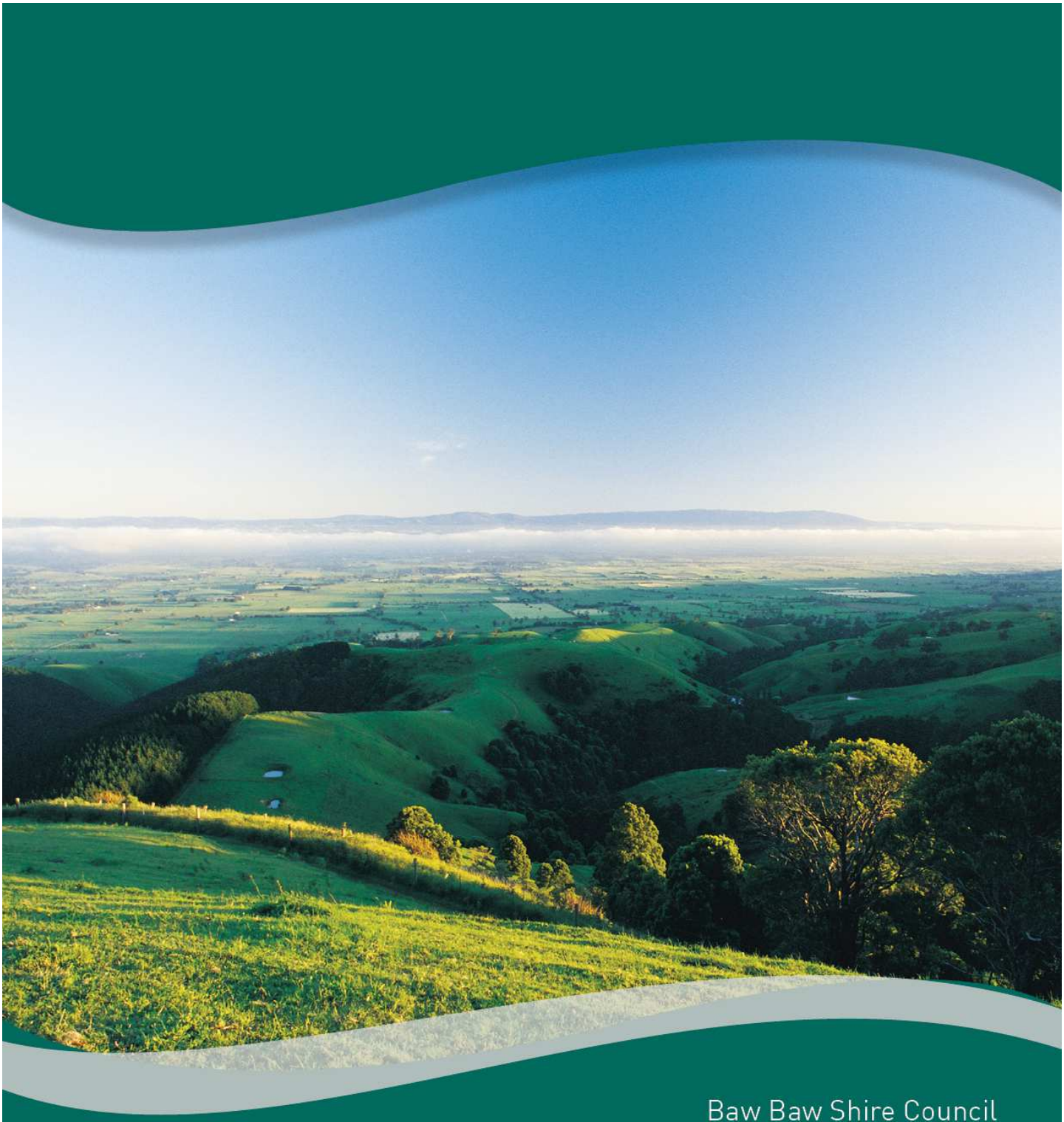

Baw Baw Shire Council

Domestic Wastewater Management Plan Operational Document

August 2016

Document Control Sheet

Document and Project Details	
Document Title:	Baw Baw Shire Council Domestic Wastewater Management Plan – Operational Plan
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Project Manager:	Mark Saunders
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Synopsis:	This Operational Plan has been developed to accompany the Technical Document (2015), which together forms the Domestic Wastewater Management Plan (DWMP), to identify domestic wastewater management (DWM) issues within the Shire and recommend management actions to ensure potential risks are appropriately managed. A key component of the DWMP is a domestic wastewater management risk assessment and mapping that has been completed for the Shire. This assessment identifies prioritised districts that are in need of improved domestic wastewater management practices. The DWMP also provides technical guidance and a strategy for community education. A framework for the regulation of domestic wastewater management system performance is also provided.
Client Details	
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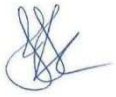
Checked by: Mark Saunders 	***Issued by:*** Jasmin Kable 

Acknowledgements

Baw Baw Shire Council would like to thank Whitehead & Associates Environmental Consultants for the preparation of this plan, as well as Melbourne Water, Gippsland Water, South Gippsland Water and Southern Rural Water who have collaborated and assisted in refining the plan.

Disclaimer

The information contained in this report is based on independent research undertaken by Jasmin Kable and Mark Saunders of Whitehead & Associates Environmental Consultants Pty Ltd (W&A). To our knowledge, it does not contain any false, misleading or incomplete information. Recommendations are based on an appraisal of the site conditions subject to the limited scope and resources available for this project, and follow relevant industry standards. The work performed by W&A included a desktop review and the conclusions made in this report are based on the information gained and the assumptions as outlined. Under no circumstances can it be considered that these results represent the actual conditions throughout the entire Shire due to the regional scale of this study.

Copyright Note

Document Certification

This Domestic Wastewater Management Plan has been prepared following the standards and guidelines set out in the following documents, where applicable:

- EPA Victoria Publication 891.4 (2016) Code of Practice – *Onsite Wastewater Management*;
- Department of Sustainability and Environment (2012) *Planning permit applications in open, potable water supply catchment areas*;
- EPA Victoria (2003) *State Environmental Protection Policy*: Waters of Victoria;
- EPA Victoria (2002) *State Environmental Protection Policy*: Groundwaters of Victoria;
- Municipal Association of Victoria (2014) *Victoria Land Capability Assessment Framework*, 2nd Ed;
- AS/NZS 1547:2012 *On-site Domestic Wastewater Management* (Standards Australia / Standards New Zealand, 2012); and
- Auditor General Report (2006) *Protecting our environment and community from failing septic tanks*.

To our knowledge, it does not contain any false, misleading or incomplete information. Recommendations are based on an honest appraisal of the sites' opportunities and constraints, subject to the limited scope and resources available for this project.

Executive Summary

Baw Baw Shire Council (BBSC) (the "Council" or "Shire") has developed a Domestic Wastewater Management Plan (DWMP) to assist with the efficient and effective management of domestic wastewater within the Shire in a way which will minimise the potential risk posed by domestic effluent upon public health, the physical environment and local receiving environments. BBSC is committed to the monitoring and management of on-site domestic wastewater management (DWM) systems within the Shire.

Under the provisions of the State Environment Protection Policy (Waters of Victoria) (SEPP), local Councils need to develop a DWMP in conjunction with relevant Water Corporations and the community. This DWMP has been prepared to ensure BBSC meets the requirements of the Minister for Water's Guideline 1 - Planning Permit Applications in Open, Potable Water Supply Catchment Areas (November 2012) for DWM; to ensure existing and future development does not compromise the Declared Water Supply Catchments (DWSCs, otherwise known as drinking water catchments) and to assist in maintaining a sustainable environment.

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

The DWMP describes the current situation relating to DWM in the Shire and identifies a range of actions Council seeks to implement. It reviews the previous Draft 2006 DWMP to determine what Actions have been completed and areas for improvement. The DWMP is comprised of two documents; this Operational Plan, which contains the Action Plan. Council will put in place for the management of domestic wastewater in the Shire; and a Technical Document, which details the derivation of methodology for the Constraint Mapping, Sensitivity Analysis and the individual Town Reports.

A number of key issues for DWM in BBSC have been identified:

- There are a number of sensitive catchments (DWSCs) within the Shire and the protection of these areas is important for the supply of potable water, maintenance of public health and the environment;
- Within the DWSCs, development is currently restricted to 1 dwelling per 40 hectares; the implementation of the DWMP by Council will enable Water Corporations to appropriately review this restriction and assess development at a higher density within these catchments, on a case by case basis;
- Failing DWM systems have the potential to pollute the environment;
- There are a number of significant constraints, e.g. challenging soils, proximity to water bodies and existing small lots, which limit the effectiveness of DWM systems in some parts of the Shire. To enable improvements to be made in areas where existing DWM systems have historically proved problematic, Council needs to develop strategies to assist DWM system owners to upgrade or replace systems where appropriate;
- Physical environments (including climate patterns) may limit the effectiveness of DWM systems within the Shire and therefore many systems may require a high level of design and management to ensure each DWM system is sustainable;
- To ensure that DWM systems associated with new development can operate in a sustainable manner, a high level of design and management is required and Council with Water Corporations and key stakeholders must develop policies and procedures to allow development to proceed in a manner which appropriately protects public health and the environment;
- Limited resources (staff) available to manage the wastewater monitoring and compliance program;

- Rate capping within Victoria will place further pressures on Local Government as to where funds are directed;
- Increasing expectations as to appropriate wastewater treatment and disposal; for example, community members are no longer happy to accept greywater discharging to street drains; and
- Water Corporations may not wish to manage small town sewer schemes and Local Government may lack the expertise and capacity to manage these systems.

The fundamental purpose of a DWMP is to identify and manage the risk from DWM systems to public and environmental health. A comprehensive 4-staged Risk Assessment Framework (RAF) was developed with the aim of quantitatively and qualitatively assessing the consequences of unsewered development. The stages are outlined as follows:

- Stage 1: Data Collection - background information, legislation/regulatory/planning controls, data collection and pre-processing;
- Stage 2: Data Analysis - development of individual constraint and informative maps for parameters that significantly impact on the degree of sensitivity of any given lot on sustainable DWM;
- Stage 3: DWM Sensitivity Analysis - weighted analysis of individual constraints which determines the final consolidated sensitivity of the unsewered lots within the Shire, based on an algorithm that takes into account the inter-relationships of individual constraints; and
- Stage 4: Land Capability Assessment – application of the final Sensitivity Rating to determine the level of information required as part of a Land Capability Assessment.
- In addition - Management of Existing Systems – review requirements for development assessment under Planning Scheme and administrative controls and the management of existing DWM systems.

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

The DWMP has collated a substantial amount of information on existing DWM systems and the various environmental and built constraints that substantially impact on DWM outcomes. This information is presented as a series of informative constraint maps developed using Geographic Information Systems (GIS) which illustrate the significance of each element (slope, soil suitability, proximity to surface water and groundwater, etc.) to DWM within both the Shire as a whole and the prioritised towns. Individual constraints have been considered in the light of current standards for DWM as outlined in the Victorian Environment Protection Authority (EPA) current Code of Practice, Australian Standards and other commonly applied industry standards. For unsewered lots, each constraint is considered on the basis of information supplied by Council or relevant State Government agencies. DWM Sensitivity is described as Low, Moderate, High or Very High depending on the degree of sensitivity it presents to DWM.

This information will assist Council to prioritise actions including programmed inspections, education of property owners and occupants, the need for and level of land capability assessment and reporting required to support proposals for new DWM systems, and will provide guidance in identifying minimum standards of DWM servicing and appropriate technologies. It will also provide Council with guidance defining areas where centralised wastewater servicing is most required.

The DWMP presents a prioritised Action Plan for the Shire with proposed timeframes for completion of the various tasks. The Action Plan provides actions which will be implemented to improve the effectiveness of DWM within BBSC, to protect public and environmental health and

to ensure that future development within the Shire is sustainable and protects sensitive waterways and potable drinking water catchments. The DWMP will also provide a valuable tool for the assessment of planning applications within drinking water catchment areas, all unsewered towns, and direction for property owners on the requirements that will need to be met.

The Operational Plan is supported by a more detailed Technical Document which outlines the basis on which the constraint mapping has been developed, presents the individual constraint and thematic maps for both the Shire and prioritised towns, and presents minimum DWM treatment system and land application area sizing requirements for compliant sustainable DWM systems. The Technical Document can be obtained by contacting the Public Health Department at BBSC.

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Acronyms

AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
AHD	Australian Height Datum
AO	Authorised Officer under Environmental Protection Act Division 5 Part IXB (1970)
AWTS	Aerated Wastewater Treatment System
CMA	Catchment Management Authority
BBSC	Baw Baw Shire Council
DEM	Digital Elevation Model
DEPI	Department of Environment and Primary Industries (now known as DELWP)
DELWP	Department of Environment, Land, Water and Planning
DIR	Design Irrigation Rate
DLR	Design Loading Rate
DSE	Department of Sustainability and the Environment (former)
DSM	Decentralised Sewage Model
DWM	Domestic Wastewater Management
DWMP	Domestic Wastewater Management Plan
EPA	Environment Protection Authority
GIS	Geographic Information System
GMAs	Groundwater Management Area
EHO	Environmental Health Officer
LAA	Land Application Area
LCA	Land Capability Assessment
LGA	Local Government Area
LRA	Land Resource Assessment
MAV	Municipal Association of Victoria
PIC	Plumbing Industry Commission
SEPP	State Environment Protection Policy
SWG	Stakeholder Working Group
VCAT	Victorian Civil and Administrative Tribunal
VVG	Visualising Victoria’s Groundwater (Project)
WC	Water Corporation(s)
WMIS	The Victorian Water Measurement Information System
WSPAs	Water Supply Protection Area(s)

1 Introduction

1.1 Overview and Objectives

Many small communities and low density developments on the urban fringes are not connected to reticulated sewer. Property owners within these areas utilise on-site Domestic Wastewater Management (DWM) systems to; treat their domestic wastewaters and; dispose the treated effluent on-site. Poorly treated or managed wastewater from DWM systems is potentially a major pollutant of stormwater, which threatens public and environmental health as well as impacting on local amenity. Poorly managed DWM systems also result in associated economic and legal risk to both residents and Council.

Baw Baw Shire Council (BBSC, 'the Shire' or 'Council') has a geographic area of 4,027km^2 and a population of 45,205 in 2013, with an estimated growth rate of 2.3% per annum (BBSC Annual Report, 2013-2014). There are approximately 3,180 on-site DWM systems with permits that Council has electronic record of within the Shire. In addition, there are unsewered commercial (non-domestic) lots, such as cafes, pubs and farms in the Shire, which are regulated by the EPA and Council. This Domestic Wastewater Management Plan (DWMP) covers the management of DWM systems within the Shire. Figure 1 (over page) identifies the unsewered areas of BBSC that forms the basis for this document.

Wastewater management in BBSC is undertaken to protect human and environmental health. The Shire is characterised by towns, rural residential development, farming (including forestry), National Parks and State Forests and a large area (around 44%) of the Shire is within Declared Water Supply Catchments (DWSCs). The protection of surface waters, groundwater and human health are all requirements of the *Environment Protection Act 1970*. Under the provisions of this Act and other legislative guidelines, Councils are required to prepare a DWMP. This DWMP is a revision of the first DWMP created in 2006 and has been developed in accordance with the legislation and policies outlined in Section 4, in particular:

- *Environmental Protection Act*, *1970*;
- Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchments, 2012; and
- State Environmental Protection Policy for both Waters of Victoria and Groundwaters of Victoria.

The DWMP addresses the various aspects of wastewater, including; treatment, land application, and cumulative impacts of DWM. This plan also covers the regulation of DWM systems, including; permits to install, permits to use, permits to upgrade and ongoing monitoring of system performance.

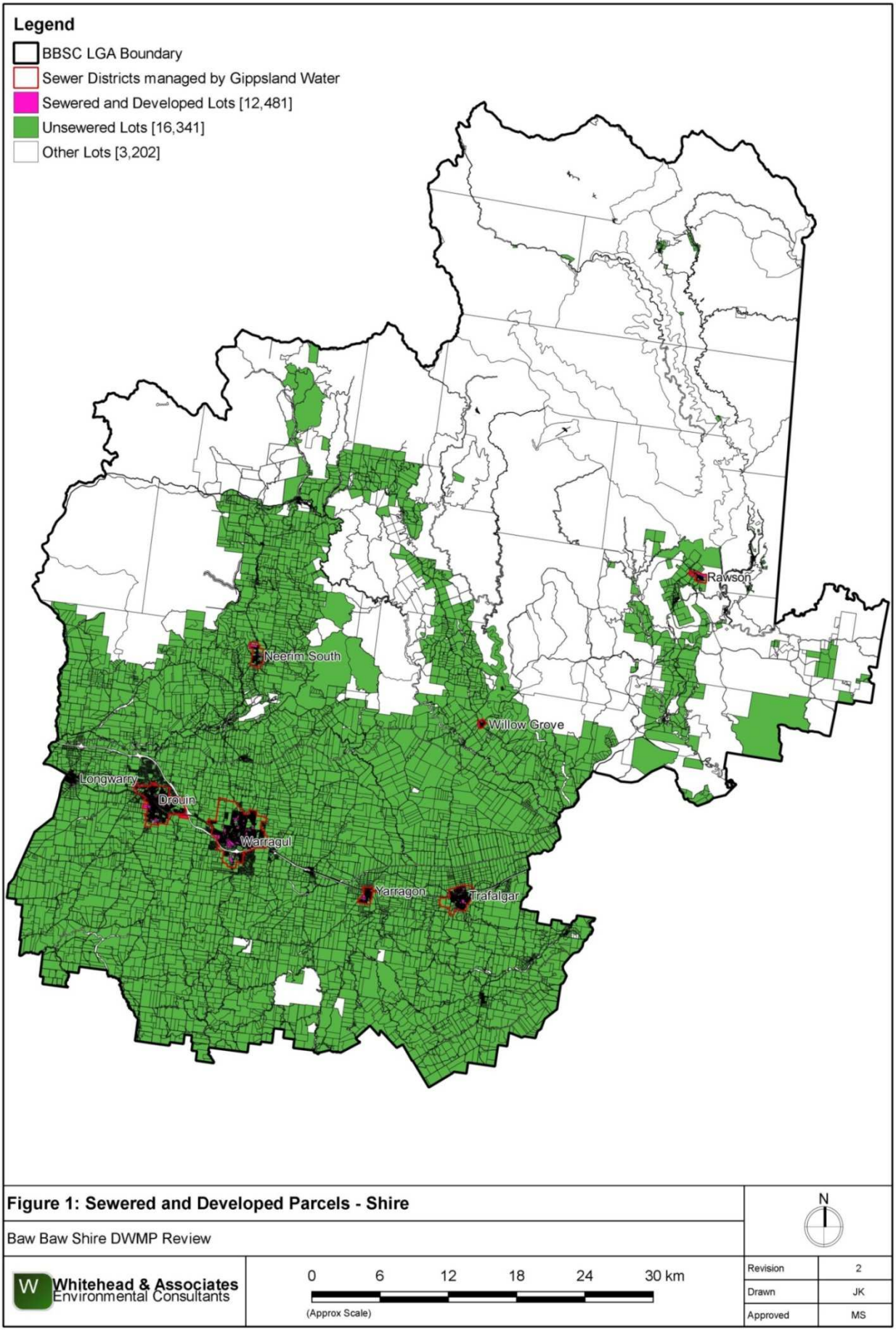
This Operational Plan forms the major component of the DWMP and outlines how BBSC will manage DWM systems and work with system designers, installers, owners and maintainers to minimise risk to public and environmental health. This document is supported by a Technical Document that provides detail on the regulatory framework for DWM and the methodology used to generate constraint mapping and corresponding Sensitivity Analysis.

The key objectives of this DWMP are to:

- Provide strategic direction for the development, management and education of wastewater throughout BBSC;
- Specify clear and achievable actions that when implemented will improve DWM in the Baw Baw Shire;
- Develop a risk-based decision tool to provide guidance on the development potential of unsewered lots;

- Identify priority areas that require investigation of existing on-site systems to understand and manage risk to public and environmental health;
- Develop a prioritised compliance program to monitor the performance and maintenance of permitted DWM systems;
- Provide guidance and minimum standards for those considering the design and installation of DWM systems;
- Provide greater certainty for landowners about the development potential of their land;

Figure 1: Sewered Lots within BBSC



1.2 Development of the DWMP

All Councils within Victoria are required to prepare a municipal DWMP. A DWMP is a planning and management document that provides a mechanism for the development, implementation and review of DWM programs to protect public and environmental health as well as amenity. The DWMP establishes Council's policy and commitment to sustainable ongoing DWM and its programs for compliance and enforcement. The DWMP establishes processes to ensure early consideration of DWM in the planning cycle and Council's responsibility for the monitoring and compliance of systems.

