion of holiday homes and significant seasonal increases in population.
- Unsewered caravan park.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Goughs Bay should be the first sub catchment to be the focus for the Monitoring and Compliance program (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable (Actions 5.1.5 and 5.1.6);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Work with Project Partners to identify alternative options to traditional reticulated sewer (Action Strategies 7.1 and 7.2);
- Improved stormwater management (Action 7.3.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.9 Sub Catchment 9 Howqua Inlet

Total developable vacant lots	19	No. of on-site systems	144
< 800 m <sup>2</sup>	1	Age of on-site systems	Majority pre 1990 15 post 2005 systems
801 – 1000 m <sup>2</sup>	5		
1001 – 2000 m <sup>2</sup>	9		
2001 m <sup>2</sup> – 40 ha	-		
> 40 ha	4		
Total lots in sub catchment	200	Area of sub catchment (km <sup>2</sup> )	19.5
		Area of unsewered township (km <sup>2</sup> )	0.18
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 7.4
			Unsewered township dwelling density 594
Non resident ratepayers in corresponding 2011 Census Statistical District (Howqua/Macs Cove)	58%	Unsewered caravan park or resort	Yes

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	2	3	3	1	11

#### Stage 2B Land Capability Assessment Requirement: High

##### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Township zoned 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 1000m<sup>2</sup>;
- 15 vacant infill lots zoned for residential development under 1000m<sup>2</sup>;
- High proportion of holiday homes and significant seasonal increases in population.

##### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);

- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Improved stormwater management (Action 7.3.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.10 Sub Catchment 10 Jamieson

Total developable vacant lots	144	No. of on-site systems	302
< 800 m <sup>2</sup>	21	Age of on-site systems	Majority pre 1990 in the township area 34 post 2005 systems
801 – 1000 m <sup>2</sup>	15		
1001 – 2000 m <sup>2</sup>	41		
2001 m <sup>2</sup> – 40 ha	65		
> 40 ha	2		
Total lots in sub catchment	435	Area of sub catchment (km <sup>2</sup> )	77.2
		Area of unsewered township (km <sup>2</sup> )	1.3
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 3.9
			Unsewered township dwelling density 160
% Non resident ratepayers in corresponding 2011 Census Statistical District (Jamieson to Woods Point)	65%	Unsewered caravan park or resort	Yes

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	3	3	14

### Stage 2B Land Capability Assessment Requirement: High

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- The Jamieson and the Goulburn Rivers join to the west of Jamieson township, identified as high level rivers by DEPI, 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 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 1000m<sup>2</sup>;
- 114 vacant lots zoned for residential development, 77 of are lots less than 1000m<sup>2</sup>;
- High proportion of holiday homes and significant seasonal increases in population;
- Unsewered caravan park.

### **Key Management Strategies and Actions**

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Improved stormwater management (Action 7.3.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.11 Sub Catchment 11 Paradise Point

Total developable vacant lots	8	No. of on-site systems	60
< 800 m <sup>2</sup>	4	Age of on-site systems	Majority pre 1990 4 post 2005 systems
801 – 1000 m <sup>2</sup>	4		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	-		
> 40 ha	-		
Total lots in sub catchment	67	Area of sub catchment (km <sup>2</sup> )	2.8
		Area of unsewered township (km <sup>2</sup> )	0.1
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 21
			Unsewered township dwelling density 412
% Non resident ratepayers in corresponding 2011 Census Statistical District (Jamieson to Woods Point)	65%	Unsewered caravan park or resort	Yes

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	2	3	3	2	11

#### Stage 2B Land Capability Assessment Requirement: High

##### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- 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 1000m<sup>2</sup> at Paradise Point;
- High proportion of holiday homes and significant seasonal increases in population;
- Unsewered caravan park and Brewery.

##### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);

- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.12 Sub Catchment 12 Woolshed Creek

Total developable vacant lots	11	No. of on-site systems	30
< 800 m <sup>2</sup>	-	Age of on-site systems	Majority pre 1990 9 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	1		
> 40 ha	10		
Total lots in sub catchment	59	Area of sub catchment (km <sup>2</sup> )	23
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 1.3 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	2	1	2	10

#### Stage 2B Land Capability Assessment Requirement: Medium

##### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Woolshed Creek bisects the northern half of the sub catchment, a medium level stream according to DEPI. 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 4000m<sup>2</sup> and located within a Farming Zone;
- Some unsewered dwellings will be holiday homes and therefore subject to seasonal use only.



## Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area in accordance with Recommendation 15 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.13 Sub Catchment 13 Mountain Bay

Total developable vacant lots	17	No. of on-site systems	1
< 800 m <sup>2</sup>	-	Age of on-site systems	All pre 1990
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	8		
> 40 ha	9		
Total lots in sub catchment	18	Area of sub catchment (km <sup>2</sup> )	15
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 0.7 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Goughs Bay)	64%	Unsewered caravan park or resort	No

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	1	3	12

### Stage 2B Land Capability Assessment Requirement: High

## **Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks**

- 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.

## **Key Management Strategies and Actions**

- Refer to the following when making decisions about future wastewater management strategies:
  - 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.
- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with the land owner to bring the single existing ageing system into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Discuss future wastewater management strategies for new development with the land owner and Project Partners;
- Education of future land owners, residents and visitors (Action Strategy 6.3).

### 6.6.14 Sub Catchment 14 Bonnie Doon East

Total developable vacant lots	12	No. of on-site systems	56
< 800 m <sup>2</sup>	3	Age of on-site systems	Majority pre 1990 Sewered subdivision in the north west of the sub catchment 7 post 2005 systems
801 – 1000 m <sup>2</sup>	2		
1001 – 2000 m <sup>2</sup>	1		
2001 m <sup>2</sup> – 40 ha	2		
> 40 ha	4		
Total lots in sub catchment	186	Area of sub catchment (km <sup>2</sup> )	10
		Area of unsewered township (km <sup>2</sup> )	0.1
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 9.5
			Unsewered township dwelling density 511
% Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	Yes

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating*	Development potential rating	Total
2	2	3	2	1	10

\* Given the unsewered Residential 1 zoned area represents a very small portion of the sub catchment, the presence of a sewerage Residential 1 zoned area and the overall unsewered density of 9.5 dwellings per km<sup>2</sup>, a medium risk rating has been applied to unsewered dwelling density.

#### Stage 2B Land Capability Assessment Requirement: Medium

##### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Two areas of Residential 1 zoned land immediately adjacent to Lake Eildon – one area is sewerage 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 1000m<sup>2</sup> 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 sewerage.

## Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area as per Recommendation 15(Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- 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 Residential 1 subdivision in James Street (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.15 Sub Catchment 15 Peppin Point

Total developable vacant lots	42	No. of on-site systems	106
< 800 m <sup>2</sup>	-	Age of on-site systems	Majority pre 1990 21 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	39		
> 40 ha	3		
Total lots in sub catchment	151	Area of sub catchment (km <sup>2</sup> )	20.5
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 5.2
			Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	Yes

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	1	3	12

## **Stage 2B Land Capability Assessment Requirement: High**

### **Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks**

- Around 70% of land is zoned Rural Living 1, with a number of lots 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;
- Unsewered caravan park.

### **Key Management Strategies and Actions**

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.16 Sub Catchment 16 Wappan

Total developable vacant lots	18	No. of on-site systems	5
< 800 m <sup>2</sup>	-	Age of on-site systems	All pre 1990
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	-		
> 40 ha	18		
Total lots in sub catchment	36	Area of sub catchment (km <sup>2</sup> )	22.3
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 0.22 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Part Bonnie Doon and part Maindample)	44 – 68%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	3	1	1	10

#### Stage 2B Land Capability Assessment Requirement: Medium

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- A low order stream/river (according to DEPI) 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).

#### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area as per Recommendation 15 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);

- 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 Residential 1 subdivision in James Street (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.17 Sub Catchment 17 Maroondah Highway

Total developable vacant lots	4	No. of on-site systems	12
< 800 m <sup>2</sup>	-	Age of on-site systems	10 pre 1990 systems 2 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>			
2001 m <sup>2</sup> – 40 ha	-		
> 40 ha	4		
Total lots in sub catchment	50	Area of sub catchment (km <sup>2</sup> )	13.5
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 0.9 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Mairdample)	44%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	1	3	1	1	7

#### Stage 2B Land Capability Assessment Requirement: Low

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Presence of pre 1990 septic systems (particularly split systems only treating blackwater).

#### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the low risk round of inspections (Action 5.1.9);
- LCA required for a low risk area as per Recommendation 16 (Section 7);

- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- 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 (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.18 Sub Catchment 18 Doolam Creek

Total developable vacant lots	86	No. of on-site systems	95
< 800 m <sup>2</sup>	7	Age of on-site systems	Majority pre 1990 29 post 2005 systems
801 – 1000 m <sup>2</sup>	2		
1001 – 2000 m <sup>2</sup>	19		
2001 m <sup>2</sup> – 40 ha	10		
> 40 ha	48		
Total lots in sub catchment	449	Area of sub catchment (km <sup>2</sup> )	76.5
		Area of unsewered township (km <sup>2</sup> )	0.3
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 1.2 Unsewered township dwelling density 129
% Non resident ratepayers in corresponding 2011 Census Statistical District (Mairdample)	44%	Unsewered caravan park or resort	No

\* 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 km<sup>2</sup>, a medium risk rating has been applied to unsewered dwelling density.

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
1	1	2	2	2	8

**Stage 2B Land Capability Assessment Requirement: Low**



## Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- 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 1000m<sup>2</sup>;
- Twenty eight vacant lots zoned for residential development under 2000m<sup>2</sup>.

## Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the low risk round of inspections (Action 5.1.9);
- LCA required for a low risk area as per Recommendation 16 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- 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 (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.19 Sub Catchment 19 Glen Creek

Total developable vacant lots	69	No. of on-site systems	51
< 800 m <sup>2</sup>	-	Age of on-site systems	Majority pre 1990 15 post 2000 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	50		
> 40 ha	19		
Total lots in sub catchment	141	Area of sub catchment (km <sup>2</sup> )	40.4
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 1.3 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	No

## Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	2	1	3	11

## Stage 2B Land Capability Assessment Requirement: High

### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Glen Creek bisects the sub catchment, a medium level river/stream according to DEPI. 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.

### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

## 6.6.20 Sub Catchment 20 Dry Creek/Tallangalook

Total developable vacant lots	47	No. of on-site systems	83
< 800 m <sup>2</sup>	2	Age of on-site systems	Majority pre 1990 11 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	3		
2001 m <sup>2</sup> – 40 ha	22		
> 40 ha	20		
Total lots in sub catchment	175	Area of sub catchment (km <sup>2</sup> )	47.8
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 1.7 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Bonnie Doon)	68%	Unsewered caravan park or resort	No

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	3	2	1	3	11

### Stage 2B Land Capability Assessment Requirement: High

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Dry Creek and several other creeks, all identified as low level creeks by DEPI 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.

#### Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);

- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.21 Sub Catchment 21 Howes Creek Road (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	18	No. of on-site systems	18
< 800 m <sup>2</sup>	-	Age of on-site systems	Majority pre 1999 6 post 2000 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	-		
2001 m <sup>2</sup> – 40 ha	1		
> 40 ha	17		
Total lots in sub catchment	69	Area of sub catchment (km <sup>2</sup> )	21.6
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 0.8 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Goughs Bay)	64%	Unsewered caravan park or resort	No

#### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	2	3	1	3	11

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

#### Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks

- Howes Creek bisects the sub catchment, identified as a low level creek by DEPI. 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.

## Key Management Strategies and Actions

- Availability of the Stages 1 – 2 risk analyses maps on the Shire’s GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the high risk round of inspections (Actions 5.1.4 – 5.1.7);
- Detailed LCA required for a high risk area as per Recommendation 14 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

### 6.6.22 Sub Catchment 22 Banumum Road (including a Stage 3 Land Unit risk analysis)

Total developable vacant lots	59	No. of on-site systems	137
< 800 m <sup>2</sup>	2	Age of on-site systems	Predominantly pre 1990 27 post 2005 systems
801 – 1000 m <sup>2</sup>	-		
1001 – 2000 m <sup>2</sup>	2		
2001 m <sup>2</sup> – 40 ha	49		
> 40 ha	6		
Total lots in sub catchment	218	Area of sub catchment (km <sup>2</sup> )	24.9
		Area of unsewered township (km <sup>2</sup> )	N/A
		Unsewered dwelling density / km <sup>2</sup>	Overall sub catchment dwelling density 5.5 Unsewered township dwelling density N/A
% Non resident ratepayers in corresponding 2011 Census Statistical District (Maidample)	44%	Unsewered caravan park or resort	Yes

### Stage 2A Sub Catchment Risk Rating

Soil risk rating	Slope risk rating	Proximity to reservoir / offtake point rating	Unsewered dwelling density rating	Development potential rating	Total
2	1	3	1	3	10

**Land Capability Assessment Requirements: Refer to the Stage 3 Land Unit Map for risk ratings for individual lots.**

#### **Domestic Wastewater / Declared Potable Water Supply Catchment Issues and Risks**

- 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.

#### **Key Management Strategies and Actions**

- Availability of the Stages 1 – 2 risk analyses maps on the Shire's GIS system to guide decisions by Council, Planners and Environmental Health Officers (Action 2.5.2 and 2.5.3);
- Monitoring and Compliance program to be undertaken in the medium risk round of inspections (Action 5.1.8);
- Detailed LCA required for a medium risk area as per Recommendation 15 (Section 7);
- Work with land owners to bring ageing systems into compliance with as many aspects of the EPA *Code of Practice* as practicable post inspection (Actions 5.1.5 and 5.1.6);
- Inspection of sites subject to a Section 173 Agreement relating to domestic wastewater management (Action 5.1.7);
- Education of land owners, residents and visitors (Action Strategy 6.3);
- 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 Residential 1 subdivision in James Street (Action Strategies 7.1);
- Planning Scheme amendments to improve policy content around domestic wastewater and catchment management issues, review of Environmental Significance Overlay 1 (Lake Eildon Environs) and updating of the North East Referral Committee Water Quality Guidelines 2001 (Action Theme 8);
- Preparation of an MOU with GMW and GVW specifying the referral and decision making processes post DWMP adoption (Action 9.1.2).

## **7. Land Capability Assessments**

---

A land capability assessment (LCA) is the main vehicle through which the risk of an additional on-site system poses to water quality, public health and amenity (and the cumulative risk) is assessed. An LCA is required when submitting a planning permit application, or where a planning permit is not required, when a Certificate to Install an on-site domestic wastewater system is required.

The EPA's *Code of Practice* outlines the minimum standards for the preparation of an LCA, including the relevant criteria that may be applicable to an individual wanting to prepare an LCA. It provides for a twelve stage 'best practice' process (EPA *Code of Practice – Onsite Wastewater Management February 2013* page 34).

The recommendations of this DWMP is that the twelve step EPA *Code of Practice* process, identified as 'best practice', will be adopted as a default standard. A 'better than best practice' approach will be required for sites identified as requiring a High Risk standard LCA. 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* and *SEPP WoV* in relation to assessing cumulative impacts of an additional on-site wastewater management system.

The *Code of Practice* states that Council's EHO can determine what comprises to be a satisfactory LCA under the Code. Accordingly for Low Risk sites it is recommended that Council's EHO be able to have a greater level of freedom to determine how the CoP can be met through the LCA process. This means that requirements such as an on-site permeability test and water/nutrient balances will generally not be required. Again, Council's EHO will determine the requirements in consultation with the land owner and LCA practitioner based on the nature of the development proposal and the individual characteristics of the site.

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 our risk analysis model. As stated previously, Council's EHO will use the Stage 2B Risk Analysis Rating as the default LCA standard for sites within the twenty two sub catchments defined by this DWMP. Where a Stage 2B risk analysis or Stage 3 risk analysis has been completed by Council, these risk ratings shall be used to define the LCA requirements.