The DWMP assists landowners and Council staff to understand the requirements for development within the Shire in respect of DWM. With the information provided by the DWMP Council staff will be able to assist land owners and developers to determine the level of assessment that is required to improve DWM into the future.

A Project Steering Committee (PSC) was established to oversee the project, comprising of officers from Council, Gippsland Water, Melbourne Water, South East Water, South Gippsland Water, Southern Rural Water, West Gippsland Catchment Management Authority, EPA Victoria, and various community representative groups. An inception meeting and a preliminary risk assessment workshop were held at the outset of the project to determine priority regions, their risks and to establish the methodology of the risk assessment framework. Consultation with the Project Steering Committee (PSC) continued throughout the revision of this DWMP, resulting in a robust plan that is accountable and achievable.

BBSC understands the importance of community consultation and endeavours to ensure that the aims and outcomes of the DWMP are shared with the community, by encouraging feedback and discussion during development. Feedback from members of the community was critical to the production of this Plan. The concerns and suggestions most commonly raised during the community consultation process are listed as follows:

- Uncertainty about planning processes and time delays for obtaining development approvals, particularly for new development on small lots located in a DWSC;
- Uncertainty about Council and Water Corporation's requirements for new and upgraded DWM systems, particularly within the DWSCs;
- Questioning the fairness of owners having to forgo potential lot development or sales opportunities for small or non-compliant lots in the DWSCs (i.e. regulatory controls and expectations change between buying and developing or selling);
- The view that large, rural properties do not pose a threat to drinking water quality and should be allowed to utilise primary DWM systems.

In accordance with Council's Community Participation Time Policy (2015), a Community Engagement Strategy was developed for the project and consultation was undertaken with local communities and key stakeholders throughout the Shire. Community members were invited to review the DWMP during the review period within January and February 2016 and provide submissions on the document. Council received two return comments.

The Draft DWMP will be updated following public exhibition of the Plan. Further liaison will also be carried out during this period with all relevant Water Corporations, neighbouring Councils and the EPA.

1.2.1 Guidelines – Planning Permit Applications in Open, Potable Water Supply Catchment Areas (DSE, 2012)

These Guidelines outline the requirements for development in declared water supply catchment areas (DWSC), where a planning permit is required to use land for a dwelling or to subdivide land, or to develop land pursuant to a schedule to the Environmental Significance Overlay that has catchment or water quality protection as an object.

Guideline 1 requires that the density of dwellings should be no greater than one dwelling per 40 hectares and each lot created in a subdivision should be at least 40 hectares in area. The dwelling density is established by calculating the number of dwellings within a one kilometre radius of the site of the proposed dwelling. The density requirement of Guideline 1 does not apply where:

- Category 1: A permit is not required (i.e. outside of the DWSC/ Environmental Significance Overlay);
- Category 2: If the dwelling is connected to reticulated sewerage;
- Category 3: If the development is consistent with a Catchment Policy that has been prepared for the catchment and endorsed by the relevant Water Corporation following consultation with relevant stakeholders; and
- Category 4: The Water Corporation is satisfied that Council has prepared, adopted and is implementing a DWMP in accordance with DWMP requirements.

The preparation and implementation of this DWMP and Action Plan will allow BBSC to demonstrate that it is meeting the requirements of Ministerial Guideline 1. Once the Category 4 criterion is met, the Water Corporations have the ability to consider applications that would result in a higher density of development than would otherwise be permitted by Guideline 1. In order to relax this density requirement, all conditions of Guideline 1, as listed below, are to be met:

- The minimum lot size area specified in the zone for subdivision is met in respect of each lot (for subdivision applications only);
- The Water Corporation is satisfied that the Council has prepared, adopted and is implementing a DWMP in accordance with the DWMP requirements; and
- The proposal does not present an unacceptable risk to the catchment having regard to items a-h which is detailed in Table 1. Items a-c are addressed through the Sensitivity Analysis as detailed in Section 5 of this DWMP. Items d-e may be addressed through the Cumulative Impact Assessment component of the RAF (Stage 6) or other methods as determined by the Council or Water Corporation. The remaining items (f-h) will be dealt with under other respective planning controls.

The preparation, adoption and implementation of a DWMP is required for the relaxation of Guideline 1. Many of the items for compliance with Guideline 1 will form part of the Operational Plan of this DWMP. These actions are identified in the DWMP and will result in the adoption of the DWMP by Council, and endorsement by the relevant stakeholders. Table 2 outlines how this will be achieved.

For the DWMP to be considered for endorsement by the Water Corporations, BBSC is required to demonstrate that resourcing is achievable for implementation of the plan, including; monitoring, enforcement, review and auditing. Coordination of Council and Water Corporations regarding the effective implementation of the DWMP is included in the Action Plan (Section 13).

Table 1: Items a-h conditions of Guideline 1

Item Condition	Relevant Section within DWMP
a – the proximity and connectivity of the proposal site to a waterway or a potable water supply source (including a reservoir).	Technical Document 4.1.2 and 6.2.3.1.
b – the existing condition of the catchment and evidence of unacceptable water quality impacts.	Operational Plan 2, 7.4, 12 and Technical Document 4.1, 4.2.
c – the quality of the soil.	Technical Document 4.1.3, 6.2.5 and 8.3.4.
d – the slope of the land.	Technical Document 6.2.4 and 8.3.3.
e – the link between the proposal and the use of the land for a productive purpose.	Operational Plan 5.4.
f – the existing lot and dwelling pattern in the vicinity of the site.	Operational Plan 5.1, 7.2, Technical Document 2.3, 2.4, 5.2, 7, Appendix B Town Reports.
g – any site remediation and/or improvement works that form part of the application.	Operational Plan 5.2, 5.3, 5.5, 9.4 and Technical Document 2.2.
h – the intensity or size of the development or use proposed and the amount of run-off that is likely to be generated.	Operational Plan 7.2, 7.3, 7.4 and Technical Document 2.3, 6.2.4, 6.2.5, 7, 8.3.3.

Table 2: Guideline 1 Requirements

Action	Details	Completed within this DWMP	Comments/Reference
The DWMP must be prepared or reviewed in consultation with all relevant stakeholders.	Other local governments with which catchments are shared	Yes	Liaison with abutting Councils will be undertaken during the public exhibition period. Detailed in Section 1.2 of the Operational Plan.
	EPA	Yes	A representative from the EPA was a part of the working group. All documentation relating to the preparation of the DWMP was provided to the EPA, which was also invited to comment on all drafts developed. Detailed in Section 1.2 of the Operational Plan.
	Local Water Corporations	Yes	This DWMP was prepared and progressively reviewed by a working group that contained representatives from Gippsland Water, Southern Rural Water, Melbourne Water and South Gippsland Water. All documentation relating to the preparation of the DWMP was provided to the Water Corporations, which were also invited to comment on all drafts developed. Detailed in Section 1.2 of the Operational Plan.
The DWMP must comprise a strategy including timelines and priorities to:	Prevent discharge of wastewater beyond lot boundaries	Yes	Assessment of lot DWM sensitivity, and assessment protocols to ensure best possible DWM system is installed. Section 8 outlines the responsibilities of property owner's, LCA assessors and Council with regards to effective DWM system design, installation and maintenance. Continual education of the community as per Action No. 12a and 12b. All lots will follow the LCA procedure outlined in Section 5.2 of the Operational Plan for their given Sensitivity Rating.
	Prevent individual and cumulative impacts on groundwater and surface water beneficial uses	Yes	Assessment of lot DWM sensitivity, and assessment protocols to ensure best possible DWM system is installed. Particular considerations to slope, soil, useable lot area and climate have been addressed within the Sensitivity Analysis. Section 5 of the Operational Plan details the methodology and results of the Sensitivity Analysis for each lot within the Shire as well as prioritising the towns.
The DWMP must provide for:	Effective monitoring of the condition of DWM systems, including compliance with permit conditions	Yes	Ongoing. Improvement of the data present within the wastewater management system to allow for effective management of existing permits and conditions. Targeted audit of systems for performance and compliance to be undertaken as a part of the Action Plan. Detailed in Sections 8, 9 and 10.

Action	Details	Completed within this DWMP	Comments/Reference
	The results of monitoring provided to stakeholders	Yes	Ongoing – annually (on date of DWMP Adoption). Report shall include summary of systems inspected, risk rating of systems, and results of any recommended upgrade works or compliance requirements. Detailed in Action No. 15a-c.
	Enforce action where non-compliance is identified	Yes	Ongoing – It has been shown in the inspection program that compliance and improvements in performance can be achieved without taking enforcement action in the majority of cases; however, Section 10 outlines enforcement actions for ongoing poor performance of systems. Council also has escalation points available to address system under-performance, with responses commensurate to the risk posed by poorly performing systems.
	A process review and update of the DWMP every five (5) years	Pending - 2021	Review of the DWMP proposed for the end of 2021. A 2019 review of the implementation of the DWMP will ensure the DWMP is on track and functioning. Detailed in Action 15c.
	Independent audit by an accredited auditor of the implementation of the DWMP, monitoring and enforcement every three (3) years	Pending - 2019	Audit to ensure that the work undertaken is done so in accordance with the DWMP. Detailed in Action No.14.
	The results of the audit are to be provided to all stakeholders as soon as possible after the audit	Pending- 2019	Results of the audit will be provided to all members of the PSC for review after the audit.
	BBSC is required to demonstrate that suitable resourcing for implementation, including monitoring, enforcement, review and audit is in place	Yes	This is detailed in Section 1.1 and 8 of the DWMP and the Action Plan (Section 13).

1.3 Implementation and Review

The effectiveness of the DWMP and the Risk-based Compliance Monitoring Program will depend on the ability of Council to implement the Action Plan (Section 13) and the monitoring program.

1.3.1 Responsibility for Implementation

To ensure the actions outlined in this Plan are carried out, Council will need to assign human resources to be responsible for the implementation of the Action Plan (Section 13). Timeframes have been suggested for each component of the Action Plan. The identification of priorities and subsequent resource scheduling is one of the first priorities to be completed once implementation of the DWMP begins.

The implementation of the risk-based Compliance Monitoring Program (refer to Section 9.4) will require regular system inspections on a priority basis to capture data, maintain compliance and public health standards.

System inspections can take more than an hour to complete (not including travel and record keeping) and can require follow-up inspections and education of system owners. In addition, staff must be trained in on-site wastewater assessment and be familiar with plumbing requirements to ensure compliance with repair and/or upgrade orders that can be made for systems under the program. Follow-up visits to properties to ensure compliance are likely to be required.

Action No. 2 of the Action Plan (Section 13) outlines the requirement for resource allocation of staff for the implementation of the DWMP. These staff may come from existing resources or involve the employment of new staff. The Public Health Unit has a current staffing level of 2.6 Environmental Health Officers and 0.8 administration and are required to manage DWM and other public health matters, such as the inspection and sampling of registered premises, complaint investigation, Tobacco Act smoke free enforcement and infectious disease investigations. In relation to DWM, the responsibility of the Environmental Health staff would be to:

- manage any resources allocation to the project;
- allocate tasks to staff as per the Action Plan, including administrative tasks;
- carry-out inspections of DWM systems;
- approve and supervise the implementation of DWM improvement works;
- assess and approve permit applications for new unsewered development;
- liaise with other sections of Council such as engineering and planning;
- liaise with primary stakeholders in the wastewater field, such as the community, CMAs, Water Corporations, EPA and DEWLP;
- monitor the effectiveness of the DWMP; and
- report to Council on a range of parameters as set out below.

This DWMP proposes many actions over the first three (3) years and subsequently, future planning should be considered for review in 2019 in conjunction with the external audit (refer to Action No. 14 of the Action Plan). Timeframes have been suggested for each component of the Action Plan. The Actions should be implemented in the time completion order set out in the Plan, and according to funding and staffing availability.

The implementation of this Plan will require a financial commitment from a number of stakeholders. The Action Plan highlights numerous opportunities for inter-agency cooperation on applications for funding and implementation. Innovative strategies for funding will be required if the risk to public health and the environment posed by poorly functioning on-site DW systems

is to be adequately managed. While property owners in unsewered areas will obviously benefit most from the implementation of this Plan, there is also a clear benefit to the rest of the Shire through the gradual improvement of water quality in drinking water and recreational catchments and a reduction in human health risks within the community.

Implementation of the DWMP has regional and state-wide benefits through the reduction in pollutants flowing downstream to catchments such as the internationally recognised Gippsland Lakes Ramsar site. Water Corporations responsible for the provision of safe drinking water also benefit from the improved management of unsewered areas. For these reasons, Council should consider and investigate possible funding sources from property owners, the broader community (through Council revenue), the Water Corporations, State Government agencies and regional natural resource groups, such as the CMAs.

1.3.2 Monitoring and Reporting

The effectiveness of the DWMP will be measured by a comprehensive monitoring and reporting process. Further to the requirements in the SEPP, Council will monitor and report annually to the Water Corporations (refer to Section 13, Action No. 15b) on a range of performance indicators listed in this DWMP, including but not limited to:

- the number of complaints about poorly functioning DWM systems;
- the number of system inspections for each risk category;
- the number of systems meeting permit conditions;
- the number of systems needing rectification (following inspection);
- the number of systems rectified;
- the number of systems still needing rectification; and
- the assessment of the results of surface and/or groundwater quality monitoring in respect to DWM and its potential impacts on water quality;

This reporting will not only indicate the progress of Operational Plan implementation, but it will also provide an indication of the effectiveness of the Actions to improve environmental/ public health and cumulative DWM risk across the Shire.

1.3.3 DWMP Review

The SEPP requires that the DWMP is independently audited every three years (refer to Action No. 14 of the Action Plan in Section 13) so as to ensure the DWMP is being implemented appropriately. Resource funding and time allocation must be made by Council to undertake this review.

2 Evaluation of DWM within BBSC

There are approximately 32,024 parcels (27,398 properties) within the Shire as of July 2015. The towns which are currently sewered are Warragul, Drouin, Yarragon, Trafalgar, Neerim South, Willow Grove, and Rawson, resulting in approximately 12,481 lots that are currently developed and sewered and 14,344 lots that are located within the sewered district (including undeveloped lots).

There are approximately 16,341 unsewered lots which are not located within reasonable distance to a sewer, or to which no sewer connection exists; with 11,818 of these unsewered lots that are likely developed (CIV>SV). All non-developable lots, 3,202 (i.e. National Park, State Forest, waterway or road), were not included in the unsewered lot count and subsequent analyses.

Of the 11,818 unsewered and likely developed lots, 27% (3,180) have a permit on BBSC's current database. It is estimated that there are 8,600 DWM systems across the Shire without a permit on the current database. Due to limited records of these systems it is difficult to determine how they are currently functioning and what risk they pose to public health. Therefore one of the key priorities of this Plan is to work with owners of existing systems to get a better understanding of the condition and operation of their systems.

This scenario is not unique to Baw Baw Shire and is why many Shires across Victoria, including Baw Baw, have emphasised the need to investigate the performance of existing 'unpermitted' systems in their DWMPs.

2.1 Domestic wastewater risks in Baw Baw Shire

2.1.1 Un-maintained existing septic tank systems

The majority of older systems include a conventional septic tank and absorption trenches. These can operate effectively in many cases; however, they do require regular maintenance. Common practice with these systems in Victoria was to bury the septic tank underground. Thus, the septic tanks are often difficult to locate and make maintenance challenging or impossible.

Without periodic desludging (every 3-5 years depending on occupancy), tanks can become overloaded with solids and do not provide adequate residence time for effective primary treatment. Without suitable settling, solids pass through to the land application system usually causing the soil to block up, resulting in trench failure and surcharge of effluent to the ground surface.

Septic tanks that do not have verified records of maintenance are likely to be greater than 20 years old and may be reaching end of life if they have not been maintained adequately. These systems, particularly those failing in DWSCs have the highest potential to impact public health.

2.1.2 Greywater discharge

Prior to 1998, blackwater was the primary wastewater component of concern to public health and hence untreated greywater was permitted to discharge off-site. Due to increased awareness of negative health risk posed by greywater, the EPA no longer permits off-site discharge. However, there is still a legacy in Victoria and Baw Baw of blackwater only systems that divert and concentrate untreated greywater off-site, often to public areas. Off-site discharge of greywater to public areas and those located in DWSCs are a priority for identification and improvement in this DWMP.

2.1.3 Declared Water Supply Catchments

Failing septic tanks or greywater discharge systems that are located within DWSC's significantly increase risk to public health because of the potential to transport infectious biological material directly to the water supply of large numbers of people. Due to the ability to impact many people it is important that the performance of DWM in DWSCs is understood and managed to decrease

risk to public health. Table 3 below includes the estimated number of DWM systems in DWSC's across Baw Baw Shire.

Table 3: Existing DWM Systems in DWSCs

	Existing DWM (Based on interpretation of aerial imagery)			
DWSC	**With Permit**	**Without Permit**	**Percent without**	**Total Systems**
Tanjil River	49	311	86%	360
Narracan Creek	58	271	82%	329
Tyers River	44	246	85%	290
Tarwin River (Meeniyan)	54	157	74%	211
Tarago River	26	67	72%	93
Deep Creek and Loch River (Noojee)	0	12	100%	12
Thomson River (All stages)	3	2	40%	5
Bunyip River	0	0	N/A	0
Drouin	0	0	N/A	0
Grand Total	**244**	**1,087**	**82%**	**1,331**

Table 3 does not necessarily mean that all DWM systems without a permit are failing, however, it is fair to suggest that if a system is not in Council's electronic database there is a high likelihood that the system is at least 15 years old, and in any many cases considerably older.

A key priority of this DWMP identified by the Shire and Water Corporations is to get a better understanding of how DWM systems in DWSC's are operating and educating owners about how best to maintain their systems to minimise public health, environmental and economic impact.

2.2 DWM Trends in Baw Baw Shire

Table 4 below provide a summary of the DWM systems within BBSC's permit management data base, current as of August 2015. Some of the earlier systems in the database do not have sufficient detail to be contained in this summary.

Table 4: DWM System Types

System Type	Number of Systems Inspected
Septic Tank	1,193
	1,029 (trenches)
AWTS	117 (subsurface irrigation)
	6 (trenches)
Sand Filter	208 (trenches)

System Type	Number of Systems Inspected
	108 (subsurface irrigation
Worm Farm	5 (sand filter with subsurface irrigation)
	9 (trenches)
Membrane System (Tertiary)	10 (subsurface irrigation)
Commercial	2
Reed Beds	1
Concrete Holding Tank	17
Other	30
Total	**2,735**[1]

The typical DWM profile in BBSC for older towns includes; small lot sizes, blackwater only systems with off-site greywater discharge, septic tanks buried 500mm below the surface and older systems (20-50 years old), many of these do not have a permit on record. Action 6 of this Plan has been developed to ensure information is continually gathered to identify and address DWM systems that have the highest probability to negatively impact public and environmental health. The combination of this proactive inspection of existing systems and the legislated requirement for approval of DWM system alterations will, over time reduce the number of unknown systems in the Shire.

In terms of newly installed DWM systems, the current regulatory framework is increasing the presence of secondary treatment systems with improved technology that achieve superior treatment outcomes. While effluent standards are improved, these systems bring with them a unique set of considerations. Often these systems are more complex and require increased maintenance requirements than more traditional systems. Monitoring of compliance with permit conditions for these systems is critical to ensure the technology continues to operate and reaches designed treatment standards.

Modelling output shows that there is a significantly high risk of effluent export from individual lots within towns like Noojee, Thorpdale and Walhalla. Modelling suggests on-site DWM is unlikely to be sustainable within these towns due to small lot sizes.

Nilma, Erica, Buln Buln and Neerim Junction pose a similar risk to public and environmental health due to existing greywater discharge and likely poor performance of blackwater trenches.

The constraints present in these existing towns prevent simple and low cost solutions. Improvement of DWM in these areas requires input from community and Water Corporations to match priorities and timelines with stakeholder expectations.

Newer systems installed in BBSC tend to provide higher levels of treatment through the use of AWTSs, sand filters or greywater treatment systems, and no longer discharge greywater off-site. These systems provide secondary treatment of the wastewater before discharge to LAA irrigation systems. However, these systems require more maintenance than a septic tank. EPA requires demonstration of servicing every three months for AWTS and every 12 months for sand filter systems.

Between July 2006 and August 2015, BBSC staff completed inspections for; 1,315 permits to install and 1,298 permits to use. During the same period service contractors submitted 3,279 service reports and 1,557 desludge reports. 17 complaints from the public were also investigated during this period.

[1] Not all DWM systems within the permit database had recorded information.

Of these reports; 48 were deemed critical non-compliant, 45 major non-compliant and 50 failed.

Within the last financial year (2015-2016), the Public Health Team completed inspections for 177 permits to install and 168 permits to use. 167 desludge reports and 389 service reports were submitted by contractors. Of these records, 31 were deemed non-compliant, 10 major non-compliance, 5 critical non-compliance and 1 minor health risk.

Annually the Public Health Team is expected to respond to ten (10) notified complaints, would undertake 150 permit to install and permit to use inspections, receive 115 desludge notifications, and 360 wastewater service reports.

2.3 Previous Draft 2006 DWMP

Although the 2006 plan as a whole was not adopted by Council it produced valuable risk assessment of site constraints for individual lots across its jurisdiction, allowing approvals and inspections to be risk based. A Comprehensive Risk Assessment was undertaken to provide an objective framework for targeting investment in DWM within the Shire. The BBSC (2006) DWMP incorporated a Risk Assessment of DWM in the Shire, which involved the generation of a broad scale on-site wastewater hazard map and the use of the Decentralised Sewage Model to assess the flow of wastewater throughout the environment within four high risk settlements.

The bio-geophysical (slope, soil and proximity to surface waterways and flood prone areas) capability for DWM was assessed and then interrogated against cadastre to consider the built hazard based on lot size. The resultant hazard map grid classified the DWM from low to very high for the entire Shire. The DSM involved a more detailed assessment to calculate the surplus effluent that cannot be assimilated on-lot and track the surplus effluent throughout the catchment. This assisted in assessing the public and environmental health risks and developing concept management strategies. The DSM was operated for four (4) towns, including Noojee, Erica, Thorpdale and Nilma. The modelling identified that 26-70% surplus effluent could not be managed on-lot.

The Risk Assessment highlighted the importance of lot size in the management of domestic wastewater within the towns.

Based on the outcomes of the Risk Assessment, there were eight (8) priority towns identified and were ranked based on level of risk; Walhalla (very high), Noojee (very high), Thorpdale (very high), Darnum (very high), Neerim Junction (high), Erica (high), Nilma (high), Buln Buln (medium). It was recommended that the management efforts were prioritised based on these rankings to maximise efficiency of investment.

Potential management strategies were provided for the priority towns, along with broad management strategies for the whole shire. Management strategies were developed under four (4) major categories; problem identification (inspections) and supervision, DWM upgrade (LCA) and repair/upgrades, interim management measures, and whole town solutions. The strategies were costed for planning purposes and the timeframes for their implementation. Council highlight that none of these strategies have been implemented, except for a complaint based inspection program which has not involved any town or clustered upgrades. No community scale DWM systems have been investigated or installed.

The Draft 2006 BBSC DWMP outlined a number of recommended actions to be undertaken for improved DWM within the Shire. A number of the actions were completed and many are in progress. All actions which were not implemented from the Draft 2006 BBSC DWMP have been reassessed for their relevance and included in the current Operational Plan where appropriate. Some actions are ongoing and have also been included in the revised DWMP as items which require continuing undertakings. Those actions which were undertaken or implemented in the Draft 2006 BBSC DWMP are detailed in Table 5 below. Many of the actions were not

undertaken due to resource or time limitations, or they required further actions and Council approval.

Table 5: BBSC (2006) DWMP Actions as of June 2016

DWMP Item	Review
Develop comprehensive database of all DWM systems present within the municipality.	All systems installed/altered since 1999 have been documented onto the electronic database with copies of plans and permits attached. As property files are called over for various information requests, the files are checked for details on any DWM system that may be present on the file; this is then added to the database.
Inspection program.	Inspection program is undertaken by licensed plumbers/drainers that are engaged by the property owner when service report requests are issued by Council to property owners. Council have developed a compliance program that monitors when service reports are due and sends out a notification to property owners. Council has not undertaken an inspection program to assess operational effectiveness/ status of existing systems. Council officers aim to conduct an approval site visit prior to issuing a permit to install a DWM system and then an installation inspection. Nuisance investigation also prompts Council to undertake inspections and possible system upgrades if they are not complying/causing a nuisance. Council have commenced enforcement of permit conditions. Reminder notices are issued to property owners if their DWM does not comply with permit conditions; particularly for higher risk lots. Council has also commenced issuing notices to property owners for failing to connect to the reticulated sewer, particularly in Longwarry.
DWM risk rating system.	Council introduced a risk rating system for DWM systems that have been installed. This assists EHO's with prioritising installation inspections.
Community Education	Council have developed information sheets that are sent out with a copy of the installed plans for every permit to use. Council has undertaken a number of educational presentations in various townships regarding DWM.
Funding/resourcing.	Access to external funding to allow for upgrades of either individual systems or via small town treatment systems was found to be quite limited for the funds on the scale required.
Community Local Law revision.	A new Local Law was adopted in 2016. All reference to DWM system management was removed by the Councillor's. Therefore, Council cannot manage any system without a permit unless a nuisance complaint is made.

3 Overview of Domestic Wastewater Management

3.1 What is Wastewater?

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

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

Domestic wastewater quality can vary greatly due to numerous factors; however Table 6 outlines typical values for domestic wastewater quality parameters.

Table 6: Typical Domestic Wastewater and Septic Effluent Quality[2]

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

3.2 The Historical Context

Historically the management of domestic wastewater systems, throughout Victoria, has been difficult. Local Councils are the regulatory authority for DWM and have generally been limited by time and financial support implementing effective DWMPs. Many Councils' throughout Victoria (and Australia) have previously provided very limited programs for DWM, focusing on an approval scheme for new systems and a basic system monitoring program, as time permits. There are limited cost recovery options for Councils to monitor increasingly complex and larger numbers of systems as the peri-urban areas experience rapid growth throughout Victoria. There is increasing pressure on all Councils within Victoria to improve DWM so that existing and future development does not impact on public health and the environment. The Auditor General's Report (2006) "Protecting our environment and community from failing septic tanks" made a number of recommendations to improve DWM and are relevant to this DWMP.

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

3.3 Wastewater Treatment

Wastewater is typically managed in urban environments in a community sewerage system, with treatment at a centralised wastewater treatment plant with disposal via discharge to waterways or land application. In areas where a centralised sewerage system cannot be provided, wastewater is managed on-site at each individual lot. On-site domestic wastewater is managed by a variety of treatment systems, including but not limited to:

- Septic Tanks;
- Aerated Wastewater Treatment Systems;
- Wet Composting Systems;
- Sand Filters; and
- Textile (fabric) Filters.

Appendix D in the Technical Document provides detailed information about treatment systems, with the EPA approval process detailed within Section 3.2.2 in the Technical Document. Following treatment, the effluent is then either disposed of or reused within the boundaries of the lot. The type of disposal or reuse system depends on the type of treatment system and the quality of effluent (primary or secondary).

Current best-practice is for effluent to be treated to a secondary standard or better, particularly within the DWSCs. Any variations to this must be provided with detailed evidence and explanations to demonstrate its suitability. Most systems apply effluent within the soil profile in a dedicated area on the lot (often referred to as the land application area or dispersal area). Highly treated and disinfected greywater can be used internally for toilet flushing and cold water supply to the laundry; however such systems are not common due to relatively high costs. Further details on land application systems are provided below.

3.4 Land Application of Treated Effluent

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

- Conventional Absorption Trenches and Beds;
- Evapotranspiration-Absorption (ETA) Trenches and Beds;
- Modified ETA Trenches and Beds – such as ‘Wick Trenches’ and modified pipe systems;
- Reed Beds;
- Wisconsin or Sand Mounds; and
- Low Pressure Effluent Distribution (LPED).

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

- All of the above systems suitable for primary effluent (although less commonly used);
- Surface spray or drip irrigation;
- Covered surface drip irrigation; and
- Subsurface drip irrigation.

Appendix D in the Technical Document provides detailed information about land application systems.

3.5 Environmental & Health Risks of Domestic Wastewater Management

Domestic wastewater can be highly variable in quantity and quality, which can impact on the performance of DWM treatment systems. Primary treatment in septic tank systems relies on the anaerobic breakdown of organic matter by microbes and the settling of solids. Shock loads or biocide use within the home can impact on the ability of these microbes to treat the wastewater and solids passing through the first treatment stage, resulting in poor quality of effluent being discharged to the environment.

DWM system failures are most often a result of poor system design, poor installation practices, inadequate maintenance and sometimes insufficient land area, all of which contribute to potential public and environmental health impacts. These are discussed below.

3.5.1 Human Health

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

1. **Bacteria** – domestic wastewater contains a wide variety and concentration of pathogenic and non-pathogenic bacteria. There are many waterborne infectious diseases e.g. typhoid and cholera. Infectious doses of disease causing bacteria in wastewater can lead to illness. Testing for pathogens is difficult and expensive, therefore indicator bacteria from the intestinal tract of uninfected humans and warm blooded animals is used; for example coliform bacteria such as Escherichia coli are used as an indicator of potential pathogenic/faecal contamination in water.
2. **Parasites** – (Protozoa and Helminths). The two dominant protozoan parasites of concern in the treatment of wastewater are:
    - Cryptosporidium; and
    - Giardia.

    These are both resistant to standard disinfection methods and pose considerable risk to susceptible members of the community (children, elderly and immune–compromised). Helminths or intestinal worms, e.g. tapeworms and roundworms, are also commonly found in wastewater. These release millions of environmentally resilient eggs throughout their lifespan.
3. **Viruses** – contamination of domestic wastewater by viruses may lead to major outbreaks, such as Hepatitis A (referred to as infectious hepatitis), which is the most dominant waterborne virus. Prevalent viruses transmitted within wastewater include Norovirus, Reovirus, Rotavirus and Enterovirus (Polio and Non-Polio Virus), which all typically cause gastroenteritis symptoms. Viruses can cause widespread illness in epidemic patterns. Viruses are more common and diverse than bacteria in the aquatic environment.

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

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

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

3.5.2 Environmental

Nutrients, along with trace quantities of other elements, are essential for biological growth. Phosphorus (P) and nitrogen (N) are the principal nutrients of concern with regard to DWM systems and are present in a range of compounds in raw wastewater and treated effluent. In excess, phosphate and nitrate encourage vigorous growth of algae and aquatic plants in surface water systems, which can lead to ecological disruptions and reduced water quality. Poor-quality raw supply water is more difficult and costly to treat for drinking water purposes, compared to water taken from catchments where pollution inputs are reduced.

3.5.3 Social

The poor management of DWM systems has potential financial implications where it may adversely impact on drinking water supplies by contamination. Where DWM systems cause pollution from effluent discharges to waterways, there is a requirement for a higher level of treatment of drinking water prior to distribution. Where failing DWM systems cause odours or discharge into adjoining properties, there is an adverse impact on public amenity and these may cause a nuisance. There are financial implications for property owners who have a failing DWM system and are required to complete upgrade works. New systems can be expensive and some property owners may not have the finances to undertake works immediately, resulting in continuing system failures.

3.5.4 Summary

Table 7 below summarises the risks common to all DWM systems (treatment and land application components). The operation of a large number of DWM systems within a catchment may have long term negative and cumulative impacts on that particular area and on downstream water bodies. However, where systems are correctly designed, installed and managed (including upgrades to existing systems where necessary), the risks of cumulative impacts to the downstream environment are substantially reduced. As such, the sustainable density of DWM systems is higher when systems are operating optimally, compared to when a proportion (or all) systems are underperforming or failing in some way.

Table 7: Health and Environmental Risks of DWM Systems

Risk	Typical Cause	Potential Impacts
Ineffective regulation	Lack of staff/ time	Environmental, Health and Social
Off-site discharge	Failing/ poorly managed/ poorly located/ damaged/ unapproved treatment and/or land application system(s)/ previous approved practices for off-site discharges	Environmental, Health and Social
Disinfection failure	No disinfection (chlorine)/ poor upstream treatment	Health
Failure of treatment system	Lack of maintenance/ poor installation/ age of system	Environmental, Health and Social
Surcharge from land application area	Peak loads/ overload of system/ failure of land application system/ undersized or poorly designed system	Environmental, Health and Social
Failure of land application system	Clogging layer in trenches or beds/ broken pipes/ inappropriate hydraulics	Environmental, Health and Social
Human contact with effluent	Poor OH&S in maintenance/ inappropriate disposal methods	Health and Social
Owner ignorance	Lack of knowledge of system	Environmental, Health and Social
Damage to land application system	Access by vehicles or stock/ inappropriate boundaries	Health and Social
Odour	Inadequate treatment in systems/ mechanical fault	Social
Groundwater contamination	Effluent disposal area overloaded (undersized and/or failing)/ poorly located	Environmental, Health and Social
Surface water contamination	Surface runoff of effluent in area with reduced setback distance buffers/ recharge from contaminated GW	Environmental, Health and Social
Human or animal disease outbreak	Direct or indirect pathogen exposure due to any of above causes	Health and Social
Degradation of soils	Undersized or failing land application system/ usually high strength effluent	Environmental and Social
Increased algae growth	Excess nitrate and phosphate in surface waters	Environmental, Health and Social
Degradation of native vegetation	Excess nitrate and phosphate in soils and/ or surface waters	Environmental and Social

4 Legislation and Policies

4.1 Council's Plans and Policies

The DWMP has been developed to fit with other Council Policies and Plans through actions identified in the Action Plan. The following lists the various Council Plans which have been included in the DWMP review, which are discussed further within the Technical Document.

- Council Plan 2013 – 2017;
- Baw Baw 2050 Community Vision;
- Baw Baw Settlement Management Plan 2013-2017
- Baw Baw Shire Municipal Public Health and Wellbeing Plan 2013 – 2017;
- Baw Baw Planning Scheme;
- Growth Management Strategy and subsequent Warragul and Drouin Structure Plans;
- Baw Baw Shire Council, Yarragon Structure Plan October 2010; and
- Council Budget.

4.2 Legislation

A summary of the legislation and their stipulated requirements relevant to the regulation of DWM systems are detailed in the Technical Document. The relevant legislation includes:

- *Local Government Act* 1989;
- Baw Baw Community Local Law 2016;
- *Environment Protection Act* 1970;
- *Water Act* 1989;
- *Safe Drinking Water Act* 2003 and Regulation 2005;
- *Planning and Environment Act* 1987;
- *Public Health and Wellbeing Act* 2008;
- State Environmental Protection Policy Waters of Victoria;
- State Environmental Protection Policy Groundwater of Victoria;
- *Catchment and Land Protection Act* 1994; and
- Victorian Building Regulations 2006.

4.3 Regulatory and Legislated Authorities

DWM involves, to varying degrees, a number of regulatory agencies:

- Council (Baw Baw Shire Council);
- Environment Protection Authority Victoria (EPA);
- Plumbing Industry Commission (PIC);
- Municipal Association of Victoria (MAV);
- Gippsland Water;
- South Gippsland Water;
- Southern Rural Water;

- Melbourne Water;
- South East Water;
- Department of Environment, Land, Water and Planning (DELWP);
- West Gippsland Catchment Management Authority; and
- Port Phillip and Westernport Catchment Management Authority.

4.4 Administrative Authorities

VCAT is a tribunal which deals with civil disputes, administrative decisions and appeals that are heard before Judge or member. It provides a dispute resolution service for both government and individuals within Victoria.

In recent cases, VCAT has questioned the quality of LCAs for DWM, particularly where a site is located within a potable water supply catchment. VCAT has also questioned the rigour of Council evaluation of these LCAs and how the minimum development guideline of 1 dwelling per 40 hectares should be applied in the DWSCs (ref. 'Guidelines – Planning Permit Applications in Open, Potable Water Supply Catchment Areas' – DSE, 2012).

4.5 Standards and Guidelines

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

- EPA Code of Practice – Onsite Wastewater Management, Publication 891.4 (2016);
- Land Capability Assessment – Onsite Wastewater Management, Publication 746.1 (2003);
- AS/NZS *1547:2012* Onsite Domestic Wastewater Management;
- AS/NZS *3500:2003* Plumbing and Drainage;
- Auditor General Report (2006) *Protecting our environment and community from failing septic tanks*; and
- Guidelines – Planning Permit Applications in Open, Potable Water Supply Catchment Areas (DSE, 2012).

Note: Since July 2016 EPA no longer award a Certificate of Approval to individual on-site wastewater systems. EPA now approves four system types in line with Australian Standards

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

Council Officers can only approve the installation of an on-site wastewater system that is certified to comply with the relevant Australian Standard by an accredited conformity assessment body (CAB). As part of a permit application to council, the applicant will need to include a copy of the certificate of conformity from a CAB.

5 Risk Assessment Framework

Risk Assessment is practiced by individuals and organisations all of the time. However, with the evolving complexity of society, a need for formal Risk Assessment has arisen since the 1950's. This began with studies of food safety and was progressively adopted in the fields of public health and environmental impact. Formal risk assessment has proven to be an effective way of making decisions in situations involving considerable complexity and uncertainty.

Formal recognition of the value, intent and application of risk assessment is provided in the international standard for formal risk management and associated guidelines (Standards Australia, 2009; IEC/ISO, 2009). AS/NZS ISO 31000:2009 (Risk Management) defines risk as the "effect of uncertainty on objectives", where an effect is a (+/-) deviation from the expected and objectives can apply to differing aspects (i.e. environmental goals) or at differing scales (i.e. strategic). In more general terms, Risk is often expressed in terms of the 'consequences' of an event or action and the associated 'likelihood' of that event/action occurring.

The fundamental purpose of any DWMP is the identification and management of risk from DWM systems to public and environmental health. A means of addressing the DWM issues raised by the unsewered towns, both within and outside of DWSCs, is to prepare a Risk Assessment tool that scientifically measures possible impacts of DWM systems on public and environmental health. A comprehensive 4-staged Risk Assessment model (Framework) (RAF) has been developed for this DWMP to assist Council in analysing risk at variable scales (Shire-wide to individual lot).

Figure 2 provides an overview of how each stage of the Risk Assessment Framework refines the risk assessment process. It also identifies the parameters applied and outputs derived at each stage in the process.

Together, all stages of the Risk Assessment have substantial value as a development assessment tool and provide a defensible identification and justification for prioritisation of existing management issues within the priority towns. It incorporates tools that assess the bio-geophysical capability for DWM in existing unsewered towns, recently developed unsewered subdivisions and undeveloped unsewered land. It will be primarily used:

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

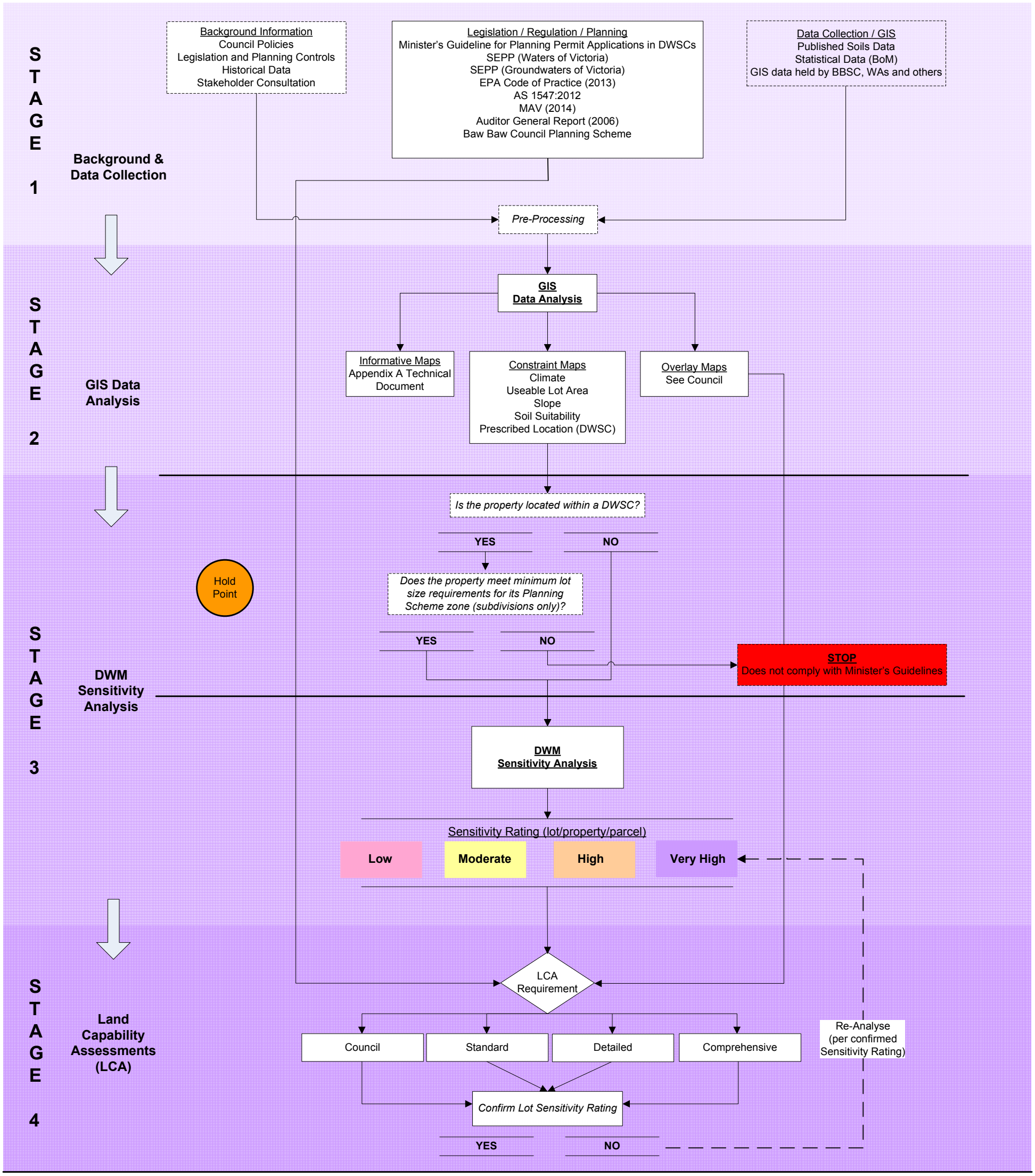
The overall Risk Assessment aims to provide Council with a reasoned and justified tool to prioritise future development, and to implement monitoring and upgrading of DWM systems within the Shire by highlighting regions with elevated DWM risk profiles (e.g. older DWM systems in DWSCs). Consideration of both individual (lot) and cumulative (regional) DWM risk provides a versatile tool for:

a) examining changes from an accepted 'baseline' condition (i.e. water quality or environmental indicators).