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 certainty for LCA practitioners and land owners as to what level of LCA is required.

## **7.1 Expectations for New Development**

It is important that Council 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 has 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 plants and disposal/irrigation areas from waterways.

### **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) should the LCA determine that a reduced standard does not pose an unacceptable risk. It must be noted that the LCA must be prepared to the standards outlined in this section based on the risk rating applying to the development site.

## Recommendations

12. **The LCA requirements for an individual site is 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 has been undertaken by Council the risk rating at minor catchment level, ie at Stage 1 of the Risk Analysis Model, must be applied;
13. 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;
14. **Land capability assessment for sites with a high risk rating:** The LCA must be a design document that includes all of the twelve stages outlined in Section 3.6.1 of the EPA's *Code of Practice – Onsite Wastewater Management February 2013*. The following must also be included in the LCA:
- an insitu permeability assessment;
  - the production of a water and nutrient balance;
  - a feature survey which provides for the delineation of surface flow vectors and buffers;
  - an assessment of colloid stability, soil reaction trend and electrical conductivity of all relevant soil horizons;
  - an assessment of any required soil amelioration; and
  - an analysis of the site using the Stage 4 risk analysis model, resulting in an overall risk rating using the Edis algorithm;
15. **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 – Onsite Wastewater Management February 2013*. An analysis of the site using the Stage 4 risk analysis model, resulting in an overall risk rating using the Edis algorithm must also be included;
16. **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. As per the discretion provided by the *Code of Practice* Council's Environmental Health Officer has the ability to waive the need for an in situ permeability test and a water/nutrient balance test based on the consideration of the site's characteristics and the nature of the development proposal;
17. For the handful of properties within the Shire that do not lie within a declared special water supply catchment Council's Senior Environmental Health Officer will inspect the site and prepare a report which satisfies the EPA's *Code of Practice – Onsite Wastewater Management February 2013* based on experience and local knowledge based on satisfactory system performance in the vicinity of the site. For the purposes of satisfying the *Code of Practice* this report will be an LCA;



18. To facilitate the LCA process and minimise costs it is recommended that **Council prepare an LCA 'toolkit' which includes the Minor, Sub Catchment and any land unit risk analysis map** prepared by Council in accordance with Stages 1 – 3 of the Risk Analysis Model. **Information about key factors** such as rainfall, evaporation rates, system failure rates, crop factors and daily wastewater generation allowances **should also be provided** (see Action Strategies 4.1, 4.2 and 6.5);
19. Training **for consultants frequently submitting LCA's to Council** should also be undertaken as soon as practicable after the adoption of the DWMP (see Action Strategy 6.5).

The philosophy behind the LCA requirements outlined above is that Council, Water Corporation and land owner/resident resources need to be focussed on high risk sub catchments and sites, rather than requiring the same standard of LCA regardless of the overall risk of an additional on-site system to water quality, public health, the environment or amenity.

High risk areas are those where there is the greatest potential for an individual and/or cumulative adverse impact on these systems if not adequately managed. Given that Council, Water Corporations and land owners have a legal responsibility to ensure such risks are minimised, focusing our collective effort on high risk areas is considered the most sensible, pragmatic outcome.

The Action and Resource Plan identifies a series of tasks to be undertaken by Council within Years 1 and 2 of the plan around the provision of LCA templates, local information and data to assist experts in preparing an effective and cost efficient LCA.

## 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 and Resource Plan will outline Council's commitment to augmenting existing resources to ensure that a comprehensive inspection and monitoring program can be developed and maintained over time.

Our survey of land capability experts indicated that that older systems (ie 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 should 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 online surveys. A particular need to ensure land owners were compliant with approved system management plans and maintenance schedules was highlighted; our experts felt that compliance with these plans was relatively poor.

Our proposed inspection program is based on the Moorabool Shire Council's model, which has been operating for the past three years with great success and is an approach supported by our Project Partner, GMW. Moorabool have generously offered to provide

Mansfield with their form letters and inspection sheets to assist with the implementation of our own inspection program.

The success of their program is partly attributable to the interpersonal skills and knowledge of the Council Officer undertaking the inspections. The ability to explain relatively complex systems in plain English to community members who know very little about their on-site system is essential. They also received financial support from three of their four Water Corporations to undertake the program; a factor which will also underpin the success or otherwise of our own inspection and compliance regime.

The Moorabool model requires the inspection program to be supported by portable, hand held hardware that is able to provide the Council Officer with information on approvals relating to each property, as well as having the ability to record a GPS coordinate for the system's location.

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. Options into the legalities of using vehicles such as a local law to regulate on-site systems, particularly ageing systems where there are no permits in place to provide an enforcement mechanism, should be addressed by the Municipal Association of Victoria given its wider application and relevance to other councils.

As outlined in the Action and Resource Plan Council and our Project Partners need to agree on the parameters of, and funding model for, the inspection program including what defines a 'failed system' and how they can utilise the data gathered to inform their own planning and service delivery. The recommendations below provide broad parameters to facilitate this process.

### Recommendations

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

21. ***Key elements of the inspection program should be:***

The first three years should see the completion of ***inspections of all existing systems in high risk sub catchments*** (around 800 inspections per year) to identify:

- their exact location and GPS coordinates
- type of system
- efficacy of system (ie if there are any maintenance issues which need to be addressed by the land owner / resident) (see Action Strategy 5.1);

22. ***Pre 1990 systems shall form the initial focus of inspections in high risk areas*** as they pose the highest risk to beneficial uses and public health/amenity (see Action 5.1.4);

23. Inspections ***of all sites with an identifiable Section 173 Agreement relating to wastewater management*** under the Planning and Environment Act 1987 that relates to on-site system management regardless of their sub catchment's risk rating within the first 3 years of the inspection program (see Action 5.1.7);

24. Once the inspection program in high risk areas is completed resources will be directed to medium and low risk sub catchments (which should be the final two years of the life of this DWMP) (see Actions 5.1.8 and 5.1.9);

25. ***Following each inspection a letter should be sent to the land owner/resident identifying what maintenance (if any) must be carried out*** on their system and by when. If no maintenance is required a letter with a positive 'keep up the good work' type message should be sent to the land owner/resident (see Action 5.1.5);

26. **Follow up inspections** should be undertaken to ensure that the required maintenance has been undertaken (see Action 5.1.6);
27. 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 (such as the installation of water saving devices) to mitigate wastewater issues as much as practicable;**
28. **Once all known existing on-site systems have been inspected the inspection cycle should be based around compliance with EPA Code of Practice requirements (eg desludging of systems every three years);**
29. Using the inspection program as a vehicle for land owner/resident education through:
  - one on one discussions between the Council Officer and land owner / resident about key features of their system, maintenance issues and how to keep their system operating efficiently;
  - providing each land owner with a brochure on how to maintain a healthy on-site system (that relates to the type of system they own);
30. 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 will be heavily reliant on the development of a Council database to track the information collected through the inspection program. This will result in a number of benefits, including:

- the collation of on-site system data in the one location (currently there are a number of databases for on-site systems);
- GPS coordinates can be added to our Geographical Information System, which will in turn assist 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 systems should also be obtained during the post installation inspection);
- The creation of a database which has the ability to generate reminders to Council officers, land owners/residents that an inspection by a technician is due, or that maintenance is scheduled to be completed, and that an inspection report must be submitted to Council either every 3 months or 3 years (depending on the 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 land owners/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 to Use, with the trigger point for an inspection being when the Permit to Install has lapsed.

Work will need to be undertaken prior to the commencement of the inspection program to create the fundamental components of a single database and to ensure that data stored in the portable hardware can easily be downloaded into Council's database.

A concerted administrative effort will also be required at the initial stages of the inspection program to ensure that permits and plans are available in electronic format to assist with the

creation of this database and the population of information on the portable hardware. This is one reason why the Action and Resource Plan suggests that the Council Officer inspecting the on-site system requires administrative support in the region of at least one day a week. Initially there may be the need to increase administrative support allocation as a means of establishing the systems outlined above.