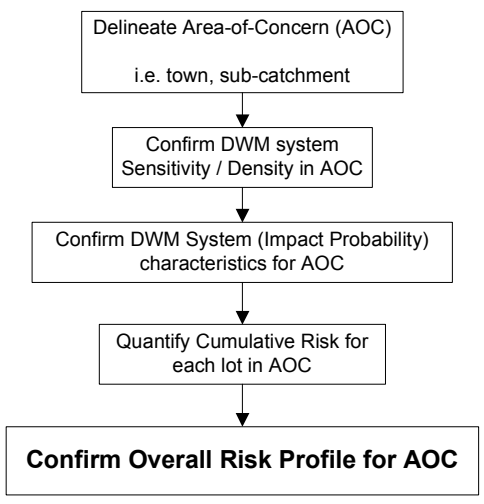
b) preparing cost/benefit analyses for upgrade/ improvement options (i.e. DWM vs. sewerage).

c) comparing alternate land use/development scenarios (i.e. development density).

BAW BAW SHIRE COUNCIL DWMP - DWM RISK ASSESSMENT FRAMEWORK (RAF) FLOW CHART (Figure 3)



Cumulative Risk Analysis (Optional)



5.1 Current Planning Scheme Zone Minimum Lot Size Compliance for Subdivisions

As discussed in greater detail in Section 6.2.3 of the Technical Document, lot size plays a key role in determining a lot's capacity for sustainable long-term DWM and influences the selection of appropriate DWM systems. The BBSC Planning Scheme sets out policies and requirements for the use, development, subdivision and protection of land. The requirements and particular provisions for each zone are detailed within the BBSC Planning Scheme. The current zonings for the Shire were thematically mapped to assist Council with future development opportunities and identification of constraints in relation to DWM.

BBSC is seeking a relaxation of Guideline 1 of the Minister's Guidelines for Planning permit applications in open, potable water supply catchment areas (DSE, 2012) from the Water Corporations. The first condition of Guideline 1 states that the minimum lot size area specified in the zone for must be met in respect of each lot for subdivisions. If this relaxation is granted and a higher density of development within a DWSC is sought, then this condition must be met. This Guideline only relates to unsewered lots located within a DWSC.

The compliancy of existing parcels to the minimum lot size requirements discussed within the Planning Scheme is detailed in Section 7 of the Technical Document.

5.2 Stage 3 - DWM Sensitivity Analysis

The primary objective of the DWMP is to assess all 'unsewered' 'developable' lots within BBSC to determine their suitability to sustainably manage domestic wastewater on-site in compliance with legislative (i.e. SEPPs) and regulatory (i.e. Code) requirements. The inter-relationship of a wide range of individual constraints and variables affect the specific land capability and associated limitations for sustainable on-site DWM. Understanding this inter-relationship can be difficult, particularly in terms of assessing the relative contributions of individual constraints in a broad-scale evaluation.

5.2.1 Methodology and Rationale

The DWM Sensitivity Analysis involved assessing the cumulative effect of the individual constraints detailed in Section 6 of the Technical Document: soil suitability, slope, useable lot area, climate and prescribed location (i.e. whether or not a lot is located within a DWSC) for all of the unsewered parcels within BBSC. Each lot was assigned a rating class for each of the individual constraints based on the criteria detailed in Section 6 of the Technical Document.

The following algorithm was developed using professional judgement and reviews of current literature. The algorithm generally follows the rationale developed for the Colac Otway Domestic Wastewater Management Plan (Colac Otway Shire Council, 2015) and the Mansfield Domestic Wastewater Management Plan Pilot Project (Mansfield Shire Council, 2014); with adaptation by the PSC to reflect BBSC specific concerns. It details how the individual constraints were combined to determine the final Sensitivity Rating for each unsewered property/parcel within BBSC:

((Soil Suitability + Slope) x ((2 x Useable Lot Area) + Climate)) / 10

The algorithm incorporates the constraints imposed by landform and soil characteristics, as well as the local climate which will impact on the selection and sizing of DWM systems for any given location. The useable lot area refers to the physical constraints imposed by prescribed setbacks from sensitive features, such as surface waterways (permanent and intermittent); groundwater bores and flood prone land. The existing vegetation on a lot, as well as the proposed development footprint (i.e. building envelope and improvements), will also impact on the resultant useable lot area. If there is insufficient area remaining, the lot will be unable to sustainably manage the wastewater on-site and, hence, not comply with the requirements of the SEPP.

The final sensitivity value (number) derived from the algorithm for each lot was assessed to determine the appropriate 'Sensitivity Rating' ranges. Further information on the development of

the Sensitivity Rating classification is provided in the Technical Document (Section 6.2.1). The following outlines the respective ranges and associated final Sensitivity Rating classes:

- Very High: > 5.3;
- High: 3.9 ≤ x ≤ 5.3;
- Moderate: 1.9 ≤ x < 3.9; and
- Low: < 1.9.

Further, all lots that were prescribed locations were determined. This step was included to ensure that all lots located within a DWSC are subject to a LCA prior to development, as per Section 3.6 of the EPA Code of Practice (2013). For example, for a 'low' Sensitivity Rating lot within a DWSC, the algorithm automatically increases the rating to 'moderate' to ensure that a LCA is undertaken, in accordance with the Code of Practice.

The criteria used to determine the Sensitivity Rating categories were based on previous constraint assessments for unsewered towns in Australia undertaken by W&A, and relevant Australian and Victorian guidelines for DWM. Table 8 provides a rationale for the interpretations that were used to derive the ratings, which is also discussed in Section 6.2.1 of the Technical Document.

The final Sensitivity Ratings give guidance towards the DWM requirements as stipulated by Council. For existing DWM systems, the level of sensitivity will commonly reflect the level of challenge that has been experienced in managing the system. This information will help guide property owners and Council in the ongoing management of existing systems.

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

Table 8: Sensitivity Rating Descriptions

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

5.2.3 Sensitivity Analysis Mapping

The final Sensitivity Rating for each individual unsewered lot within BBSC is shown in Figure 3 and Table 9. The final Sensitivity Rating and final map for each of the priority towns are detailed in the respective Town Reports in Appendix B of the Technical Document. The priority towns were highlighted as priority regions of investigation by Council and the PSC. The towns include: Buln Buln, Darnum, Erica, Neerim Junction, Nilma, Noojee, Thorpdale and Walhalla. The town centre boundaries were primarily based on the zoning boundaries, with the town boundaries based on the parish locality boundaries provided by Council.

The lots within each lot include both commercial and domestic DWM systems without distinction. Town boundaries may also, on occasion, transect a given lot. In that instance the lot is considered to be within the town boundary and its Sensitivity Rating will be applied to the entire lot.

Council maintains a database of the calculated Sensitivity Ratings for all the unsewered lots within the Shire, which will be updated as they are validated by LCA or by Council inspection as part of this DWMP.

An owner can contact Council to obtain the data for the final Sensitivity Rating of their land. Council intends to develop an interactive map interface on the Council website where residents can access the final Sensitivity Analysis map as detailed in Action No. 4b in the Action Plan (Section 13).

Table 9: Final Sensitivity Rating Summary

	Total Lots	Final Sensitivity Rating*number of lots			
		Very High	High	Moderate	Low
Shire (Overall)	16,341	1,071	3,259	7,588	4,423
Buln Buln	255	0	34	114	107
Darnum	429	3	83	146	197
Erica	187	11	32	144	0
Neerim Junction	122	7	28	87	0
Nilma	164	1	17	85	61
Noojee	365	176	87	102	0
Thorpdale	569	1	132	430	6
Walhalla	207	160	14	33	0

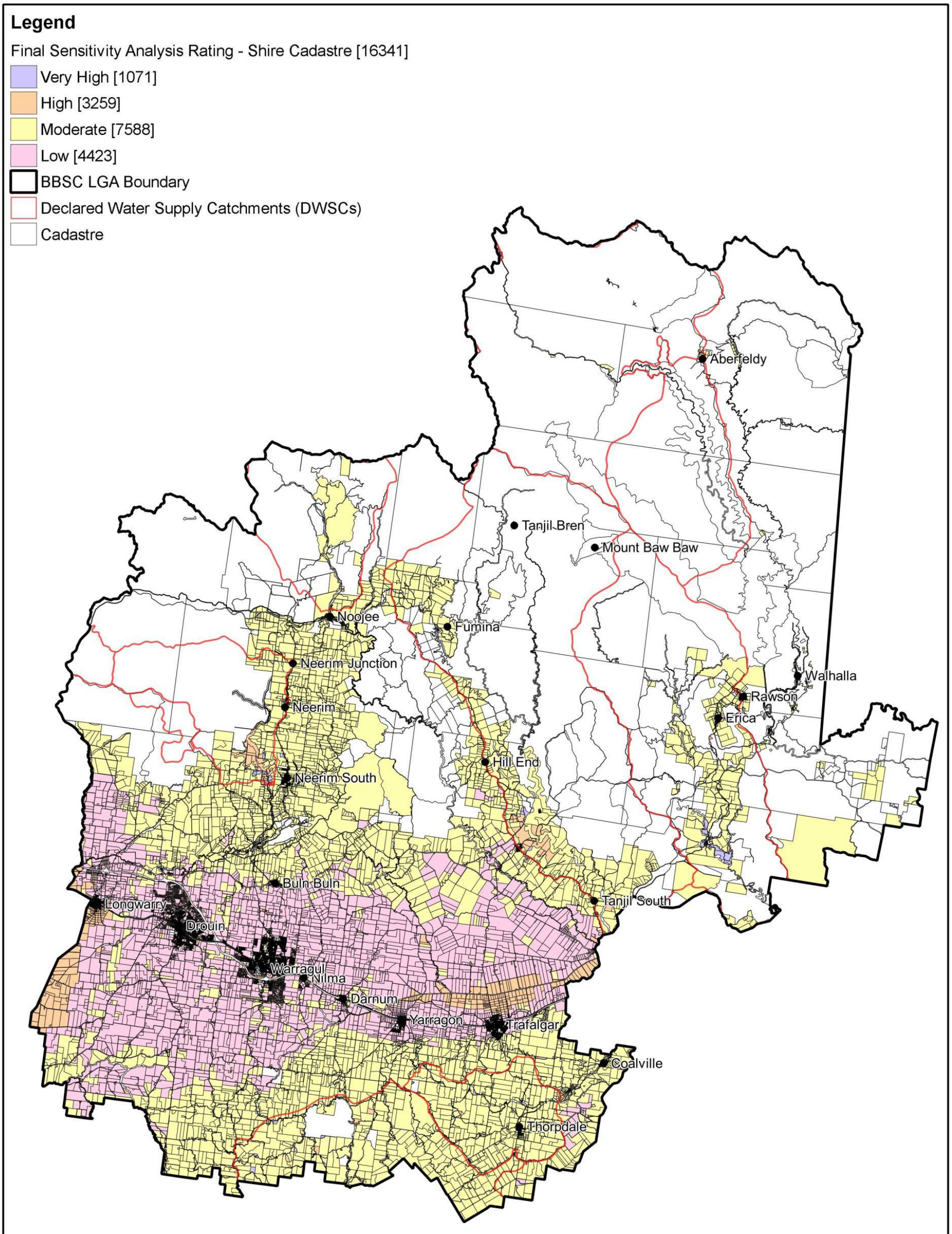


Figure 4: Sensitivity Analysis - Shire

Baw Baw Shire DWMP Review

Whitehead & Associates Environmental Consultants

Revision	4
Drawn	JK
Approved	MS

5.2.4 Evaluation of Final Sensitivity Analysis

The Sensitivity Analysis resulted in the lots throughout the majority of the Shire being assigned a Moderate Sensitivity Rating. The final Sensitivity Analysis map highlights the inherent relationship that results in only one or two individual constraints (e.g. soil suitability) generally affecting any given lot. This relationship is described further in the individual Town Reports (Appendix B, Technical Document). Each town has particular DWM constraints that need to be addressed.

The mapping identifies approximately:

- 27.07% of lots within the Shire with a Low Sensitivity Rating;
- 46.44% of lots with a Moderate Sensitivity Rating;
- 19.94% of lots with a High Sensitivity Rating; and
- 6.55% of lots with a Very High Sensitivity Rating.

The spatial distribution of the levels of sensitivity appears to be distinctly influenced by topographical features, such as the alpine ranges. The central region along the Princes Corridor appears to pose a lower sensitivity to sustainable DWM, whereas, the northern and southern regions of the Shire associated with the Great Dividing Range and Strzelecki Ranges, respectively, generally pose a higher sensitivity to sustainable DWM. Therefore, prioritisation should be towards the areas that pose a higher level of sensitivity and around the developed towns.

According to the individual constraint maps as detailed in the Technical Document, the parameters contributing the greatest limitation to DWM within the Shire are useable lot area, in particular the proximity to surface waters, as well as soil suitability, with localised impacts from the other constraints. Further detail is provided within the Town Reports in Appendix B of the Technical Document.

Climate (rainfall versus evaporation) soil moisture surplus is most limiting in the higher altitudes around Mount Baw Baw and the Strzelecki Ranges. Useable lot area is constrained around towns as well as rural residential and farming lots to the south of Longwarry and north of Trafalgar and Yarragon.

There is a high percentage of surface water coverage throughout the Shire, particularly either side of the development corridor along the Princes Highway, consistent with the locations of the DWSCs, which occupy approximately 44% of the Shire. Sensitivity Rating summaries for the DWSCs are below shown in Table 10; except for Drouin and Bunyip River which do not include any unsewered parcels within their defined catchment area.

Table 10: Sensitivity Ratings for Lots within DWSCs

DWSC	Final Sensitivity Rating - Number of lots			
	Total Lots	Very High	High	Moderate
Tarwin River (Meeniyan)	507	88	37	382
Tanjil River	564	79	108	377
Tarago River	278	44	72	162
Tyers River	414	42	46	326
Narracan Creek	759	21	138	600
Deep Creek and Loch River (Noojee)	35	5	3	27
Thomson River	18	2	3	13
Total	2,575	281	407	1887

Groundwater bores are predominately focused around the development corridor, with considerable regions of flood prone land in close proximity to the towns are to the southwest of

Tanjil South, north of Trafalgar and Yarragon, northwest of Nilma and around Longwarry. Regions of increased slope are evident on the Shire-wide scale, with the northern and southern regions either side of the main development corridor along the Princes Highway; consistent with the Baw Baw alpine region and Strzelecki Ranges.

Soil suitability is predominately low for DWM throughout the Shire; regions of moderately constraining soil are found around Thorpdale, Warragul/Nilma, Drouin, Erica and Hill End. Additionally, more than half of the lots within the Shire do not meet the minimum lot size zoning requirements as set out in the Planning Scheme.

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

Furthermore, the degree of risk depends on the type of effluent disposal system and generated effluent quality (e.g. subsurface irrigation can be installed on slopes up to 15 – 20% in some cases, but this would be impractical for trenches). This relationship is detailed further in Section 6.2.4 of the Technical Document. Physical constraints can often be overcome or substantially mitigated by a range of measures (such as terracing, importing topsoil fill, installing stormwater diversions, removing vegetation or planting nutrient tolerant vegetation), thereby increasing the 'suitability' of the available area.

Overall Sensitivity Ratings should be used to justify the requirement for more detailed individual lot LCAs, more rigorous assessment of development proposals and to target investment in the inspection and management of existing on-site DWM systems, rather than to define system performance or land capability.

Council will need to develop additional fields within the DWM system database to include the lot Sensitivity Rating and associated information (all the constraint criteria used in deriving the final Sensitivity Rating), which is detailed in Action No. 3b in the Action Plan (Section 13). This data will need to be reviewed by Council after completion of a LCA and updated as necessary.

5.3 Stage 4 - Land Capability Assessment

A Land Capability Assessment (LCA) is required when submitting a Planning Permit application for a development or subdivision on a Moderate, High or Very High Risk lot (and for Low Risk lots within a DWSC), or when a Certificate to Install a DWM system is required.

A LCA must be conducted in accordance with the minimum standards outlined in the current EPA Code of Practice and *AS/NZS 1547:2012* and should be guided by the Victorian Model Land Capability Assessment Framework (MAV, 2014). A LCA needs to demonstrate that the requirements of the SEPP will be met.

The Sensitivity Rating determined by the Sensitivity Analysis will act as the default LCA standard for lots as defined by this DWMP. It is important to note that there may be circumstances where the desktop Sensitivity Analysis results do not correlate perfectly with actual site conditions. In these circumstances, an increase or decrease in the Sensitivity Rating and LCA requirements may occur at the discretion of Council through completing a Site Inspection and Field Investigation. Therefore, the results of site-specific LCAs will constantly update the Sensitivity Analysis database held by Council, which will improve site understanding and validity of results; as detailed in Action No. 4a of the Action Plan (Section 13). The Environmental Health Officers will need to be trained by the GIS Officer in accessing and updating the Sensitivity Analysis mapping in order to provide details to residents and ensure that the database remains up to date as detailed in Action No. 5 of the Action Plan (Section 13).

It may be suitable for accredited LCA assessors to provide a clause within the contract warning clients of a potential fluctuation of requirements, and hence cost, that is dependent on Sensitivity Rating confirmation of the lot. The current EPA Code of Practice states that Council's Environmental Health Officers (EHOs) or other Authorised Officers (AO) can determine what comprises a satisfactory LCA.

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

When completing a LCA, the results from LCA stages 1-3 must be confirmed with Council in order to assess the final Sensitivity Rating for the lot and to confirm final LCA requirements for DWM system selection and design. A Site Plan showing the available effluent management area(s) must be provided, along with the Sensitivity Pro-forma Checklist (example shown below in Table 11), for Council assessment. A copy of the Sensitivity Pro-forma Checklist can also be found in Appendix B. Copies of the minimum requirements for assessment and reporting for each level of LCA are provided in Appendix C.

Table 11: Sensitivity Pro-forma Checklist Example

Parameter	Site specific input
PFI Identification Number[3]	(e.g. 5763482)
Lot Address	(e.g. 57 Main Road)
Locality	(e.g. Walhalla)
Zoning and Overlay	(e.g. Township Zone)
Lot Size (ha)	(e.g. 4ha)
Soil Texture	Soil Category as per AS/NZS 1547:2012 (i.e. Category 4 - Clay loam)
Soil Depth (m)	Depth to limiting layer (1.7m)
Soil Structure	Weak, moderate, strong, massive or apedal (i.e. weak)
Soil Limitations	(e.g. sodic and low fertility)
Permeability (Ksat) (m/day)	Indicative as per *AS/NZS 1547:2012* or directly measured in-situ (e.g. 0.1m/day) using approved methodology (i.e. Appendix G *AS/NZS 1547:2012*)
Lot Slope (%)	Average slope (e.g. 4%)
Presence of Surface Waters	Distance to nearest surface waters
Useable Lot Area (ha)	Apply all relevant setback distances (e.g. 1.5ha)

With regards to DWM system selection and sizing, the hydraulic permeability and corresponding 'design' loading rate for the most limiting soil horizon within 1.2m of the soil surface must be used. This conservative approach ensures that the loading of wastewater on the soil can be supported for the entire soil profile to ensure that surface runoff and excessive deep drainage does not occur. The DWM systems should be sized either:

- as per the System Sizing Tables (Section 8 of the Technical Document) if permitted by this DWMP; or
- by site-specific design as detailed by the respective LCA requirements explained below.

5.3.1 Requirements for Low Sensitivity Lots

For Low Sensitivity Rating lots, it is envisaged that a LCA will generally not be necessary, unless deemed so by Council staff. Application for low sensitivity lots can be assessed using the Sensitivity Pro-forma Checklist (Table 11 and Appendix B) and/or the 'Site Information Sheet' template in Appendix D of *AS1547:2012* to confirm and record the site and soil characteristics. If available for the location, the proposed treatment and land application system combination can be selected from the System Selection (Appendix D in the Technical Document) and Sizing Tables (Town Reports in Appendix B of the Technical Document).

[3] Either parcel or property identifier

Council will conduct a site visit to confirm site and soil details are as per the Pro-forma detail and that the proposed DWM treatment and land application system is appropriate for the site. If a Low Sensitivity Rating lot is located within a region of increased sensitivity or DWM constraint, Council staff may require, at their discretion, a Standard LCA Assessment and Report to be completed (Table C1, Appendix C). This may include lots that are located in areas prone to landslip, high groundwater regions, or Groundwater Management Areas.

For Low Sensitivity Rating lots located within a DWSC, a LCA is mandatory as per Section 3.6 of the EPA Code of Practice (2016); therefore, they are automatically required to complete a Standard LCA as detailed in Table C1, Appendix C.

For Moderate, High and Very High Risk lots, or other lots where Council has ordered that a LCA should be prepared, the following guidelines (or as amended) should be adhered to by the consultant preparing the LCA on behalf of the property owner:

- EPA Code of Practice – On-site Wastewater Management, Publication 891.4 (2016);
- *AS/NZS 1547:2012*; and
- Municipal Association of Victoria – Model Land Capability Assessment Guideline (2014).

5.3.2 Requirements for Moderate Sensitivity Lots

For Moderate Sensitivity Rating lots, a Standard LCA is required (Appendix C, Table C1) which includes Site Inspection and Field Investigations. However, where appropriate and available, system design can be determined using the System Selection (Appendix D in the Technical Document) and Sizing Tables (Section 8 and the Town Reports in Appendix B of the Technical Document). For Moderate Sensitivity Rating lots located outside of a DWSC, Council may at its discretion not require an LCA to be completed and the procedure as per Low Rating lots to be followed.

5.3.3 Requirements for High Sensitivity Lots

For High Sensitivity Rating lots, a Detailed LCA is required (Appendix C, Table C2) which requires information in addition to the Standard LCA. The main requirement of a Detailed LCA is to undertake a monthly water balance for sizing the DWM system. More comprehensive soil testing is also required to assist with appropriate system selection and ensuring any necessary mitigation measures are implemented into the site management plan.

System Selection and Sizing Tables are not available for High Sensitivity Rating lots.

5.3.4 Requirements for Very High Sensitivity Lots

For Very High Sensitivity Rating lots, a Comprehensive LCA is required (Appendix C, Table C3) which understandably requires a higher level of assessment and reporting due to the inherent constraints and risks associated with sustainable DWM on the lot. A Comprehensive LCA requires in-situ permeability testing, viral die-off modelling, soil chemical analysis, conservative monthly or daily water balance, an annual nutrient balance and a detailed site specific hydraulic design in addition to the standard LCA requirements.

5.3.5 Generic LCA Requirements - Overlays

As detailed in Stage 1 of each LCA procedure (Appendix C), confirmation of any relevant sensitivity overlays with Council is required. If any sensitivity is identified, this needs to be specifically addressed within the LCA. Discussion with Council is required to determine the necessary requirements to be met. If the site is located within an identified landslip region, then a geotechnical report (DWM relevant) will likely need to be completed; refer to Stage 4 [pp.34] of the 12-step LCA procedure in the EPA Code of Practice (2016) for detail.

If the site is located within a known shallow groundwater region, the depth to (permanent and shallow) groundwater will need to be determined and discussed within the LCA report.

It should be noted that a LCA may indicate that it is not be possible to design an appropriate DWM system for a given site and sometimes costs for construction may be prohibitive.

However, the onus of justification rests with the LCA assessor who may demonstrate to Council/WA satisfaction that the risk from a proposed DWM system combination has been adequately addressed by design or management measures.

5.3.6 Subdivision LCA Requirements

It is very important that an LCA is performed early in the planning phase of land development before rezoning or subdivision as it achieves a more sustainable result, because areas with higher degrees of limitation can be appropriately zoned and subdivision layouts can make best use of the constraints and opportunities of the land. Chapter 5 of the MAV (2014) broadly discusses LCAs for subdivisions.

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

Only concept DWM system designs are necessary at this stage to determine the minimum size of the land application area. Options may be left at broad technology types suitable for the lots, with detailed system design required at the individual lot development stage.

The LCA requirements detailed within Section 5.3 is applicable to all scales of development planning and assessment. The Sensitivity Rating of the existing lot will direct the level of detail required for an LCA for a subdivision or rezoning of a lot.

5.4 Sensitivity Analysis Summary

The recognised limitations emphasise that the Sensitivity Analysis should only be used as a guide to distinguish regions within the Shire with relatively higher levels of sensitivity to DWM related public and/or environmental health outcomes. The results can be used to target more detailed investigations into suitability for on-site DWM. The Sensitivity Analysis maps help to target the main bio-physical DWM constraints associated with a specific lot which, with appropriate individual lot assessment and design, can potentially be mitigated or overcome.

Useable lot area, irrespective of total lot size, plays a key role in determining a lot's capacity for sustainable long-term on-site DWM and influences the selection of appropriate systems. As a general rule, the smaller the size of the lot, the less land that will be available for effluent management after allowing for other development of the land. It is difficult to define the minimum lot size that would be required throughout the Shire to ensure long-term on-site DWM without further detailed study. This will vary depending on the physical constraints of the lots, the nature of the development as well as the type of treatment and land application system used.

The Minister for Water's Guideline 1 requires that the density of unsewered dwellings should be no greater than one dwelling per 40 hectares and each lot created in a subdivision should be at least 40 hectares in area within DWSCs. In order to allow for consideration of a relaxation of this Guideline, a LCA needs to demonstrate that DWM is sustainable with no off-lot discharges and that the minimum zoning lot size requirements (for subdivisions only) in the Planning Scheme are met. Further assessment on sustainable lot densities within specific sub-catchments is required.

It is also evident that variability in constraint exists between the different unsewered towns within the Shire. Further detailed studies into the performance of existing on-site DWM systems within each of the priority towns is recommended to verify the findings of this broad-scale assessment, to provide a more detailed study on maximum lot development density and hence minimum lot size in proposed development areas. This will aid Council in ensuring future development will not adversely impact environmental and public health.

5.5 Prioritisation of Investigation Areas

A key role of the DWMP and Action Plan is to guide the systematic investigation and management of unsewered development within the Shire. Investigation may include:

- Improving and expanding the existing Council DWM database through inspection of undocumented lots;
- Focussing compliance and monitoring activities in areas where risk to public and environmental health is greatest ie. highly sensitive lots within DWSCs;
- Developing a greater understanding of the risks of increasing unsewered development density within an Area-of-Concern which may be described at various scales (i.e. lot, off-take, catchment area etc.); and
- Guiding strategic planning initiatives to enhance environmental objectives (i.e. water quality targets) or to examine alternative wastewater servicing solutions for unsewered areas.

It is not feasible to deal with the requirements of the entire Shire simultaneously so a process for ranking the priority Areas-of-Concern (AOCs) for investigation effort is required. It was agreed by the PSC that the priority towns would be analysed as the AOCs to address the variable goals of BBSC and the Water Corporations. Subject to resourcing, DWM Sensitivity Density could be applied to other AOCs within BBSC, for example the DWSCs, as outlined in Action No.10 in the Action Plan (Section 13).

Priority is based on the density of DWM sensitivity (Sensitivity Density) within each AOC. Sensitivity Density is reported as the aggregated DWM sensitivity (value) per unit area (km^2). The methodology for calculating Sensitivity Density within each AOC is as follows:

- Delineate the AOC;
- Confirm the number of unsewered lots within the AOC;
- Calculate the cumulative Sensitivity Rating 'value' for the investigation lots within the AOC (sum of all values);
- Calculate the cumulative area of the investigate lots within the AOC (sum of individual lot areas);
- Calculate the DWM Sensitivity Density for each AOC (cumulative DWM Sensitivity Rating 'value' per unit area – km^2); and
- Assign the priority ranking of each AOC based on the assigned sensitivity density value.

Lot priority is based on the 'DWM Sensitivity Density' of all the unsewered lots within the delineated AOC (in this case the town) boundaries. This approach follows the intention of the *Guidelines for Planning Permits in Open Potable Water Supply Catchment Areas* (DSE, 2012) where any development proposal must demonstrate that "the proposal does not present an unacceptable risk to the quality and quantity of the water generated by the catchment [all land uses] having regard to the land capability assessments, land condition and management conditions of the site and catchment". Lots that are located within more than one AOC are included in both AOC analyses to ensure conservatism as it is unknown at a regional scale where the development, or potential, is located on the lot.

The prioritisation will assist in decision making and planning for future development within the AOCs. Additional detailed analysis and compliance regimes can then be developed with the aim of protecting the environment and public health, whilst allowing for development consistent with Council strategies and planning controls.

Table 12 outlines the results and rankings of the Prioritisation Analysis for each AOC in descending order based on cumulative sensitivity to DWM. The priority ranking (by Sensitivity Density) will *inform* operational priority which also accommodates other factors in prioritising work, such as objectives in the Council Plan.

Table 12: Prioritisation Summary

Priority Ranking	Area of Concern (AOC)	Location/ Description	Unsewered Lots within AOC	Cumulative Sensitivity Rating	AOC area (km^2)	Sensitivity Density (per km^2)
Towns						
1	Walhalla	proximate to DWSC	207	1186.5	1.2	1031.7
2	Nilma		164	403.0	3.7	109.5
3	Noojee	proximate to DWSC	365	1724.1	19.7	87.5
4	Erica	within DWSC	187	612.0	7.9	77.6
5	Buln Buln		255	594.3	17.8	33.4
6	Darnum		429	1062.8	36.0	29.5
7	Neerim Junction	within DWSC	122	395.2	14.5	27.3
8	Thorpdale	within DWSC	569	1553.7	59.5	26.1

5.6 Limitations of the Risk Assessment Framework

There are several limitations inherent in the methodology adopted to assess the variation in on-site domestic wastewater related sensitivity throughout the Shire. Briefly, these are due to:

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

The recognised limitations emphasise that the Sensitivity Analysis mapping should only be used as a preliminary attempt to distinguish regions within the Shire with relatively higher levels of risk to public and/or environmental health and with the objective of determining preliminary priority for future wastewater servicing. The Sensitivity Analysis can be used to target more detailed investigations into suitability for on-site DWM as detailed in Section 5.5.

6 Management of Unsewered Development in BBSC

Figure 4 5 outlines Council's 'procedural' steps for determining the management requirements for existing unsewered development or the need for further investigation and analysis for new development. Action No. 9a of the Action Plan (Section 13) state that all Planning and EHO staff should be briefed on the DWMP and resultant new procedures.

6.1 Management of Existing Systems- Inspection Program

Existing DWM systems in BBSC will be managed through the risk-based compliance monitoring and inspection program as described in Section 9 of this DWMP and Action No. 6 of the Action Plan (Section 13).

Figure 4 outlines the procedural framework under which BBSC will prioritise, inspect and, if necessary, require/enforce management of DWM systems in the Shire.

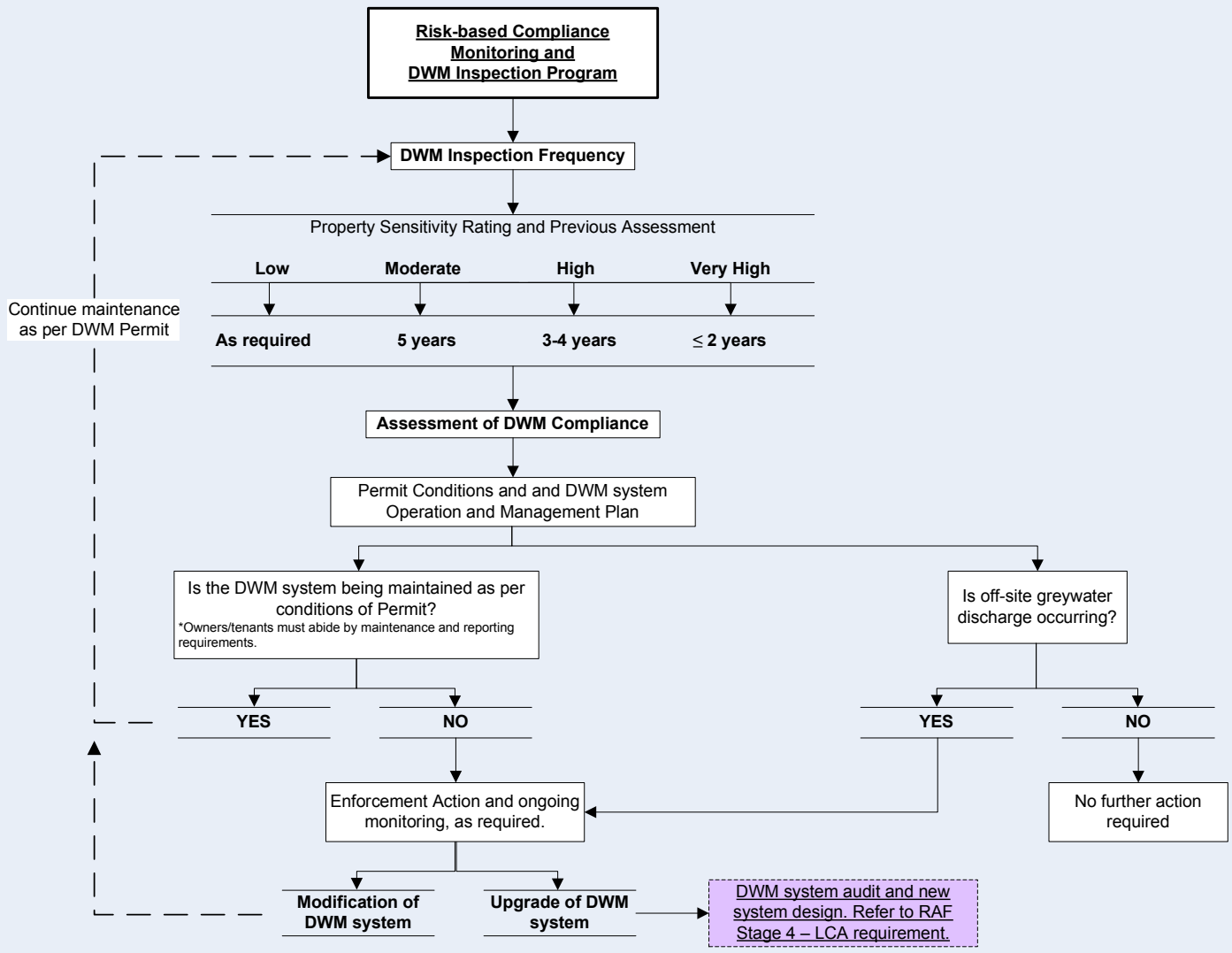
6.2 Assessment of New Development

Proposals for development exempt from planning permit requirements (e.g. dwelling in Township Zone that is not covered by any overlays) will proceed directly to the preparation of a LCA as per the requirements set out in Section 5.3 of this document.

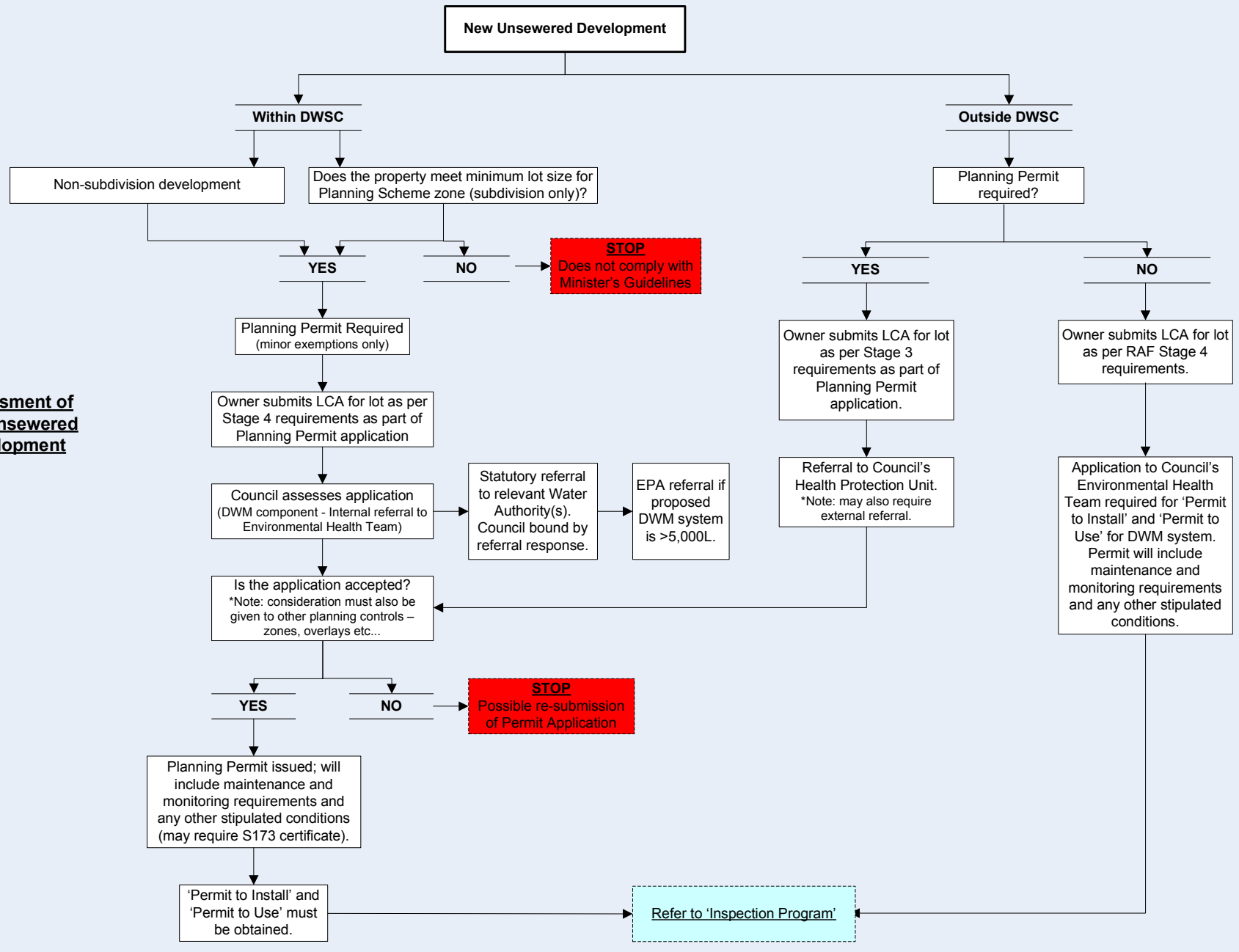
Development and planning proposals for lots located within the DWSC must comply with the requirements of the Planning Scheme, which includes the referral of applications to the relevant Water Corporation as a determining authority.

BAW BAW SHIRE COUNCIL DWMP – MANAGEMENT OF EXISTING AND NEW DWM SYSTEMS FLOW CHART (Figure 5)

Management of Existing Systems 'Inspection Program'



Assessment of New Unsewered Development



7 Development Planning and Assessment

Common issues associated with development planning and assessments include:

- Development pressure on small lots (typically <2,000m^2) that were subdivided before the formal regulation of DWMs was introduced;
- Development pressure for new unsewered subdivisions on marginal land with limitations to DWM;
- Adoption of consistent and sustainable minimum lot size for new unsewered subdivisions;
- Establishing a minimum lot size that allows for the long-term repair and replacement of DWM system components;
- The enforcement of connection to existing sewerage systems for new subdivisions on the fringes of towns such as Warragul, Drouin and Longwarry;
- Maintaining a consistent standard of installation and construction of DWM system components; and
- Ensuring on-site DWM system designs incorporate appropriate technologies for the site(s).

7.1 Assessment of DWM Proposals

Council's procedures for assessing DWM proposals are detailed in Sections 6, 7 and 8 of this Operational Plan. All DWM proposals must be submitted to Council with a 'permit to install' application form for the proposed treatment and land application systems. DWM proposals in defined DWSCs will be referred to the relevant Water Corporation (and other agencies, as required). The Action Plan (Action No. 1) includes a review and finalisation of Council procedures for the assessment of DWM proposals.

A LCA will not be necessary for Low Sensitivity lots located outside of DWSCs (as identified by the Sensitivity Analysis mapping), unless Council considers it is necessary due to site-specific factors. The minimum Sizing Tables (in the Town Reports in Appendix B of the Technical Document) will be appropriate for Low and Moderate (LCA also required) Sensitivity Rating lots outside of the DWSCs (unless otherwise determined by Council). LCAs and detailed designs will be required for all lots located within DWSCs and all High and Very High Sensitivity Rating lots (and any other lot as determined by Council).