### 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, and the subsequent creation of an accurate database and GIS mapping layer which shows the exact location of each on-site system.

Another measure is the success rate of follow up letters requesting that maintenance be undertaken to address issues of concern by the land owner/resident.

#### Recommendations

31. Given the potential impact of existing on-site systems on potable water quality as one of the policy drivers for this DWMP there should be a ***quantitative measure relating to water quality within the sub catchment prior to the education/inspection program and after the defined window for required maintenance to be completed expires*** (see Action 5.1.3).

As the inspection and monitoring program will be an ongoing, rolling program, it is essential that the ***baseline parameters for water testing conditions are clearly defined to ensure that the samples allow for a consistent, scientific approach.*** This will ensure that water quality samples from a sub catchment gathered over time will provide a meaningful qualitative measure around water quality.

This is where our Project Partners GMW, GVW and the EPA can assist Council in the monitoring of the outcomes of the inspection program. It is recommended that discussions be held with these authorities prior to the commencement of the program in high risk catchments so that water samples can be scheduled in nearby waterways.

This multi-agency approach is also a way in which external authorities can gain confidence in Council's program, as well as collating empirical evidence on the level of impact existing on-site systems have on potable water quality.

## 9. Management of Existing On-site Systems

---

The data and maps for the twenty two 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 incredibly 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 the standards were established.

As highlighted in Section 10 of the Background Report, current legislation fails 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* is all that is available to a council to address an on-site system which is malfunctioning (Part 6, Division 1, Section 58 (1)).

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

The Action and Resource Plan contains a series of ways in which the management of ageing systems can be improved in a relatively short period of time and at low cost, thereby potentially achieving significant environmental, public health and water quality benefits. The key action, the education and inspection program, has already been outlined in the previous section.

## 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 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 are under 1000m<sup>2</sup> may not have sufficient site area for a system that meets all of the *EPA Code of Practice* requirements.

### Recommendation

There are two choices in this situation open to Council and its Project Partners – one is to say that no redevelopment can occur and the other is to accept that whilst not all *EPA Code of Practice* standards will be met, significant benefit will be gained through upgrading the current ageing system.

32. It is strongly recommended that the latter approach be adopted and that redevelopment be allowed to occur subject to a satisfactory Land Capability Assessment. The ***overall aim is to maximize the performance of each site with compliance of as many Code of Practice requirements as possible for each site.***

The rationale is simple; 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);

33. ***Incremental gains can be made to mitigating any cumulative risks to public health, local amenity, the environment and water quality if this approach is taken.***

It must also be acknowledged that this is also a cost effective way to address potential impacts on beneficial uses. While the land owner will bear the cost of the upgrade but we must be mindful that requiring very expensive may be prohibitive and scupper any redevelopment at all. This will be a fine 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.

Overall, the driving principle should be that any upgraded system will provide benefits when compared to a decades old split system that treats black water alone.

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.

#### Recommendation

**34. *The last factor that needs to be kept in mind for redevelopment sites is that of tenure type.***

Many of the redevelopment sites may still well be holiday homes; as such an aerated wastewater system is not an appropriate solution. Although it is impossible to link the nature of the tenure of the dwelling to the type of wastewater system installed, the Land Capability Assessment Expert and Council can, and should, consider the immediate proposed tenure (ie is it to be a holiday home or permanent dwelling into the foreseeable future).

That is, a worst case scenario should be adopted in terms of whether or not an on-site system will be regularly used. Precautionary measures should be applied, therefore, through a more comprehensive inspection and maintenance program via conditions on the Certificate to Use or a Section 173 Agreement under the Planning and Environment Act (if required by GMW or GVW).

It is considered that this pragmatic approach, along with other improvements to infrastructure within these townships implemented by Council and its Project Partners, will provide significant mitigation of existing risk issues.

## 9.2 Improved Community and Expert Awareness

Community education is a fundamental part of any DWMP's implementation. Even though our resident/land owner survey resulted in a relatively small sample size of 46 respondents, the results clearly show that people do not think about their on-site system until something goes wrong. Only two respondents had a copy of the land capability assessment undertaken when the system was installed, 65% knew how often to get their system desludged and only 18% knew they should get their system serviced regularly.

When asked how Council could support them in better managing their on-site system, the following solutions were proffered:

- access to a copy of the land capability assessment, Permit to Install / Certificate to Use;
- reminders when their next system maintenance was due;
- information on septic friendly cleaning products; and
- an annual information session on how to maintain a system.

It is considered that there are a number of good sources of information that Council can use as the basis for their own set of brochures and online information.

The local installer/service technician survey result also found that land owners will sometimes ask for the installation to deviate from the approved plans, or that the land owner has reconfigured the system after it has been installed (eg they may wish to re-use the treated water on the garden rather than it being dispersed via realn drains). The importance of not doing so should be reinforced through the education campaign.

Installers/Service technicians and land capability experts were also asked if a different approach was required for non-resident ratepayers (ie those with holiday homes). While it was apparent that some experts felt that the attention paid to on-site systems was similar to that of current residents, others felt that holiday home owners were unaware that their systems probably require more attention than permanent dwellings as the systems are unused for much of the year and then go through periods of intense use.

Given that over 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.

### **Recommendations**

35. The inspection program outlined in Section 8 will be a main educational tool to increase community awareness about on-site systems (see Action Strategies 6.2 and 6.3). This will clearly need to be augmented by:
- succinct and plain English brochures about how to maintain the most common types of systems installed in Mansfield Shire, 'septic friendly' cleaning agents, how holiday home owners can effectively maintain their system etc;
  - online resources accessed through Council's website;
  - reformatting of existing online forms to allow ease of completion and submission on line (including a form to request Permits to Install and Certificates to Use);
  - a series of media releases and stories to be published in Mansfield Matters;
  - an annual information session for residents;
  - use of the annual non resident ratepayer meeting in Nunawading to educate holiday home owners about on-site system maintenance.

Our local system installers/service technicians indicated through the online survey that the provision of discussion forums and training sessions would also be of benefit to them. Meeting with Council, and Water Corporations, to discuss common issues and seek solutions was seen to be a useful initiative.

### **Recommendations**

36. It is considered appropriate that **Council work with local installers and technicians to identify minimum standards for the servicing of various types of systems**; for example it may be that a standard form be developed to ensure consistency in servicing standards, with a user-friendly means of providing the completed forms to Council (preferably electronically for ease of recording on Council systems) (see Actions 4.3.2 and 4.3.3);
37. **Random follow up inspections by Council after maintenance** has been undertaken may also be useful to assess whether or not servicing standards are met (see Action 5.1.6);
38. **Discussion forums with local experts** can also be used to explore broader wastewater management infrastructure provision, such as cluster systems, with Council and Water Corporations (see Action Strategy 6.4).

Local decision makers also need to be better informed about on-site systems, including Planners, Engineers and Councillors.

## Recommendation

39. ***The Action and Resource Plan will support the development and delivery of an education program for decision makers***, including training sessions to better understand land capability issues and joint meetings with local Water Corporations to explore how domestic wastewater issues, particularly those caused by ageing systems, can be addressed by Council and its Project Partners (see Action 6.6.1).

It is noted that the process of educating Council Planners about on-site systems and land capability has already commenced, with officers attending a three day land capability assessment course and a training session with Larry White (hosted by Mitchell Shire) about how to read and interpret a land capability assessment.

This DWMP has also resulted in an increased awareness of water quality, land capability and wastewater management issues amongst Council officers and Councillors.

Such programs must continue if decision making is to thoroughly consider domestic wastewater management issues and if Council's Planning and Environmental Health functions are to become more integrated.



## 10. DWMP Action & Resource Plan

### Resource Key:

<b>Low</b>	An easy task requiring a minimal amount of officer time (including one off tasks or simple, ongoing tasks)	Minimal additional costs that can be met from within existing budgets, as a guide < \$10,000. Excludes existing Council officer time costs.
<b>Medium</b>	A relatively easy task but is ongoing in nature or will require a reasonable amount of officer time to be allocated for a number of months to deliver the task	A moderate additional budget allocation is required, as a guide between \$10 – 30,000. Excludes existing Council officer time costs.
<b>High</b>	A difficult task which will require the dedication of a new resource (ie it cannot be accommodated from within existing resources)	A significant budget allocation required of more than \$30,000 (eg for the purchase of software, the hire of a consultant or creation of a new officer position).

Please note that capital works expenditure is not addressed in the costings. Actions relate to undertaking more detailed studies to identify suitable, targeted works by Council and its project partners as a means of identifying what the costs of new infrastructure will be.

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>1 Completion of Risk Analysis</b>									
1.1 Analysis of sub catchments using Edis-White model.	1.1.1 Completion of a sub catchment analysis using the Stage 2B Risk Analysis Methodology (Table 9) for all twenty two sub catchments.	Senior EHO, GIS Officer	✓	✓	✓	✓	✓	Officer time from within existing resources but external expertise may be required Easy task but medium levels of resources required if task cannot be completed in house	High risk sub catchments completed and publically available in Years 1 & 2 Medium risk sub catchments completed and publically available between Years 3 - 5

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
1.2 Preparation of Stage 3 land unit maps for sub catchments using the Williams methodology.	1.2.1 Preparation and completion of land unit risk maps all high risk sub catchments.	Senior EHO, GIS Officer	✓	✓	✓			Officer time from within existing resources External expertise may required Easy task but medium levels of resources required if task cannot be completed in house	Completion of maps and availability in LCA toolkit and online
	1.2.2 Preparation and completion of land unit maps for medium risk sub catchments.	Senior EHO, GIS Officer				✓	✓	Officer time from within existing resources External expertise may required Easy task but medium levels of resources required if task cannot be completed in house	Completion of maps and availability in LCA toolkit and online

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>2. Improved databases and systems</b>									
2.1 Tracking system for DWMP implementation	2.1.1 Creation of a database and reporting templates (based on Tables 16 and 17) to track the implementation of the DWMP.	Development Services Manager, IT Unit, Senior EHO, Statutory Planning Coordinator, Senior Strategic Planner	✓					Officer time from within existing resources Easy task and low levels of resources required	Database operational Reports provided to stakeholders on six monthly and annual basis
2.2 Improved database integration of former Delatite Shire and Mansfield Shire databases	2.2.1 Creation of a single database of all on-site systems.	IT Unit, Senior EHO, Statutory Planning Coordinator	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Database operational
	2.2.2 Creation of database of all on-site systems with permits where specific conditions of approval need to be monitored.	IT Coordinator, GIS Officer, Senior EHO, Statutory Planning Coordinator	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Database operational
2.3 Improved databases to support monitoring and compliance programs	2.3.1 Use of Synergy to track inspections, provide reports and send reminders for inspections or reports.	IT Coordinator, GIS Officer, Senior EHO, Statutory Planning Coordinator, Administrative Team	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Tracking/reporting system operational Reminders for inspections sent to land owners
	2.3.2 Creation of database for sites where a Section 173 Agreement under the Planning & Environment Act relates to on-site wastewater management.	IT Coordinator, GIS Officer, Senior EHO, Statutory Planning Coordinator	✓					Officer time from within existing resources Easy task and low levels of resources required	Database operational

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
2.4 Improved databases to facilitate monitoring and compliance programs	2.4.1 Investigation of use of iPad, or similar portable technology, including the capability to identify GPS coordinates for onsite systems, storage of relevant permits/correspondence and the generation of standard letters/reports.	Information Technology Coordinator, GIS Officer, Senior EHO, Statutory Planning Coordinator	✓					Officer time from within existing resources Easy task and low levels of resources required	Suitable hardware identified
	2.4.2 Purchase and application of in field portable devices to assist the inspection and monitoring program.	Information Technology Coordinator, GIS Officer, Senior EHO,	✓					Officer time from within existing resources Purchase of in-field hardware (around \$1200) Easy task and but medium levels of resources required.	In-field technology operational
2.5 Improved use of GIS capabilities	2.5.1 Creation of a GIS layer identifying location of existing and permitted on-site systems.	GIS Officer	✓					Officer time from within existing resources More complex task and moderate levels of resources required in terms of officer time given the complexity and shortcomings of existing databases.	GIS layer operational GIS layer used on a daily basis by Planners, EHO's and Engineers

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
2.5 Improved use of GIS capabilities (cont'd)	2.5.2 Development of a GIS layer identifying sub catchments and level of risk using the Stage 2 risk methodology.	GIS Officer	✓					Officer time from within existing 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
	2.5.3 Creation of layer for Stage 3 land-unit risk maps for all high and medium risk sub catchments.	GIS Officer	✓	✓	✓	✓	✓	Officer time from within existing resources Relatively easy task but medium levels of officer time required	GIS layer operational GIS layer used on a daily basis by Planners, EHO's and Engineers
	2.5.4 Integration of portable IT hardware collecting inspection data with GIS system to populate layer data for on-site systems.	GIS Officer & EHO	✓					Officer time from within existing resources More complex task and moderate levels of resources required	Hardware operational and successfully populating GIS

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>3. Better integration of Environmental Health and Planning functions of Council</b>									
3.1 Consistent and streamlined planning referrals	3.1.1 Development of a clear procedure for the referral of planning permit applications and key strategic planning initiatives in unsewered areas to Environmental Health.	Statutory Planning Coordinator, Senior Strategic Planner & Senior EHO	✓					Officer time from within existing resources Easy task and low levels of resources required	Procedure implemented and followed at all times
	3.1.2 Review the existing referral form to ensure it provides the EHO with sufficient direction as to what advice is sought from Planners and that both Strategic and Statutory Planners have the right information to consider and assess potential impacts on potable water quality/catchment health.	Statutory Planning Coordinator, Senior Strategic Planner & Senior EHO	✓					Officer time from within existing resources Easy task and low levels of resources required	Outcomes of review implemented
	3.1.3 Organisation of bi monthly 'round table' discussion/training sessions with Statutory/Strategic Planning and EHO functions to achieve a greater focus on wastewater and water quality issues.	Development Services Manager	✓					Officer time from within existing resources Easy task and low levels of resources required	Bi monthly meetings held on an ongoing basis with a high level of attendance

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>4. Development of LCA &amp; Technical Standards</b>									
4.1 Provision of LCA templates to minimise cost to land owners, improve LCA standards and ensure the complexity of the report reflects the risk of the site/area.	4.1.1 Provision of a LCA template that includes the use of the Edis Algorithm (Recommendation 8) for all sites.	Senior EHO in consultation with Paul Williams, GMW, EPA & GWV	✓					Officer time from within existing resources Easy task and low levels of resources required	Templates developed and available on Council's website
	4.1.2 Develop templates for high, medium and low risk areas and sites in partnership with the EPA, GMW and GWV.	Senior EHO in consultation with Paul Williams, GMW, EPA & GWV		✓				Officer time from within existing resources Easy task but medium levels of officer time required	Templates developed and available on Council's website
	4.1.3 Each individual site's Edis Algorithm result entered onto a Council database and mapped on the GIS to build a risk profile of each sub catchment to inform future reviews of the DWMP.	Environmental Health unit and GIS Officer	✓	✓	✓	✓	✓	Officer time from within existing resources Easy task and low levels of resources required	All algorithm results recorded
4.2 Provision of local information and data (eg rainfall) to facilitate LCA process and ensure consistency.	4.2.1 Work in partnership with local LCA experts to develop technical information for LCA's in response to DWMP survey responses about how to minimise LCA costs and improve consistency/quality of LCA's.	Senior EHO in consultation with local LCA experts, GMW, EPA & GWV	✓					Officer time from within existing resources Easy task and low levels of resources required	Data collated and available on Council's website

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
4.3 Development of technical standards for system maintenance standards.	4.3.1 Consult with LCA experts, local installers, the EPA, GMW and GVW to identify appropriate on-site systems for high, medium and low risk sites and different soil profiles.	Environmental Health Unit	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Technical standards adopted and launched by Council
	4.3.2 Consult with local installers and service technicians, the EPA, GMW and GVW to identify maintenance standards for all types of systems.	Environmental Health Unit	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Technical standards finalised and available. Installers/service technicians operating in Mansfield Shire educated about standards.
	4.3.3 Consult with local installers and service technicians to ensure the process for submitting maintenance reports is as streamlined as possible.	Environmental Health Unit	✓	✓				Officer time from within existing resources Easy task and low levels of resources required	Maintenance reporting process operational.



Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
4.4 Review of North East Planning Referrals Committee 2001 guidelines to clarify parameters for setbacks of on-site systems to waterways and reservoirs (and reflect the new EPA Code of Practice).	4.4.1 Lobby the North East Planning Referrals Committee to commit to prioritising the updating of this document, which is a reference document in the Mansfield Planning Scheme and must be considered when considering planning permit applications in Environmental Significance Overlay areas.	Development Services Manager in consultation with Senior EHO, Statutory Planning Coordinator & Senior Strategic Planner	✓					Officer time from within existing resources Easy task and low levels of resources required	Guidelines reviewed and ready to form the basis of an amendment to the Mansfield Planning Scheme.

5. Monitoring and Compliance									
5.1 Location and initial analysis of existing on-site systems	5.1.1 Explore the potential for project partners to financially support audit of existing on-site systems.	Development Services Manager, Senior EHO	✓					Officer time from within existing resources Easy task and low levels of resources required	Joint funding secured
	5.1.2 Define process for audit program, parameters for what is a 'failing system' and timelines for action by land owners with Council and Project Partners.	Development Services Manager, Senior EHO	✓					Officer time from within existing resources Easy task and low levels of resources required	Parameters and process agreed to by Council and Project Partners
	5.1.3 Define possibility for water quality testing within a sub catchment (both prior to the instigation of the inspection program and after the specified maintenance action period has closed) as a means of scientifically quantifying the impact of the inspection program.	Development Services Manager, Senior EHO	✓					Officer time from within existing resources Water Corporations may need to supplement water testing programs and analysis. Low levels of resources required initially to test a small number of sub catchments but then increasing to all sub catchments over time	Parameters and process agreed to by Council and Project Partners  Water quality tests undertaken for the first high risk sub catchment

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
5.1 Location and initial analysis of existing on-site systems (cont'd)	5.1.4 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 / EHO	✓	✓	✓			New officer resource required (1 EFT) Administrative support also required (minimum 1 day per week) Easy task but high level of resources required	800 sites inspected per annum. GIS layer updated with GPS coordinates
	5.1.5 Inform land/owner resident of inspection outcome, including specifying required maintenance and timelines for completion where required.	Senior EHO / EHO	✓	✓	✓	✓	✓	Required resources as per 5.1.4	100% of land owner/residents informed of required action, with timelines for action prescribed.
	5.1.6 Follow up inspection undertaken after period for required maintenance has lapsed.	Senior EHO / EHO	✓	✓	✓	✓	✓	Required resources as per 5.1.4	All sites where maintenance was required re-inspected
	5.1.7 Inspection of sites where a Section 173 Agreement relating to wastewater management exists.	Senior EHO / EHO	✓	✓	✓	✓	✓	Required resources as per 5.1.4	All sites inspected in accordance with Section 173 requirements
	5.1.8 Audit of existing on-site systems in medium risk areas, faults identified and land owners informed of required action.	Senior EHO / EHO				✓	✓	Required resources as per 5.1.4	800 sites inspected per annum and GIS updated with GPS coordinates 80% of follow up inspections show issues of concern have been resolved.

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
5.1 Location and initial analysis of existing on-site systems (cont'd)	5.1.9 Audit of existing on-site systems in low risk areas.	Senior EHO / EHO					✓	Required resources as per 5.1.4	800 sites inspected per annum, each system located and entered into Council's GIS, operational efficiency of system assessed.  80% of follow up inspections show issues of concern have been resolved.
<b>6. Improved community and expert awareness in relation to on-site wastewater management issues and water quality implications</b>									
6.1 Launch of DWMP via media campaign	6.1.1 Launch of DWMP by Minister for Water and Council, attended by Project Partners	Development Services Unit						Officer time required is relatively minor Some publishing costs will be incurred Easy task	Successful launch
	6.1.2 Development and distribution of an information pack for other Councils, media and the public.	Development Services Unit						Officer time required is relatively minor Some publishing costs will be incurred Easy task	Good level of media interest Distribution of information to peak bodies, councils and Water Corporations
6.2 Joint branding of education material by Project Partners	6.2.1 Meet with Project Partners to secure joint branding of all information and funding model.	Development Services Manager and Senior EHO	✓					Officer time required is relatively minor Easy task and low levels of resources required	Funding secured from Project Partners

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
6.2 Joint branding of education material by Project Partners (cont'd)	6.2.2 Types of education material, key issues to be addressed and sign off process agreed to by Project Partners and Council.	Development Services Manager and Senior EHO	✓					Officer time required is relatively minor Easy task and low levels of resources required	Agreement gained from all Project Partners and Council.
6.3 Education campaign for Land Owners / Residents and Visitors	6.3.1 Development and distribution of information sheets aimed at assisting land owners and residents to properly maintain / manage their on-site system and adopt responsible land management practices to protect water quality / waterway health.	Development Services Manager and Senior EHO	✓	✓	✓	✓	✓	Officer time required is relatively minor Publishing costs will be incurred Resources relatively minor if shared between Project Partners	Sign off from Council and Project Partners for education material. Publishing of material on Shire website. Inclusion of information pack in New Residents' Kit.
	6.3.2 Development and distribution of information sheets on all sub catchments including LCA requirements, on- site system design and development parameters.	Development Services Manager and Senior EHO	✓	✓	✓	✓	✓	Officer time required is relatively minor Publishing costs will be incurred Resources relatively minor if shared between Project Partners	Sign off from Council & Project Partners. Publishing of material on Shire website. Inclusion of information pack in New Residents' Kit.

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
6.3 Education campaign for Land Owners / Residents and Visitors (cont'd)	6.3.3 Development and delivery of training / education sessions (2 per year) for land owners and residents about on-site system maintenance and related good land management practices.	Development Services Manager and Senior EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Some catering costs incurred but minor Easy task and low levels of resources required	Delivery of two sessions per year with good attendance numbers
	6.3.4 Development of toolkit for non resident ratepayers to address issues particular to systems inactive for long periods of time, followed by heavy loading over a short timeframe.	Development Services Manager and Senior EHO	✓	✓	✓	✓	✓	Officer time required is relatively minor Publishing costs will be incurred Resources relatively minor if shared between Project Partners	Sign off from Council and Project Partners. Publishing of material on Shire website. Inclusion of information pack in New Residents' Kit.
6.4 Education campaign and regular, ongoing Council consultation with On-site system Installers and Service Technicians	6.4.1 Provision of technical standards to technicians and installers as per Action 4.3, supported by information sessions being held at Council with Project Partners.	Senior EHO / EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Some catering costs incurred but minor Easy task and low levels of resources required	Sign off from Council and Project Partners for education material. Publishing of material on Shire website. Information sessions held and well attended.
	6.4.2 Organisation of annual meeting between Project Partners and installers / service technicians.	Senior EHO / EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Easy task and low levels of resources required	Meeting held annually and well attended

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
6.5 Education campaign and regular Council consultation with LCA experts	6.5.1 Provision of LCA templates, technical design standards and data as per Actions under 4.1 and 4.2, supported by information sessions being held at Council with Project Partners.	Senior EHO / EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Minor catering and publishing costs incurred if costs spread between Project Partners Easy task and low levels of resources required	Templates provided and updated to ensure currency Information sessions held and well attended
	6.5.2 Organisation of annual meeting between Council officers, Project Partners and installers / service technicians, including training on current issues.	Senior EHO / EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Minor catering costs Easy task and low levels of resources required	Meeting held annually and well attended
6.6 Education campaign for Councillors, Planners & Engineers regarding on-site wastewater management, water quality and catchment management issues.	6.6.1 Development and delivery of training program in consultation with Project Partners, Councillors and staff.	Development Services Manager and Senior EHO / EHO	✓	✓	✓	✓	✓	Officer time from within existing resources Minor catering costs Easy task and low levels of resources required	Training program agreed to by all stakeholders Training program delivered Training program reviewed annually to ensure currency and relevance