Records of development and rezoning applications in unsewered towns provides useful data about development pressures across the Shire and can be used to inform strategic land use and development planning decisions in the unsewered towns and their surrounds. It is recommended in Action No. 9b of the Action Plan (Section 13) that the Town Reports in Appendix B of the Technical Document are reviewed in addition to system inspection data to inform planning decisions in unsewered towns. It is important to ensure that the broader planning processes and decisions take into consideration the DWMP and ongoing system inspections and therefore all the Planning and EHO should be briefed on the DWMP requirements (Action No. 9a).

7.2 Development Potential in Unsewered Towns

The Baw Baw Shire Settlement Management Plan (2013) assessed growth throughout the Baw Baw Shire. The largest predicted growth towns are Warragul, Drouin, Trafalgar, Yarragon, Longwarry, Neerim South, Rawson, Darnum, Willow Grove Nilma and Thorpdale. The cost of sewerage infrastructure provision is an influencing factor in growth patterns. The majority of the population growth will be accommodated in existing sewered towns. Very little or no growth is predicted for Thorpdale due to there being no provision for sewer to the town and limited land

available for DWM in the DWSC. Noojee, Tanjil Bren and Walhalla are also predicted to have limited growth.

The Settlement Management Plan (2013) identified Willow Grove and Rawson with moderate growth potential, however there is limited infrastructure in these towns which are located in a DWSC. The results of the Sensitivity Analysis mapping indicate that of these localities, Neerim Junction and Thorpdale have the most development potential, with a higher proportion of Low and Moderate Sensitivity across the broader locality area compared to Walhalla which is constrained in particular by slope, useable lot area and soils. However, where the long-term sustainability of proposed DWM systems can be supported by appropriately detailed LCA and DWM system design, expansion of these towns is not precluded by the Sensitivity Analysis mapping.

7.3 Minimum Lot Size for New Developments

The Sensitivity Analysis mapping will assist in planning for future development and determining minimum lot sizes for future subdivisions. The assessment of a site for wastewater management potential is important as it can assist in understanding the site's potential for development. Historically, wastewater management was overlooked in early planning stages and it has resulted in a number of subdivided lots within towns and low density residential areas (i.e. settlements) being significantly undersized. Due to small lot size, these lots have been given a high risk sensitivity rating in the sensitivity analysis and generally wastewater management on these lots is constrained and potentially unsustainable. This does not automatically preclude them from development; however, an appropriately detailed LCA and design will be required to the satisfaction of Council and other stakeholders, including the relevant Water Corporation (in accordance with the Sensitivity Rating). Where DWM is not supported on small lots, consolidation with adjacent undeveloped lots (where feasible) is the most likely pathway to allowing development proposals to be considered on the land subject to approval by Council and other relevant stakeholders. Such approval will also take into account other planning controls relating to the land.

Where rezoning of land is being considered or Structure Plans are being developed, Council can use the Sensitivity Analysis to determine suitable development potential and density. The results of the Sensitivity Analysis mapping and findings in the previous 2006 DWMP, support a general minimum lot size of 0.4ha (4,000m^2), assuming that there is adequate 'useable' land for DWM, including a sustainable effluent disposal or reuse system contained entirely within the lot boundary. This minimum lot size is a broad guideline only; detailed LCAs must be carried out for all subdivision and single-lot developments within all DWSCs.

Constrained properties, such as those with steep slopes, very shallow soils or in close proximity to surface waters or groundwater bores, will need to demonstrate that they have adequate available land for the sustainable application of treated effluent. 0.4ha may be too small in such instances; however, innovative building design and lot layout can mitigate constraints on previously undeveloped or redevelopment sites.

7.4 Stormwater Management

A Stormwater Management Plan was prepared by Sinclair Knight Merz in 2002 for BBSC. Table 4.4 of the Stormwater Management Plan lists very high threat rating to stormwater for septic tank overflows at Neerim South, Thorpdale, and Rokeby, and towns given a high threat rating include Erica, Darnum, Longwarry, Walhalla, Warragul and Noojee. The field investigations conducted for the Draft 2006 DWMP identified stagnant stormwater in road drains in towns following wet weather, which was exacerbated by the inflow of greywater directly discharged from properties. Some improvements have since been made and greywater redirected to DWM systems where a problem has been identified. However, improvements to street drainage should still be investigated on a needs basis for towns following the incremental upgrading and/or replacement of DWMs. However, generally speaking, there is no urgency to upgrade street drains or improve street drainage while greywater connections to street drains persist. Where greywater is found to be discharging to stormwater drains during DWM system audits,

upgrade works will be required to the discretion of Council to redirect greywater to the DWM system and land application area; refer to Action No. 8e of the Action Plan (Section 13). The progressive upgrade of stormwater drains will improve stormwater drainage in the Shire and would require discussions between the relevant Council sections and staff.

8 DWM System Design, Approval, Installation and Operation

This section broadly describes how planning and operation of DWM systems should be carried out by property owners in unsewered towns of the Shire, with reference to the Sensitivity Analysis and Risk Assessment Framework described in detail in the Technical Document. The level of detail required to support a proposal for DWM on an unsewered lot is outlined in the relevant LCA procedure (Section 5.3), which reflects the lot's Sensitivity Rating (Section 5.2).

8.1 Responsibilities of Local Government Authorities

Local Government is responsible for issuing permits for new and altered DWM systems under the *Environment Protection Act* 1970. Responsibility extends to the management of all DWM systems within the Shire; including the inspection of existing systems and ensuring compliance with Council, EPA and legislative requirements (including the *Public Health and Wellbeing Act* 2008). This responsibility is explicit where permits have been issued under the *Environment Protection Act* 1970 by Council, and more generally for all DWM systems (with permits or not) with respect on public health under the *Public Health and Wellbeing Act* 2008.

Council officers will update and prepare procedures (refer to the Action Plan in Section 13: Action No.1) in line with the relevant requirements. The legal requirements of Local Government Authorities include (but are not limited to):

- Application for a 'permit to install/alter' must be completed by the owner/builder/installer and submitted to Council officers for assessment;
- The system must comply with current Standards and the current EPA Code of Practice;
- For DWM systems in DWSCs, Council officers cannot issue a permit to install until it has received comment and/or conditions from the applicable Water Corporation;
- Council officers must issue a 'permit to install/alter' before a DWM system can be installed;
- A Council officer assesses the application and plans and conducts site inspections. Further information may be requested from the applicant;
- Council officers issue a 'permit to install' with approved plans and conditions or refuses application; note that if a Council Officer refuses an application, this must be ratified by Council;
- The system must comply with permit conditions and its relevant EPA Certificate of Approval. As detailed in Section 3.2.2 of the Technical Document, the EPA will only issue Certificates of Approval for *types* of systems (i.e. AWTS) from January 2016, pending review;
- The system is inspected by a Council officer during installation;
- Council officers must issue a 'permit to use' before the DWM system can be used;
- Council officers can issue fines to a system owner if an installation permit to use is not complied with; and
- Council officers can, in response to complaint investigation or failure to operate a DWM system appropriately contravening the SEPP, issue a Prohibition Notice and/or an Improvement Notice to the owner of a DWM system, to ensure the system ceases to operate and/or is upgraded to appropriately reduce the risk of human or environmental health impacts.

Council officers may inspect the site of a proposed DWM system at multiple stages during the assessment and installation process, as determined on a case-by-case basis. Key site inspection milestones can include (but are not limited to):

1. Pre-installation site inspection to ensure the site is suitable for the proposed DWM system (i.e. ground-truthing of the Land Capability Assessment);
2. Inspection during the installation stage, before excavations are back-filled (i.e. trenches are open and the wastewater treatment system has been installed but not backfilled, and not yet turned on), to ensure the system has been installed correctly; and
3. A post-installation inspection to ensure that the installation is complete and that the system is operating correctly.

The number of inspections carried out must be weighed against the available resources (staff time) to carry out the inspections. Low risk sites may require just one inspection, whereas high risk sites may require three or more inspections, depending on the circumstances of each proposal.

Upgrade options for non-compliant systems are discussed in further detail in Section 10.

8.2 Property Owners' Responsibilities

The owners and residents (i.e. tenants) of unsewered dwellings and commercial operations have primary responsibility for the operation and maintenance of the DWM system. In accordance with the EPA Code of Practice, owners and occupiers must ensure that the DWM system is operated, maintained and monitored in accordance with Council requirements. This requires a proactive approach from owners and residents to (as a minimum):

- familiarise themselves with the type of system (treatment and land application components);
- identify the location of all system components on the site;
- regularly inspect their system for any signs of problems;
- regularly maintain their system to prevent problems from occurring (or worsening);
- follow any instructions issued by Council pertaining to their system; and
- to upgrade or replace their system where insurmountable problems are occurring.

Details on appropriate DWM system maintenance are provided in Section 8.6 and Section 10 of this Operational Plan. Details on options for upgrading and replacing DWM systems are provided in Section 10 of this Operational Plan. Objectives to achieve better DWM system management in the Action Plan include:

- Action No. 4b – develop a map interface on Councils website for the Sensitivity Mapping, allowing owners to determine individual lot Sensitivity Ratings;
- Action No. 6 – monitoring and auditing of all DWM systems based on prioritisation detailed in Section 9.4;
- Action No. 8a-e – necessary upgrades or modifications based on existing DWM system permit conditions to ensure compliance; and
- Action No. 12a and 12b – community and owner education program.

8.3 LCA Assessor/System Designer's Responsibilities

The EPA Code of Practice outlines minimum requirements for land capability assessors (Section 1.8.3) with regards to qualifications, experience, association, insurances and independence.

The professional engaged to undertake the LCA and the DWM system design has a responsibility to prepare a site-specific DWM design and supporting documentation that demonstrates that the requirements of the SEPP will be met. The LCA must include sufficient information regarding treatment performance (effluent standard) and land application area

(sizing and layout) to allow for an appropriate DWM system design to be provided with an application.

The assessor/designer is required to undertake the level of investigation and reporting appropriate to the Sensitivity Rating applied to the lot, as prescribed in Appendix C Land Capability Assessment Checklists. The following sections provide general advice on design, installation and maintenance of DWM systems, that applies to all unsewered lots in the Shire.

Council officers will conduct one-on-one training with local DWM and LCA consultants, plumbers and system maintenance contractors to inform and educate them on the new requirements of the DWMP as detailed in Action No. 13a and 13b of the Action Plan (Section 13).

8.4 DWM System Design

8.4.1 Treatment Systems

Where a new system or major upgrade works (i.e. new LAA installed) are proposed in BBSC, the system must comply with the current Standards and Code of Practice. Where an existing system is operating effectively but does not comply with the current EPA Code of Practice or Standards, the system will be monitored; however, unless a failure occurs, the owner will not be required to upgrade or replace the system.

Appendix C of the EPA Code of Practice (2016) provides useful guidance on factors to consider when selecting an EPA-approved DWM system. Site constraints (including for effluent disposal or reuse) are a major factor when deciding on a treatment system.

For the installation of new proprietary treatment systems, the selected system must have current accreditation by the EPA. Custom-design treatment systems (e.g. sand filters only) must be designed in accordance with the following standards as outlined in Appendix D in the Technical Document.

In addition, the South Australian Department of Health Septic Tank Standard Supplement A: Aerobic Sand Filters (1995) provides useful and detailed information on the design, installation and operation of sand filter systems.

8.4.2 Land Application Systems

The key issues that influence the selection and design of land application systems (domestic or commercial) are:

- The level of treatment of the effluent (primary, secondary or advanced secondary);
- Soil characteristics (particularly texture, structure, depth, dispersibility and phosphorus adsorption capacity);
- Site characteristics (particularly slope, aspect and shading); and
- Proximity to sensitive receiving environments (such as surface waters and groundwater).

The degree of constraint for sustainable land application of effluent can be a major factor in selecting a treatment system.

The design of the land application system must be carried out consistently with the two guidelines cited in 8.4.1 above, as well as the *AS/NZS 1547:2012*.

It is preferable to design the land application area based on both a water and nutrient balance (as described in the MAV Model LCA, 2014); however, the level of detail required depends on the risk category of the lot and any other factors as determined by Council and/or the LCA assessor. For Low and Moderate Risk properties, the standard Sizing Tables (Appendix B of the Technical Document) may be used to determine the minimum area for the chosen land application system, based on climate and soils.

There are various options to mitigate constrained sites. For example, it may be appropriate to import lighter-textured topsoil (to appropriate depths) to the land application area in order to increase the DLR/DIR and thereby reduce the minimum required area of the system.

The Sizing Tables for each system type were created using monthly average water balances, using methods described in MAV Model LCA, 2014. Further details are provided in Section 7 of the Technical Document.

Standard drawings for land application areas were prepared as part of the 2006 DWMP; these Standard Drawings are included in Appendix E in the Technical Document. The Standard Drawings for the various land application options have been partially based on the EPA Victoria Certificates of Approval, EPA Code of Practice (2016) and the *AS/NZS 1547:2012*, with some variations based on best practice from outside Victoria and the experience of designers, installers and manufacturers. They are intended for use as an example of an acceptable configuration or design. Some drawings do include generic component sizes simply for the purpose of demonstrating an acceptable installation. However, the information in the drawings (Appendix E in the Technical Document) and Appendix D in the Technical Document may need to be adjusted to suit each particular site or design.

8.5 Installation

Often system failures will occur as a result of poor installation practices. The installation of DWM systems must be undertaken by a licensed plumber or system installer who is familiar with the requirements of Council, the Guidelines and Standards, and has experience in installing DWM systems. Issues such as poor drainage around tanks and uneven distribution of effluent throughout trenches or irrigation systems can all result in effluent ponding, runoff or impacts on human and environmental health which can easily be avoided.

8.6 Maintenance

For a system to operate and perform as it was designed, the system must be installed in accordance with the manufacturer's requirements and regular maintenance must be undertaken in accordance with the maintenance procedures outlined in Section 10.2 of this Operational Plan.

By undertaking these regular maintenance tasks a system can operate effectively without major problems; however, a lack of care for any one, or all, of these items can result in system failures.

Secondary treatment systems such as Aerated Wastewater Treatment Systems (AWTS) rely on primary treatment as well as the addition of oxygen for the aerobic breakdown of organic matter by aerobic microbes in a secondary stage which is generally followed by disinfection, usually by chlorine. If there has been poor primary treatment of effluent, it can be detrimental to the secondary treatment process and most commonly disinfection will not be effective. These systems require regular maintenance and monitoring by a qualified service agent in accordance with specific EPA Certificates of Approval.

9 Compliance Monitoring

9.1 Record Keeping

Electronic data base records of applications and permits for DWM systems in the Shire date back to 1999; although there are some hardcopy files which contain DWM system information dating back to the mid-50s. Council cannot guarantee the number of files having this information or the quality of the plans that are present (i.e. some plans are simply indicative proposed systems and no 'as installed' plans. The current record system for DWM system applications and permits is as follows:

- Application and permits are electronically registered in the Health Manager Database. Details of the type of system, the permit conditions, the issue dates and the inspection results are kept on the database. This register dates back to 1999**.** The electronic database is linked to Council's main property database which allows for the effective integration and recovery of information.
- Hard copy records of plans, permits and inspections notes are kept on the relevant property files**.** It is thought that information should be available for most of the DWM systems that have been installed since the mid-50s (note that during the amalgamation of Council's, there was a loss of information there was also a fire in the old Shire of Narracan where a number of files were destroyed).
- Hard copies of active files are kept by the Public Health Unit.

It is recommended that key data from all hard copy files for the period between mid-50s and 1999 is manually entered into the existing records database if they become active files (refer to Action No. 3a and 6a of Section 13 of the Action Plan). The existing information will be used to inform whether systems are likely to be compliant or non-compliant in terms of their operational risk classification, prior to ground-truthing undertaken during the compliance monitoring program.

9.2 Electronic Records of Inspections

The use of a paper based records system for field work can be time consuming and requires extra staff to enter the details into the data base upon return to the office. It is recommended that the proposed monitoring program and the existing records database are supported by a portable, hand-held device (e.g. tablet or small laptop) loaded with software that includes the system inspection proforma (i.e. the inquiry fields to be completed by the Council Officer). The device would also record the GPS coordinates of the system components (tank and application area/s).

In the absence of electronic inspection software, hard-copy inspection checklists have been developed based on existing templates in use by BBSC and current best practice.

9.3 Fees or Charges for DWM System Owners

Many rural and regional Councils' with a high proportion of DWM systems have introduced an annual fee or charge for owners of unsewered lots, to help resource inspection programs as well as education programs. Adequate resourcing is a prerequisite to implementing the DWMP and monitoring its effectiveness. It is recommended that BBSC investigate the options for implementing an appropriate fee or charge to fund the Actions and programs in this Plan (refer to Action No. 2 of the Action Plan in Section 13). Fees and charges may need to be considered and special charges for these Council activities under a Community Local Law.

9.4 Risk-Based Compliance Monitoring Program

9.4.1 Overview

The effective management of DWM systems requires a robust and well-resourced inspection and compliance program for existing and future systems.

The results of the Sensitivity Analysis (Section 5.2.2) were used in the development of the risk-based compliance monitoring program to be finalised and implemented by Council staff. The overarching principle is that the priority and frequency of DWM system inspections is largely determined by the lot Sensitivity Rating as mapped, and the age of the systems (with the oldest, highest risk properties being highest priority). In addition, other factors can trigger case-by-case inspections, of any system, including:

- A complaint made by a member of the public in relation to a system;
- The owners of a system lodge a planning permit to alter the associated dwelling or commercial premises;
- Council reasonably suspects there is a nuisance caused by a system; or
- Where it is a condition of approval that the system be maintained to a certain standard.

The Draft 2006 BBSC DWMP described the results of previous audits of lots in unsewered towns. As this data is now 10 years old, it follows that this milestone has been reached (disregarding incremental replacement and upgrades of some existing DWM systems across the Shire). As such, it is important that all DWM systems are inspected as part of the compliance monitoring program; however, the short-term focus (refer to Action No. 6 of the Action Plan in Section 13) is on those lots where the environmental and human health impact is likely to be the greatest (i.e. High and Very High Risk lots as shown by the Sensitivity Analysis). It must be recognised that many DWM systems are 10-30 years old on lots that are largely unsuitable for DWM. These systems are a historical legacy of Council and whilst it is now clear that such systems are not appropriate of may be creating unacceptable risks, there does need to be an acknowledgement that many of these problems will take time to rectify.

9.4.2 Legislation

There are two pieces of legislation applicable to management of DWM, the *Environment Protection Act* 1970*,* which deals with new septic systems, historic systems with permits and the setting of current standards for DWM, and the *Public Health and Wellbeing Act* 2008 that covers all DWM systems insofar as they may pose a nuisance (that is they are, or are likely to be, objectionable or injurious to health).

Each piece of legislation has different, but compatible, objectives and requirements for the exercising of powers by authorised officers and mechanisms that may apply to improvement of DWM systems.

The Community Local Law was recently reviewed (2016) and all reference to DWM system management was removed by Council. Therefore, Council cannot manage any system without a permit unless a nuisance complaint is made. Council will need to ensure that inspections and necessary upgrades occur to older systems without a permit when planning permit applications are submitted. The inspection program will also highlight any issues that individual owners may wish to rectify. Action No. 8d recommends that the management of DWM systems should be included in Council's Local Law to allow for proportionate enforcement. A Local Law may be one method for establishing a regulatory framework for the operation of DWM systems and a fee structure for the management and improvement of DWM system operation. It also may be possible to use a Local Law to contribute to the implementation of community wastewater improvement schemes or whole town wastewater management solutions.

9.4.3 Inspection Program

Council has carried out inspections of all (except for the historical records entered into the database, e.g. pump-out receipt records) the existing DWM systems with permits within the

Shire to date; at least once for each system. However, records are not available for every inspection carried out (particularly older systems). All system inspection records are to be incorporated into the wastewater management database; including data entry for pre-1999 hard-copy files and revisiting properties for which no records were created. Refer to Action No. 6a of the Action Plan (Section 13).

The inspection program involves:

1. Permit approval inspections;
2. Unpermitted system detection and capture;
3. Ad-hoc inspection by request or nuisance complaint; and
4. Compliance inspection;

Permit approval process:

Following the review of the proposed system, if it is deemed suitable for the site, Council will issue a 'permit to install' and stipulate any conditions. Council inspects a DWM system prior to approving it for use and issues a 'permit to use'.

Unpermitted system detection and capture:

Identification of improved properties without a record of permit will be undertaken using indicative data. An approach based on a case-by-case basis will be used to ensure these unpermitted systems comply with current legislation.

Ah-hoc inspection by request or nuisance complaint:

Inspections can be made in response to nuisance complaints from system owners or the general public or in response to other actions as Council deems appropriate, on a case-by-case basis.

Compliance inspection:

Compliance inspection will continue on an ongoing basis and it is expected that 0.1-0.5 FTE staff will be required to resource the inspection program over the next 5 years. The Very High and High Sensitivity Rating lots should be assessed first as a priority before other lots.