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>7 Inter agency infrastructure planning</b>									
7.1 Identification of infrastructure required to service growth communities and mitigate wastewater risks	7.1.1 Appoint inter-agency working group to identify infrastructure issues for growth and high risk communities.	Development Services Manager and Engineering & Works Manager	✓	✓	✓	✓	✓	Officer time from within existing resources More complex task but relatively low levels of resources required if shared between Project Partners	Working Group appointed Governance Charter adopted Work program agreed to
	7.1.2 Identification of options for infrastructure provision in short, medium and long term to support future growth while minimising adverse impact on catchment health, water quality and public health.	Development Services Manager and Engineering & Works Manager	✓	✓	✓	✓	✓	Officer time from within existing resources More complex task but relatively low levels of resources required if shared between Project Partners	Preparation of options report for submission to respective Boards / Council Adoption by respective Project Partner's decision makers
	7.1.3 Development of timetable and capital works program to deliver required infrastructure.	Development Services Manager and Engineering & Works Manager	✓	✓	✓	✓	✓	Officer time from within existing resources More complex task Significant resources required	Development of works program for consideration by respective Boards / Council Adoption by respective Project Partner's and allocation of resources in annual budgets



Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
7.2 Identification of infrastructure required to mitigate risk in high risk communities	7.2.1 Appoint inter-agency working group to identify infrastructure issues for growth and high risk communities.	Development Services Manager and Engineering & Works Manager		✓				Officer time from within existing resources More complex task but relatively low levels of resources required	Working Group appointed Governance Charter adopted Work program agreed to
	7.2.2 Identification of options for infrastructure provision in short, medium and long term to support future growth while minimising adverse impact on catchment health, water quality and public health.	Development Services Manager and Engineering & Works Manager		✓				Officer time from within existing resources More complex task but relatively low levels of resources required	Preparation of options report for submission to respective Boards / Council Adoption by respective Project Partner's decision makers
	7.2.3 Development of timetable and capital works program to deliver required infrastructure.	Development Services Manager and Engineering & Works Manager		✓	✓	✓	✓	Officer time from within existing resources More complex task Significant resources required	Development of works program for consideration by respective Boards / Council Adoption by respective Project Partner's and allocation of resources in annual budgets
7.3 Improved stormwater management in high risk, unsewered townships	7.3.1 Discuss with Council and Engineering Services the possibility of prioritising the development stormwater management plans and works in high risk areas.	Development Services Manager and Engineering & Works Manager		✓	✓	✓	✓	Officer time from within existing resources Minor catering costs Easy task and low levels of resources required	Decision made by Council

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>8. Planning Policy and Controls</b>									
8.1 Development of a Local Planning Policy on wastewater management and catchment management / water quality issues (ensuring the DWMP and Background Report are either incorporated or reference documents).	8.1.1 Establishment of working party with Project Partners, agreement to the key issues to be addressed by the policy and joint funding of project.	Development Services Manager and Strategic Planning Unit	✓					Officer time from within existing resources Easy task and low levels of resources required	Working Party established, parameters and joint funding agreed.
	8.1.2 Development of new policy in consultation with Project Partners.	Strategic Planning Unit	✓					Officer time from within existing resources Easy task and low levels of resources required	New overlay schedule developed and signed off by Project Partners and Council
	8.1.3 Prepare and process an amendment to the Mansfield Planning Scheme to incorporate new policy using DWMP as strategic justification for the amendment.	Strategic Planning Unit	✓	✓				More complex task and medium levels of time and resources required (consultation costs, possible Panel costs) Costs of amendment should be shared between Project Partners	Amendment approved by Minister for Planning
8.2 Joint Mansfield and Murrindindi Council review of Lake Eildon Overlay controls to gain consistency in controls and objectives.	8.2.1 Establishment of working party with Project Partners, agreement to the parameters for the review of the ESO and joint funding of project.	Development Services Manager and Strategic Planning Unit		✓				Officer time from within existing resources Easy task and low levels of resources required	Working Party established, parameters and joint funding agreed.

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
8.2 Joint Mansfield and Murrindindi Council review of Lake Eildon Overlay controls to gain consistency in controls and objectives (cont'd)	8.2.2 Development of new ESO or other suitable overlay schedule in consultation with Project Partners.	Strategic Planning Unit		✓				Officer time from within existing resources Easy task and low levels of resources required	New overlay schedule developed and signed off by Project Partners and Council
	8.2.3 Prepare and process an amendment to the Mansfield and Murrindindi Planning Schemes to incorporate new schedule using DWMP as strategic justification for the amendment.	Strategic Planning Unit		✓	✓			More complex task and medium levels of time and resources required (consultation costs, possible Panel costs) Costs of amendment should be shared between Project Partners	Amendment approved by Minister for Planning
8.3 Review of the application of ESO 1 and 2 controls with Project Partners to focus on high and medium risk areas and a streamlined referral process.	8.3.1 Establishment of working party with Project Partners, agreement to the parameters for the review of the ESO's and joint funding of project.	Development Services Manager and Strategic Planning Unit		✓				Officer time from within existing resources Easy task and low levels of resources required	Working Party established, parameters and joint funding agreed.
	8.3.2 Development of new ESO schedules in consultation with Project Partners.	Strategic Planning Unit		✓				Officer time from within existing resources Easy task and low levels of resources required	New schedules developed and signed off by Project Partners and Council

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
8.3 Review of the application of ESO 1 and 2 controls with Project Partners to focus on high and medium risk areas and a streamlined referral process (cont'd).	8.3.3 Prepare and process an amendment to the Mansfield Planning Scheme to incorporate new schedules using DWMP as strategic justification for the amendment.	Strategic Planning Unit		✓	✓			More complex task and medium levels of time and resources required (consultation costs, possible Panel costs) Costs of amendment should be shared between Project Partners	Amendment approved by Minister for Planning
8.4 Incorporate new North East Referral Committee Water Quality Guidelines into Mansfield Planning Scheme.	8.4.1 Prepare and process an amendment to Mansfield Planning Scheme to replace the existing document with the new Guidelines in both Environmental Significance Overlay Schedules.	Development Services Manager		✓	✓			More complex task and medium levels of time and resources required (consultation costs, possible Panel costs) Costs of amendment should be shared between Council and North East Referral Committee Members	Amendment approved by Minister for Planning

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
<b>9. Strong and Productive Relationships with our Project Partners</b>									
9.1 Coordination of strategic, statutory and wastewater management planning functions of Council and its Project Partners.	9.1.1 Undertake a tender or expression of interest process to appoint an independent auditor to analyse the implementation of the DWMP in accordance with the Ministerial Guidelines.	Development Services Manager	✓					Officer time from within existing resources Public notice costs incurred Easy task and low levels of resources required	Auditor appointed in partnership with Water Corporations
	9.1.2 Prepare and implement a new Memorandum of Understanding with GMW and GVW specifying the decision making and referral processes to be implemented post DWMP adoption (including what planning permit applications will/will not be referred)	Development Services Manager	✓					Officer time from within existing resources Easy task and low levels of resources required	MOU signed by all parties
	9.1.3 Organise quarterly meetings with our Project Partners to discuss wastewater issues, water quality issues, strategic planning issues and progress of DWMP.	Development Services Manager	✓	✓	✓	✓	✓	Officer time from within existing resources Easy task and low levels of resources required	All meetings held and well attended Quarterly minutes provided to Council