The DWM Sensitivity Ratings, as determined in Section 5, are used to inform inspection program scheduling. Council will use this priority to inform the order of the inspections. Action No. 6b, 6c and 8a of the Action Plan (Section 13) details the projected timeframes for completion and the resources required for the inspection program.

An overview of the inspection program is provided below in the following stages:

1. All of the lots assigned a **Very High** Sensitivity Rating should be investigated as priority within **two (2)** years of implementation of this DWMP;
2. All of the lots assigned a **High** Sensitivity Rating should be investigated within **three (3) to four (4) years** of implementation of this DWMP;
3. All of the lots assigned a **Moderate** Sensitivity Rating should be investigated after the completion of stages 1 and 2, within **five (5) years** of implementation of this DWMP;
4. Subsequently, all of the lots assigned a **Low** Sensitivity Rating should be investigated after the completion of stages 1, 2 and 3 **as required**.

Table 12 in Section 5.5 lists the town priority for DWM management based on Sensitivity Rating density. This town prioritisation should be used when coordinating the compliance inspections to help direct Council's resources to ensure the higher risk lots are inspected as a priority. For example, all of the Very High Sensitivity Rating lots (stage 1) should be inspected within each town in descending priority order before commencing stage 2 inspections; with Walhalla as the first priority. Where inspections of individual towns are required to develop or revise planning

strategies or other reports, Low Sensitivity Rating lots in the town can be inspected before higher Sensitivity Rating lots in other towns, at the discretion of Council officers.

Other factors also need to be taken into consideration with regards to the inspection program and are as follows:

- Properties with septic tanks and trenches should be inspected as a priority within each risk classification group;
- Properties older than 30 years (pre 1986) should be inspected prior to newer systems within each risk classification group;
- All properties with a Section 173 Agreement under the *Planning and Environment Act* 1987 relating to DWM will be inspected within 3 years of the implementation of this DWMP (regardless of the DWM system operational risk or final Sensitivity Rating) and a report will be forwarded to the relevant Water Corporations;
- Additional inspections can be made in response to nuisance complaints from system owners or the general public.

9.4.4 Inspection Protocol

Appendix D provides an example system inspection proforma covering virtually all possible attributes that may be used to record details and observations in the field, for entering into Council's database.

In summary, the inspection should record key DWM system information, including (but not limited to):

- exact location and GPS coordinates of system components;
- type of treatment and land application systems; and
- performance and compliance of systems (e.g. if there are any maintenance issues which need to be addressed, and their urgency).

As part of the Draft 2006 DWMP Action Plan, Council developed an operational risk classification system to classify DWM system operational risk. This operational risk is different to the Sensitivity Rating derived from the Risk Assessment. It relates to site specific conditions and the operational condition of DWM systems. The results of the Risk Assessment and the operational DWM system risk classification are highly valuable for improving and refining risk assessment tools and for providing a standardised base for requiring the rectification or replacement of poorly functioning DWM systems. Council officers may increase or decrease the operational risk classification after inspection if that inspection reveals that more or less frequent monitoring of that DWM system is required. Section 10 outlines the various methods for rectification or upgrade works which may be required following an inspection of a system. Action No. 11 of the Action Plan (Section 13) proposes to investigate the development of methodology for, and undertake, a Cumulative Impact Assessment of Areas-of-Concern, to provide guidance on potential risks associated with existing or proposed development in unsewered areas. This would involve the incorporation of the underlying lot Sensitivity Rating with the operational risk of the existing DWM systems to investigate potential upgrade scenarios.

10 Onsite System Maintenance and Upgrade Options

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

10.1 Non-compliant Systems

The potential management strategies for failing systems include the repair, improvement or replacement of systems (or components). The priority towns will form the focus of improvement works in terms of the implementation of this DWMP. Every effort will be made to ensure property owners are aware of their responsibilities and are willing to commit resources to such projects.

However, it is recognised that many existing DWM systems are several decades old and/or are located on lots that may be unsuitable for DWM. Existing systems may be undersized or have direct greywater discharge off-lot, in most cases approved by Council at the time they were installed. While it is now clear that such practices are no longer appropriate and may be creating unacceptable risks, it is acknowledged that many of these problems will take time to rectify.

10.1.1 Addressing Compliance

Figure 4 in Section 6 outlines the procedure for managing existing DWM systems in the Shire through regular (risk-based) inspection, monitoring and improvement (upgrade or rectification). Actions No. 8a-e of the Action Plan (Section 13) outline Council's objectives, intentions and resource commitments in this regard.

It is not intended that the inspection and compliance program take a 'hard-line' approach and require all non-compliant systems to be upgraded immediately. However, a commitment is required from property owners, Council, and State and regional management entities to improve DWM practices in a progressive and incremental manner, with a focus on high-priority towns and/or systems. Sections 10.2 to 10.4 (following) outline the range of options available to BBSC to improve DWM performance in the Shire.

Implementation of the DWMP (including compliance monitoring and improvement) will be reviewed internally by Council (Actions No. 15a-c) and audited externally (Action No.14) within 3 years of commencement.

10.2 Maintenance of Existing Systems

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

- Regular desludging of septic or primary tank as required by EPA Certificates of Approval for each type of system. The 2006 Plan noted that failure to regularly de-sludge septic tanks caused the majority of preventable problems with onsite systems, as evidenced by plumbers servicing unsewered areas. A pump-out should significantly improve performance; however, this will not rectify existing damage to the disposal areas resulting from excess suspended solids;
- Checking of all system chambers and other checks as required by system manufacturers for secondary systems;
- Addition of chlorine for disinfection where an AWTS with chlorination is used;
- Ensuring householders do not discharge chemicals used within the house to the system i.e. bleaches, antibacterial cleaning products, paints, dyes etc.;
- Ensuring that the system is not turned off at any time;

- Responding to system alarms as this usually indicates a system failure or problem;
- If the secondary treatment system (of any type) is more than five years old, then effluent samples should be collected for analysis of BOD_5, TSS and faecal coliforms/ *E. coli* to assess whether the system is still functioning to its specification and achieving the target effluent quality as prescribed by EPA Victoria; and
- Ensuring sprinklers or irrigation area is maintained, i.e. lawn mowing, checking that sprinklers/distribution lines are not damaged and that flushing of lines is undertaken periodically.

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

Council have developed a compliance program that monitors when DWM service reports are due and sends out a notification to the property owners.

10.3 Modifications for Existing Systems

In some cases, it is not necessary to replace of all of the system components. Risks from defective DWM systems can be appropriately managed by modifying a system. The required modifications should be determined on a case-by-case basis, and discussed with Council prior to implementation. If existing septic tanks are to be modified or repaired, they must be structurally sound and adequately sized for the number of bedrooms in the dwelling. Otherwise, they should be replaced with an adequately sized septic tank.

Typical modifications are discussed below.

10.3.1 Install Service Riser for Septic Tank Access

Inaccessible tanks (those that have been buried or built over) are highly unlikely to be inspected or pumped out as regularly as is required for optimum system performance (3-5 years for pump outs as recommended by *AS/NZS 1547:2012*). Tanks are often installed completely below ground to achieve minimum fall for gravity drainage from the dwelling; however, buried septic tanks often result in owners not knowing where the septic tank is (especially after properties change ownership). Non-accessible tanks were common in the audits of existing systems in the Shire undertaken by the consultants and were deemed to be in an unsatisfactory condition as a result, due to the very high likelihood that the tank had not been adequately serviced or desludged.

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

10.3.2 Minor Repairs

The structural integrity and design of the septic tank also determine its suitability for continued use. Generally, the older a septic tank, the more likely it is to have cracks, missing components (e.g. outlet ‘T junctions’), poorly sealed access openings, corrosion, or other physical problems. It is possible to mitigate or repair these issues, and the estimates have assumed a nominal cost of $500 per identified tank to carry out minor repairs. Repairing cracks will need to be done when the tank is empty (after it has been pumped out), with care taken to ensure that all cracks are identified and repaired.

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

10.3.3 Install Outlet Filters in Septic Tanks

The simplest way to improve the performance of a standard septic tank is to retrofit the outlet pipe with an outlet filter. Filters of various designs are commercially available and can provide significant solids retention. Filters have a large surface area to limit clogging and reduce maintenance requirements. Filters can reduce the impacts of solids carry over to the land application area or secondary treatment system. Filters should be removed and cleaned (hosed onto grass or gardens with limited human and animal contact) and replaced in the septic tank at least twice per year.

10.4 Upgrade/Replacement of Existing Systems

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

Where an existing system is shown to be operating effectively but does not comply with the current EPA Code of Practice or Standards, then the system should be monitored. However, unless a failure occurs, effluent is discharging off-site, or a house extension/modification is proposed, the owner should not be required to upgrade or replace the system as long as it is performing as per the original permit conditions (this situation is common for older homes where trenches may be undersized for the number of bedrooms, but only one or two people are living in the dwelling).

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

10.4.1 Enforcement of Upgrade Works

Under the *Environment Protection Act* 1970, local government is the primary agency responsible for the management of DWM systems. Under this Act, a property owner cannot construct, alter or install a septic tank without a local government permit. Local government use permits to regulate the installation, maintenance and monitoring of DWM systems within their LGA. Council are also responsible for identifying failing septic systems that are causing environmental, public health and amenity risks.

Under the *Environment Protection Act* 1970, Councils have the power to enforce compliance with Council permits, EPA Certificate of Approval conditions and issue penalty infringement notices to premises where owners do not have their system regularly maintained by a professional service technician.

In addition the SEPP Waters of Victoria (Clause 32) prohibits off-site discharge of wastewater from DWM systems to stormwater drains, waterways or beaches. BBSC will endeavour to liaise with a property occupier to ensure upgrade works are undertaken; however, in some circumstances enforcement will be required to ensure compliance with the *Environment Protection Act* 1970. Under the SEPP, property owners are responsible for managing their DWM system in accordance with their permit conditions.

Enforcement will either proceed under the *Environment Protection Act* 1970 if the conditions or maintenance requirements of a permit are not being complied with, or the system has been installed without a permit, using an infringement or summons to court. If the failing system does not have a current permit (age) then an Improvement Notice may be issued under the *Public Health and Wellbeing Act* 2008, if the failing system is found to be a nuisance (detrimental to health or offensive).

One limitation of the *Environment Protection Act* 1970, is that there is no facility for local government to specify any rectification, improvements or alterations within a legal notice that would clearly direct the property owner in how to mitigate the problem of their failing DWM system. Local government can only initiate proceedings that may result in a fine to the property

owner for non-compliance with a specific offence. EPA officers, however, have the power to require rectifications, improvements and alterations through a Pollution Abatement Notice. Another limitation with the Act is the inability of local government to withdraw or cancel “original” permits that allowed the installation and use of a septic system that now does not meet today’s minimum standards and, hence, remains a continuing source of pollutants. This power was previously available under the Health Act regulations. Many old DWM system permits do not have relevant permit conditions, which has prevented local government from taking enforcement action.

10.4.2 Replacement of Septic Tanks

It is envisaged that where simple repairs and pump-outs fail to meet compliance standards, existing septic tanks will require complete replacement, due to being undersized, structurally unsound and/or discharging effluent inappropriately. All proprietary treatment systems must have current accreditation from the EPA, which is called a Certificate of Approval.

Where appropriate, septic tanks can be replaced with another septic tank, in accordance with a LCA report and design for the lot’s specific circumstances. However, for permanently-occupied premises, it is likely that an upgrade to a secondary treatment system will be the preferred outcome (in accordance with a site-specific LCA and design report by an appropriately qualified professional).Prep

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

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

10.4.3 Upgrades, Extensions and Replacements for Trenches

Trenches and beds have relatively small footprint areas and rely substantially on effluent absorption, thus imposing high loading rates on the soil. This increases the risk of systems being overloaded and failing hydraulically in the long term, with potential adverse health and environmental impacts. Furthermore, prolonged effluent application through absorption systems increases the risk of soil degradation by increasing salinity and sodicity, as well as the development of a ‘clogging layer.’ Over time, the organic load in effluent forms a clogging layer in the soil around the trench, which reduces the porosity of the soil and limits soil absorption of effluent. Higher suspended solids concentration in the primary-treated effluent increases the rate of development of the clogging layer. The suspended solids concentration of septic tank effluent generally increases as the pump out rate decreases (particularly if there is no outlet filter installed).

A range of options for upgrading or replacing trenches and beds is provided below. Site constraints, particularly available suitable space, will determine what options are feasible, and will be determined on a case by case basis as part of the recommended servicing strategy. Properties with inadequate suitable space to replicate or extend their trenches will be most suited to trench rejuvenation, and potentially replacement of the septic tank with a secondary treatment system.

Trench Rejuvenation

Provided the trenches are structurally sound and the clogging layer is not excessively developed, it is possible to 'rejuvenate' existing trenches by oxidising the clogging layer, either using an oxidising chemical, physical aeration (compressed air blowers) or both. This technique in combination with septic tank pump-out (if required) and installation of an outlet filter has good potential to improve overall system performance, and is relatively low-cost. This solution will only be appropriate as a long-term solution on lots with adequate available space for effluent disposal and if the existing trench system is appropriately sized for the number of occupants or number of bedrooms. However, it could be a valuable interim solution for lots without adequate available space, prior to implementation of a compliant solution.

Replace, Replicate or Expand Trenches

Where rejuvenation is not an option (e.g. if trenches are physically damaged or collapsed), there is scope for trenches to be excavated and replaced in-situ, using imported materials including topsoil (preferably loam or sandy loam) and improving the existing subsoils (see below). This is the most feasible option for small lots, or lots where other areas have been used for other improvements.

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

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

Soil Amelioration

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

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

Shallow topsoil or topsoil that is too sandy may also limit the growth of the vegetation in the land application area. For optimal growth of typical vegetation used with DWM systems, the topsoil should be at least 250mm deep and have at least 5% organic matter.

Alternative Trench Designs

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

Other modified designs are based on existing technologies which, although not formally approved, have been shown to enhance performance. One recent example of this is the 'wick' trench, developed for use in clay soils as an alternative to standard absorption trenches (referred to in the current EPA Code of Practice as a 'wick trench or bed'). This system can be described as a conventional absorption trench adjacent to a shallower evapotranspiration/ absorption bed, with a continuous layer of geotextile fabric laid under the trench and up into the evapotranspiration bed. The geotextile acts as a wick, using capillary movement, to distribute some of the effluent over the transpiration bed adjacent to the trench. This provides a larger surface area than would be available using the trench alone, with a greater potential for

evapotranspiration and greater infiltration capacity. Typically the evapotranspiration/absorption bed is approximately twice the width of the trench. This option requires a larger area than conventional trenches, but smaller than that required for irrigation.

10.5 Risk Mitigation in DWM Design and Installation

The DWM risks identified across unsewered areas in the DWMP are based on the predominance of standard (primary) septic tanks with conventional absorption trenches throughout the Shire (as confirmed by Council records and supported by field investigations). The summary table below outlines some possible ways these risks can be mitigated.

Table 13: Risk Mitigation for various constraints

Risk Category	Issue	Possible solutions	Methods	Benefits
Soils	Poor soils make it difficult for the site to contain effluent.	Enhanced treatment of effluent.	Septic System and sand filter.	Passive system; only uses electricity for pumps. Sand life should exceed 10 years before replacement.
			AWTS 20/30.	Higher standard of treatment suitable for sub-surface effluent disposal in poorer soils.
			AWTS 20/30/10.	Disinfection stage decreases public health risk. Higher standard of treatment suitable for sub-surface effluent disposal in poorer soils.
		Remediate soils.	Addition of gypsum/lime as per LCA recommendation	Can assist in improving effluent adsorption capabilities of dispersive soil.
		Import better quality soils.	Sandy loams, loams and clay loams with <10% gravel content.	Soils can be selected for suitable characteristics (e.g. permeability) and also increase profile depth.
Slope	Steep slopes can be destabilised by effluent, and it is difficult to contain effluent onsite.	Terracing.	Reduce slopes by creating flatter areas (ensure soil depth is adequate if using cut and fill).	Ease of access and maintenance (e.g. mowing) and other controls (e.g. erosion).
Lot size	The smaller the lot the less area is available for effluent disposal.	Reduce house size (number of bedrooms).	To be done at the planning and design stage.	If a house is smaller with fewer occupants it will generate less wastewater.
		Reduce footprint of house and other improvements.	To be done at the planning and design stage.	To ensure there is enough area to use for effluent disposal, reduce the space occupied by the house, shed, driveway etc.
		Consider		Permits highest effluent

Risk Category	Issue	Possible solutions	Methods	Benefits
		mound system as land application option.		loading rate per square metre.
Water-courses/ Groundwater Bores	The Code has setback distances from watercourses and groundwater bores.	Ensure entire system (including house) is located outside of setbacks and consider treatment options.	Increase wastewater treatment standard.	Setbacks can be reduced when higher treatment standards (e.g. advanced secondary with disinfection) are used.
Flood Prone Land	Wastewater should not be disposed of in flood prone land.	Ensure entire system (including house) is located away from flood prone land.		Waters are protected from contamination. System is protected from inundation of water which eliminates the potential need for costly system replacement.

10.6 Decentralised or Clustered Wastewater Management

Where local conditions (including dwelling density and lot layout) allow, it may be feasible for small groups of properties to enter into a decentralised servicing arrangement whereby raw wastewater or primary-treated effluent is collected from each lot in a common pipe, for off-site treatment and discharge, or treatment and discharge on one or more of the serviced lots. Systems include pressure sewer, vacuum sewer and Common Effluent Discharge (CED) systems.

This option is unlikely to be further explored by landowners due to the complexity involved. This option would best be classified as a commercial wastewater system and would require investigations and approvals by a range of stakeholders (including, but not limited to, Council and the relevant Water Corporations). Off-site treatment and/or disposal is likely to trigger the regulatory involvement of the EPA. EPA Works Approval and licencing is discussed within Appendix A. Options for connection to reticulated sewerage or a decentralised cluster system are typically more expensive when compared to onsite alternatives.

11 Educational Programs

BBSC currently uses DWM systems inspections as an opportunity to educate system owners 'one-on-one' in order to improve system maintenance and performance. In addition, the BBSC website has an extensive section dedicated to DWM in the Shire, which explains how owners and residents of unsewered lots can best manage their systems in order to protect human and environmental health. This online content is supported by printed publications which are available at Council offices and are given to owners and residents during system inspections where appropriate. The education material has been updated reflect the revised DWMP and Victorian government documents (including the current EPA Code of Practice) and to provide more useful guidance and information for home owners and residents. The education program is outlined in Actions No. 12a and 12b in the Action Plan (Section 13).

12 Downstream Water Quality Monitoring

The EPA is responsible for environmental monitoring and the Catchment Management Authorities also undertake water quality monitoring programs.

The use of a large number of on-site DWM systems in a catchment may have long-term negative impacts on that area and on downstream waterbodies. To monitor these impact levels, regular testing of ground and surface water for faecal and nutrient contamination should be carried out to indicate problem areas and assess the effectiveness of Council management practice for DWM systems.

There should also be a review of the existing water quality data collected by other authorities in the Shire (including Water Corporations and Catchment Management Authorities), where this data is relevant and available. There have been multiple sampling and monitoring programs conducted throughout catchments within the Shire, for example: the Tarago Catchment Management Plan (Melbourne Water, 2003) identified septic tank effluent as a source of pollutants (nutrients and pathogens) in the catchment and recommends Council to make the catchment a priority area for improving DWM; and the Narracan Creek Catchment Water Quality Risk Assessment regarding the Thorpdale township (Ecos Environmental Consulting, 2014).

It is recommended that human-specific contamination indicators should be targeted for downstream water quality testing, to rule out non-human sources of generic contaminants (pathogens, nutrients and chemical compounds). Commonly used indicators include: optical brighteners used in laundry detergents and faecal sterol compounds. *E.coli* is not human-specific and high concentrations can be caused by other animals (including livestock) and bird (including wetland birds), and the forestry industry can also impact on downstream water quality.

A detailed water quality monitoring program is beyond the scope of this DWMP and could form part of a broader water quality monitoring program that considers a range of regional stakeholders and objectives.