Action Theme & Strategies	Action	Responsibility	Year of Implementation					Required Resources, Possible Funding Sources Ease of Task	Success Indicator(s)
			1	2	3	4	5		
9.2 Monitoring and reporting on progress of DWMP's implementation.	9.2.1 Establish six monthly and annual reporting/review process with Project Partners using the template provided in Table 16.	Senior EHO and Development Services Manager	✓	✓	✓	✓	✓	Officer time from within existing resources Easy task and low levels of resources required	Reporting process completed as per agreed timetable
	9.2.2 Completion of six monthly and annual review/reports in partnership with GMW and GVW.	Senior EHO and Development Services Manager	✓	✓	✓	✓	✓	Officer time from within existing resources Easy task and low levels of resources required	Reports received by Council and Boards of Water Corporations
	9.2.3 Undertake tri-annual independent audit of the DWMP's implementation in conjunction with Project Partners.	Development Services Manager, GMW, GVW, EPA			✓			Officer time from within existing resources Possible additional funding required for independent auditor Easy task and low levels of resources required	Audit completed and plan to act on recommendations in place
9.3 Review of DWMP in 5 years	9.3.1 Determine process and scope of the DWMP's review at the end of its five year life in consultation with Project Partners.	Senior EHO and Development Services Manager					✓	Officer time from within existing resources Easy task and low levels of resources required	Scope and process for review agreed to by Council and Project Partners
	9.3.2 Commence the 5 yearly review of the DWMP in consultation with Project Partners.	Senior EHO and Development Services Manager					✓	Possible external resource required More complex task with medium levels of time and resources required	Review completed

## 10.1 2013 – 17 Mansfield Shire Council Plan Actions and Performance Measures

The following actions and performance measures are contained within the adopted Council Plan, which sets the strategic direction for Council and the administration in relation to the DWMP and related projects. The Council Plan was adopted in 2013 but must be reviewed annually under the Local Government Act 1989. The actions below represent those contained in the 2014 revised Plan.

**Table 14 2013-17 Council Plan Actions Related to the DWMP**

	What we will do	Primary responsibility	13/14	14/15	15/16	16/17
4.1.1	Implement the Key Actions of Council's Environment Strategy, including the Domestic Wastewater Management Plan Pilot Project	Development Services Manager	✓	✓	✓	✓
4.1.5	Support community education programs for new residents in relation to responsible and effective land management practices.	Development Services Manager	✓	✓	✓	✓
4.2.1	Adopt and implement the Mansfield Shire Council Domestic Wastewater Management Plan Pilot Project in partnership with local Water Corporations and the Department of Environment and Primary Industries.	Development Services Manager	✓	✓	✓	✓
4.2.4	Review the Mansfield Planning Scheme to identify what improvements can be made to ensure it reflects community priorities and commence implementation of the Review.	Development Services Manager		✓	✓	✓
4.3.1	Review the fixed infrastructure managed by Council to identify service gaps that need to be addressed to meet current and future needs.	Engineering & Works Manager	✓	✓	✓	✓
4.3.2	Prepare a Shire-wide drainage strategy and progressively implement the Mansfield Township Drainage Strategy.	Engineering & Works Manager	✓	✓	✓	✓
4.4.1	Work in partnership with Goulburn Murray Water and other lead agencies to deliver the key priorities of the Lake Eildon On-Water Management Plan through participation in the Implementation Committee.	Tourism and Economic Development Manager	✓	✓	✓	✓
5.3.1	Prepare and exhibit a planning scheme amendment on behalf of the Goulburn Broken Catchment Management Authority that introduces updated flood zone and land subject to inundation overlays based on current flooding models.	Development Services Manager	✓	✓		

## 10.2 Council Plan Indicators Relevant to the DWMP

There are several indicators within the Council Plan that assist in tracking the implementation of DWMP related initiatives.

**Table 15 2013-17 Council Plan Indicators Relevant to the DWMP**

Goal	Indicator	Target 13/14	Target 14/15	Target 15/16	Target 16/17
4.3 Mansfield has the infrastructure required to support economic and population growth.	YTD expenditure of renewal works compared to budget	85%	87%	90%	92%
	% of capital works completed at year end	75%	78%	80%	85%
4.4 Council has strong partnerships with land and water management agencies.	Number of proactive inspections of septic systems	250	250	250	250



# 11. Monitoring, Auditing and Reviewing Our DWMP

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

## 11.1 Monitoring and Reporting of the DWMP's Progress

The implementation of the DWMP is an action within the Shire's 2013 – 17 Council Plan. As such, regular updates will be provided to Council via its overall monitoring of the Council Plan's implementation. Council will also receive copies of the reports generated for our Project Partners.

### **Recommendations**

40. Given the number of initiatives and tasks contained within the Action and Resource Plan it is suggested that **updates be provided to Council and its Project Partners as to the status of each action every six months (see Action Strategy 9.2);**
41. The Progress Report's format could be provided to Project Partners in the format outlined in Table 16;
42. **An annual report and review process should also be undertaken to determine the status of each action and whether or not the Action and Resource Plan requires modification** in relation to the initiatives to be implemented in the year ahead (see Action 9.2.2). Table 17 could be used for this purpose, and it could also be used as the basis referred to under action 2.1.1 of the Action and Resource Plan;
43. 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 (see Action Strategy 9.2);
44. Both the six monthly and annual progress reports should be formally presented to Council for noting (see Action 9.2.2);
45. The Action and Resource Plan states that quarterly meetings will be held with our Project Partners (see action 9.1.3). **This is another vehicle through which the Plan can be monitored but in a more informal way.**

**Table 16 Proposed Format for Six Monthly Progress Reports**

Action Theme & Strategy	Action	Responsibility	Percentage of Action Completed (including progress data from external agencies)	Comments on Progress to Date (including comments from external agencies)

The 'Comments on Progress to Date' should include information as to what issues are either impeding the progress of the action, or conversely, whether or not the action's implementation is ahead of schedule and why this is so. Any other issues of note should also be briefly outlined.

**Table 17 Proposed annual report format**

Action Theme & Strategy	Action	Responsibility	Percentage Complete	Assessment against DWMP Action & Resource Plan Success Indicator	Comments	Action to be carried over into the year ahead? (Yes or No)

## 11.2 Independent Audits

Action 9.1.1 of the Action and Resource Plan relates to the completion of an expression of interest process to appoint a suitably qualified, Water Corporation approved, independent auditor to review the progress of our DWMP every three years.

### Recommendations

46. The actual process and terms of reference for the three yearly Independent Audit must be the subject of further discussions between Council and its Project Partners. However, it is essential that each organisation provide both qualitative and quantitative data as evidence for the implementation of the Action and Resource Plan.

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 (see Action Strategy 9.2).

***It is also important that all relevant agencies be required to present their data and evidence of action to the independent auditor for review.*** In this way the audit process can reaffirm the need for inter agency action and cooperation around domestic wastewater management issues (see Action Strategy 9.2).

47. Given the audit process will require participation by our Project Partners ***all agencies should receive a copy of the Independent Audit Report*** directly from the Independent Auditor (see Action 9.2.3);

48. It is suggested that a meeting be held with our Project Partners soon after the audit report is received to identifying how any recommendations for action made by the Auditor will be addressed;

49. A report to Council should be prepared to receive the Independent Auditor's report and for approval of any recommended changes to the Action and Resource Plan required to address its recommendations (see Action 9.2.3).

### 11.3 Reviewing and Updating the DWMP

The Action and Resource 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.

#### **Recommendations**

50. In terms of revisiting the entire DWMP in five year's time, it is suggested that discussions with our Project Partners about the terms of reference commence early in Year 4 of this Plan, as per Action 9.3.1;
51. The five yearly review process should include a public consultation phase, including liaison with on-site installers/service technicians and land capability assessment experts (see Action Strategy 9.3).



# **MANSFIELD SHIRE DOMESTIC WASTEWATER MANAGEMENT PLAN PILOT PROJECT**

## **Part 2 DOMESTIC WASTEWATER MANAGEMENT PLAN**

### **REFERENCE DOCUMENTS**



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 – Onsite Wastewater Management, February 2013 (EPA)

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

Victoria Planning Provisions

Mansfield Shire Council Plan 2013 - 17

Municipal Strategic Statement (Mansfield Planning Scheme)

Local Planning Policy Framework (Mansfield Planning Scheme)