13 Action Plan Timeline

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

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
1	**Preparation of policies and procedures**	Prepare (or revise/finalise) and document the following to ensure they are in line with this DWMP: • DWM system inspection procedure and program; • Non-compliant with inspection procedure; • Complaint inspection procedure; • Rectification/upgrade works procedure; • Issuing of fines/notice procedure; • Permit to install procedure; • Approval to use procedure; and • Compliance and Enforcement Policy.	Short Term	June 2017	Environmental Health Team Leader, EHO	Existing resources - ongoing.
2	**Fees and Charges**	In order to fund the Actions in this Plan, Council will need to consider sustainable options for ensuring appropriate resources to implement the DWMP. Investigate staffing requirements for the implementation of the DWMP	Short Term	December 2016 after local election	Manager Building and Regulatory Services and Environmental Health Team Leader	Subject to new Council direction in September.
3a	**Database management**	Ensure that Council's DWM Health Manager Database is updated on an ongoing basis to record all property and system details (including any existing hard copy files that have yet to be incorporated into the system).	Administrative follow up on all inspections		EHO, IT/GIS (assistance)	Existing resources – ongoing.
3b		Development of additional fields within Council's Health Manager Database to include Sensitivity Rating and associated information.	Short Term & Ongoing	2016 & Ongoing	EHO, Admin, IT/GIS (assistance)	Able to establish an internal link to the sensitivity database and update on an ongoing basis. To change the

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
						Health Manager Database will incur a cost from Open Office and resources to work with them - investigate cost associated with alteration of database if necessary.
4a	**Sensitivity Analysis Mapping**	Regularly update GIS layer for Sensitivity Ratings as required (based on the DWM Health Manager Database following LCAs and inspections). Printed maps to be updated at least annually.	Ongoing	Annually	GIS Officer & EHO	Existing resources.
4b		Develop a map interface (interactive) on Council's website of the final Sensitivity map to allow residents/users to identify the Sensitivity Rating of their parcels.	Short Term	June 2017	GIS Officer	The time required to incorporate onto Council website will need to be programmed into GIS Work Plan and resourced. Council can provide copies of the maps for the major towns as an alternative.
5	**GIS Training**	Train EHO in accessing and updating the Sensitivity Analysis mapping in order to provide details to residents and ensure that the database remains up to date.	Short Term	December 2016	GIS Officer, EHO, Environmental Health Team Leader	Existing resources. This is achievable on the link with the internal system.
6a	**Implement the Risk-based Compliance Monitoring Program**	Update the DWM system risk rating for older existing systems as well as new DWM systems.	Administrative follow up on all inspections		EHO	Existing resources - ongoing compliance work.
6b		System inspections within priority areas.	Ongoing	Annually	EHO / Domestic Wastewater Officer	0.5-1.0 FTE Seek external funding. Potential to outsource work to external qualified contractor (i.e. plumber/LCA assessor).

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
7	**Commercial Systems**	Undertake system audits of all commercial scale systems (2,000≤x≤5,000L/day) on a risk basis priority.	Long Term/ Ongoing	2021	EHO	Part of 6b FTE. Seek external funding. Potential to outsource work to external qualified contractor (i.e. plumber/LCA assessor).
8a	**Permit Conditions and Compliance**	Undertake compliance audits of new installations.	Regulatory/ Compliance/ Approvals		EHO	Existing resources – already undertaken. The legislated powers of Water Corporations under the *Water Act 1989* could be utilised in the compliance program. To implement proactive rolling inspection program would require resources and included in Action 6b.
8b		Enforce compulsory upgrades of systems, as required (case-by-case). This will be determined by BBSC and Water Corporations.			Environmental Health Team Leader, EHO	
8c		Enforce mandatory maintenance of systems (depending on system type) as per permit conditions.			EHO	
8d		Advocate the inclusion and implementation of local laws to allow for effective management of DWM systems, allowing for a proportionate enforcement.	Long Term	2021	Environmental Health Team Leader	Existing resources.
8e		Investigate off-site greywater discharge to stormwater issues based on risk prioritisation	Moderate Term	2019	EHO & Engineering	Lots with greywater discharge will be identified during system inspections. Need for upgrade and course of action will be assessed between BBSC and Water Corporations.
9a	**Planning**	Brief all Strategic and Statutory Planners and EHO staff on the DWMP.	Short Term	March 2017	Manager Building and Regulatory Services, Environmental Health Team Leader, EHO	Existing resources – ongoing compliance.

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
9b		Review Town Reports (Appendix B Technical Document) in DWMP and system inspection data to inform planning decisions regarding unsewered towns. Ensure that strategic and statutory planning processes and decisions take into consideration the DWMP and ongoing inspections.	Moderate Term	2018	EHO facilitate, Planning	Existing resources.
10	**Sensitivity Density**	Assess the DWM Sensitivity Density for Areas-of-Concern for prioritisation. Method detailed in Section 5.5 of the Operational Plan. • Priority towns.	Completed	2016	W&A	DWMP review – completed for priority towns.
		• Declared Water Supply Catchments.	Short to Moderate Term	2018	EHO facilitate	Subject to securing funding from Melbourne Water or other provider.
		• Remaining unsewered towns or semi-urban areas • Remainder of Shire.	Moderate Term	2019		Subject to securing funding from Melbourne Water or other provider. We have 1 FTE focused on the Tarago Reservoir and there may be some synergy to use with some of the DWMP, but this is not the focus in the JD or funding.
11	**Cumulative Impact Assessment**	Develop methodology for and undertake a Cumulative Impact Assessment of Areas-of-Concern, to provide guidance on potential risks associated with existing or proposed development in unsewered areas.	Moderate Term	2019	EHO facilitate	This would require an external consultant with an expected minimum cost of $20k or 0.2FTE.
12a	**Education Program**	Continue to discuss individual systems with property owners during the permit application process and in response to enquiries from owners. Educate future/ potential owners of homes with DWM systems.	Ongoing	Ongoing	EHO, Environmental Health Team Leader	Existing resources – ongoing reactive compliance work.

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
12b		Update educational material.	Completed	2016	W&A	DWMP review – completed.
		Proactively distribute policies and educational materials to the community and service providers. Provide details about permit process on Council's website.	Moderate Term	2018	EHO and Community Relations Officer	Existing resources and Domestic Wastewater Officer.
13a	**DWM Professionals Briefing**	Conduct a briefing session and/or potential training with local DWM & LCA consultants, plumbers and system maintenance contractors to inform and educate on the new requirements of the DWMP.	Short Term	June 2017	Environmental Health Team Leader, Professional Consultant	Resourcing required but good investment as an annual initiative.
13b		Development of "self-service" GIS information for plumbers and LCA assessors.	As funding secured		Environmental Health Officer, GIS Officer, Manager Building and Regulatory Services	This would need to be programed into the GIS Work Plan and resourced, in addition to EHO resource to work with them.
14	**External Auditing**	Undertake external auditing of DWMP, including monitoring and enforcement after 3 years in order to meet the requirements of the Minister's Guidelines. Results of the audit to be provided to stakeholders for review. This DWMP proposed many Actions over the next 3 years. Future planning should be considered for view in conjunction with the external audit. Review audit results and implement agreed recommendations.	Long Term	September 2019	Environmental Health Team Leader and Water Corporations	External Auditor required (Council audit committee not approved). This Action is driven by the Minister's requirements and not the Water Corporations.
15a	**Reviews**	Initial 6 monthly progress review.	Short Term	March 2017	Environmental Health Team Leader and Stakeholders	Existing resources.

Action Number	Action	Description	Term	Due Date	Responsibility	Resource Funding
15b		Annual progress review of DWMP.	Ongoing	Annually	Environmental Health Team Leader and Stakeholders including Water Corporations	Existing resources.
15c		Review of 2016 DWMP after five (5) years.	Long Term	2021	Environmental Health Team Leader, Stakeholders and External Auditor	Additional resources required.

14 Glossary of Terms

Term	Definition
Aerobic treatment	Biological treatment processes that occur in the presence of oxygen (i.e. aerobic bacteria digest wastewater contaminants). Aerobic bacteria are organisms that require oxygen to survive and grow.
Anaerobic treatment	Biological treatment processes that occur in the absence of oxygen.
Blackwater	Wastewater from a toilet.
Desludging	Removal of the semi sold waste from a tank.
Effluent	Water discharged from a treatment plant.
Evapotranspiration	Transfer of water from the soil to the atmosphere through evaporation and plant transpiration. Calculated using the FAO Penman-Monteith method to derive (ET_0).
Organic Matter	Material that comes from the tissues of organisms (plants, animals, or microorganisms) that are currently or were once living.
Greywater	Wastewater from showers, baths, sinks, washing machines, dish washers.
Hardpan	A layer of dense compacted of hard soil.
Non-Potable	Water not suitable for human consumption.
Peds	An aggregate of soil particles.
Permeability	The ability of the soil to allow water to pass through.
Prescribed Location	Refers to the location of a lot within any prescribed location (i.e. town, sub-catchment, etc…). In terms of its definition in Section 5.2.1, it refers to a lot located within a DWSC.
P-sorb	Phosphorus adsorption capacity of a soil.
Sensitivity	The 'likely' consequence of off-site (DWM) impacts based on the cumulative effect of individual lot constraints (soil suitability, slope, useable lot area, climate and location) and variables affecting the specific land capability and associated limitations of the lot to sustainably manage wastewater in compliance with SEPP objectives.
Sewage	Solid and liquid wastewater conveyed through sewers.
Sewerage	A system of sewers.
Town	The area within the town boundaries as identified in the Baw Baw Planning Scheme.

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Appendix A

Commercial Wastewater Management Systems

1. Commercial Wastewater Management Systems

1.1. Overview

Wastewater Treatment Systems with a design capacity between 5,000 - 100,000L/day require Works Approval from the EPA. Systems in this range which discharge solely to land in accordance with specification acceptable to EPA are exempt from ongoing licensing. Acceptable practices are defined in guidance material, the EPA Vic Guidelines for Wastewater Re-Use Pub 464.

It is unknown how many commercial premises within BBSC have undergone the EPA Works Approval process or have EPA licenses as EPA have been unable to provide exact figures.

The Environment Protection (Scheduled Premises and Exemptions Regulations) 2007 define which activities require EPA Works Approval and licensing under the Environment Protection Act. A Works Approval is statutory document which allows scheduled works to be constructed, subject to whatever conditions the EPA deems appropriate as part of the assessment process. As part of the approval process, the EPA assesses any potential environmental impacts from the proposal, ways to mitigate any impacts, compliance with policy requirements (including protection of beneficial uses), and comments from referral agencies and the general public.

Systems with a design capacity greater than 100,000 L/day are subject to works approval as above and also to ongoing licensing from the EPA. The EPA licences set acceptable waste discharge and management criteria. They are publically available documents that can be viewed at http://www.epa.vic.gov.au/our-work/licences-and-approvals/search-licence. In some cases, the EPA may approve an exemption from the need to obtain Works Approval for current licence holders who are upgrading an existing system. The EPA periodically inspects all licenced sites, with the frequency informed by a range of factors related to the degree of environmental risk posed by the site. Targeted inspections can also be made based on intelligence and pollution report information. Licenced sites are required to submit an Annual Performance Statement detailing their performance against the licence conditions. These are also public documents that can be searched on the above link. The EPA conducts a combination of targeted and random assessments of Annual Performance Statements. As of May 2015, EPA notified Council that there are 3 licenced wastewater discharge sites in BBSC.

There are other types of industrial activity (not wastewater treatment) that are not directly regulated under the Environment Protection (Scheduled Premises and Exemptions Regulations) 2007 that still have potential to impact on water quality. Examples include dairy farm effluent management and stormwater from commercial and light industrial operations, particularly in unsewered areas. The EPA has a role in pollution prevention and response in these activities. The EPA's approach to these issues is outlined in the Compliance and Enforcement Policy Pub. 1388. The Compliance and Enforcement Policy articulates the EPA's approach, method and priorities for ensuring compliance with Council's Acts and carrying out Council's compliance and enforcement powers

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

There is limited available information on the performance of commercial systems in the Shire. BBSC have identified importance of gathering all of the commercial system data for the Shire which is noted as Action No. 7 in the Action Plan. Commercial systems within BBSC will be

managed as per the same criterion as domestic systems, with some consideration for the specific waste stream. Generally speaking, commercial treatment plants are often the same age as the development they service, and are upgraded or replaced only when a noticeable problem is observed, and/or the development is modified to alter (usually increase) design flows (e.g. expanding operations).

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

Whilst BBSC do not have ultimate regulatory responsibility for all commercial systems in the Shire, the DWMP identifies the importance of actively managing commercial system data for the Shire. Objectives to achieve better management of larger DWM systems in the Action Plan (Section 13) include to schedule audits of all commercial systems (2,000 - ≤5,000L/day) (Action No. 7).

2. Risks Associated with Commercial Systems

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

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

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

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

3. Management Strategies for Commercial Systems

3.1. Wastewater Treatment Systems

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

Regular maintenance by appropriately trained staff and/or contractors is essential. Depending on the scale and complexity of the treatment system, and the nature of the wastewater to be treated, daily low-level maintenance may be required. This can often be carried out by regular, appropriately trained, staff (e.g. checking effluent levels, visually checking and/or testing

samples of effluent for treatment performance, etc.). More specialised maintenance must be carried out by appropriately qualified and experienced personnel.

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

Council is responsible for monitoring commercial systems <5,000L/day. These systems should be included in the Council database and inspection program (Action No. 7) and, where problems or complaints are received, Council should assess and manage the system in a similar fashion to a domestic system and also inform the EPA of the investigation. The EPA is responsible for carrying out additional investigations at its own discretion, including in response to complaints about a system from Council or members of the public.

3.2. Effluent Management Systems

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

All effluent management areas require regular maintenance and should be closely monitored to ensure effective operation and even distribution of effluent. An Operation and Maintenance Manual or Plan should be developed (if not in existence) and regularly referred to by staff and contractors. Land application areas that are turfed will require regular mowing (and lawn clippings removed from the area). Other vegetation types should be pruned and maintained as necessary to ensure nutrients are being removed by plant uptake.

Commercial systems less than 5,000L/day should be serviced and maintained in accordance with the system manufacturer's requirements. Secondary treatment systems will require servicing quarterly; however, some commercial systems will require daily monitoring by an onsite system operator. Results of system servicing should be submitted to Council on a quarterly basis or in accordance with the system conditions of approval to operate. Where system maintenance records are not supplied to Council as required, follow up action should be taken by Council to ensure the system is serviced appropriately.

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

Appendix B

Sensitivity Proforma Checklist

Parameter	**Site specific input**
PFI Identification Number	
Lot Address	
Town	
Zoning	
Lot Size (ha)	
Soil Texture	
Soil Depth (m)	
Soil Structure	
Soil Limitations	
Permeability (Ksat) (m/day)	
Lot Slope (%)	
Presence of Surface Waters	
Useable Lot Area (ha)	

Appendix C

Land Capability Assessment Checklists

Table C1: Minimum Requirement for a Standard LCA Assessment and Report

Report Element	Standard Requirements	Completed
1. Introduction and Background	Report summary/ executive summary.	☐
	Confirmation of Sensitivity Rating.	☐
	Confirmation of any relevant sensitivity overlays (e.g. landslip) as per communications with Council.	☐
	Confirmation that lot(s) meets minimum lot size criteria for BBSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, subdivision, rezoning, or non-domestic development. Refer to Section 5.3.6 for subdivisions or rezoning.	☐
	Name, contact details and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Allotment size.	☐
	Proposed/existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Water Corporation, Catchment Management Authority and State Government requirements, including restrictions and caveats on title, and planning/building/bushfire/flood controls, e.g. zones and overlays. Note Environmental Significant Overlays, potable water supply and DWSCs. Impose this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the site and adjacent land, e.g. climatic information, groundwater and bore water information. (Refer to stage 3 pp.34 EPA Code of Practice (2016)).	☐
	Details of date, time and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two soil test pits or auger holes within the identified available effluent management area(s), with additional test pits required for more than one soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice.	☐
	Soil assessment that considers the following parameters from Table 2 of the Victorian LCA Framework (2014): • colour and mottling; • electrical conductivity; • Emerson Aggregate Class; • permeability and design loading rate (using soil texture); • pH; • rock fragments; • soil depth; • soil texture (field textural analysis); and • depth to watertable (if required). Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints.	☐
3. Available Area	Calculation of available effluent management area and location on	☐

Report Element	Standard Requirements	Completed
and Setback Distances	the Site Plan.	
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice (2016)). Justification required.	☐
4. LCA Confirmation	Confirm the results from Stages 1-3 of the LCA checklist with Council to assess the final Sensitivity Rating for the site to confirm LCA requirements for system selection and design. Provide a Site Plan showing the available effluent management area(s) and completed Sensitivity Proforma Checklist.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water and groundwater.	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Description and location of applicable DWM treatment system options (refer to relevant Locality Report and EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location (as per relevant Locality Report). Sizing of land application area as per the system Sizing Tables detailed in the Technical Document.	☐
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints posed to the sustainable treatment and application of wastewater on-site. This may include the following: • Storm water management • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and DWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐
9. Conclusion	Conclusion summarising all the important design, sizing and mitigation requirements to ensure sustainable on-site DWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones and overlays and/or restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays and DWSCs).	☐
	Type of catchment (e.g. potable or other special water supply catchment).	☐
	North arrow.	☐
	Location of groundwater bores.	☐
	Contour lines (at maximum 1 in 10m intervals), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface waterways (dams, creeks, reservoirs and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐

Report Element	Standard Requirements	Completed
	Location, depth and specified use of groundwater bores on the site and adjacent properties from Water Measurement Information System web database maintained by DELWP http://data.water.vic.gov.au/monitoring.htm Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice (2016).	☐
	Location of existing and proposed buildings, sheds, driveways, paths and any other improvements.	☐
	Available effluent management area(s).	☐
	Location of proposed land application area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the land application area.	☐
	Location of proposed DWM system (nominal).	☐
	Location of reserve land application area (sized to scale).	☐
11. Appendices	Figures	☐
	Site Plan	☐
	Soil bore logs for all test pits or auger holes	☐
	Certificate of Title(s) for lot (plan)	☐
	Proposed building plans	☐
	Planning Permit application (where applicable)	☐
	Septic Tank Permit application	☐
** Lots with a Low Sensitivity Rating that are located within a DWSC are required to complete this Standard LCA as per the current EPA Code of Practice requirements.*		

Table C2: Minimum Requirements for a Detailed LCA Assessment and Report

Report Element	Detailed Requirements	Completed
1. Introduction and Background	Report summary/ executive summary.	☐
	Confirmation of Sensitivity Rating.	☐
	Confirmation of any relevant sensitivity overlays (e.g. landslip) as per communications with Council.	☐
	Confirmation that lot(s) meets minimum lot size criteria for BBSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, subdivision, rezoning, or non-domestic development. Refer to Section 5.3.6 for subdivisions or rezoning.	☐
	Name, contact details and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Allotment size.	☐
	Proposed/existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
	Site survey plan (2m contours) will need to be conducted by a qualified surveyor.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Water Corporation, Catchment Management Authority and State Government requirements, including restrictions and caveats on title, and planning/building/bushfire/flood controls, e.g. zones and overlays. Note Environmental Significant Overlays, potable water supply and DWSCs. Impose this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the Site and adjacent land, e.g. climatic information, groundwater and bore water information. (Refer to stage 3 pp.34 EPA Code of Practice (2016)).	☐
	Details of date, time and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two soil test pits or auger holes within the identified available effluent management area with additional test pits required for more than one soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice.	☐
	Soil assessment that considers all of the parameters in Table 2 of the Victorian LCA Framework (2014): • colour and mottling; • electrical conductivity; • Emerson Aggregate Class; • permeability and design loading rate (using soil texture); • pH; • rock fragments; • soil depth; • soil texture (field textural analysis); • watertable (depth to); • cation exchange capacity (CEC); • sodicity (Exchangeable Sodium Percentage ESP); and	☐

Report Element	Detailed Requirements	Completed
	• Sodium Absorption Ratio (SAR). Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints. Soil permeability testing conducted in situ for the soil within the available effluent management area as per constant head well permeameter method (AS/NZS 1547:2012) can be undertaken if desired, otherwise soil texture classification and application of effluent using the loading rates within the AS/NZS 1547:2012 is satisfactory.	
	Detailed review of available published soils information for the site. Soil landscapes and different soil facets should be mapped on the Site Plan.	☐
3. Available Area and Setback Distances	Calculation of available effluent management area and location on Site Plan.	☐
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice (2016)). Justification required.	☐
4. LCA Confirmation	Confirm the results from Stages 1-3 of the LCA checklist with Council to assess the final Sensitivity Rating for the site to confirm LCA requirements for system selection and design. Provide a Site Plan showing the available effluent management area(s) and completed Sensitivity Proforma Checklist.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water and groundwater.	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Assess the capacity of the land to assimilate the treated wastewater based on the data collected and the total dissolved salts (TDS) in the potable water supply (see Section 2.3.4 and Appendix G of EPA Code of Practice (2016)) for both levels of effluent quality, primary and secondary.	☐
	Description and location of applicable DWM treatment system options (refer to the EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location.	☐
	Monthly water balance sizing the preferred effluent land application area. The 70 percentile climate data must be used for your location, as detailed in Section 7.3.2 of Technical Document. A copy of the 70^{th} percentile climate data is attached in Appendix C of the Technical Document. All inputs, results and justification to be shown in the report.	☐
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints posed to the sustainable treatment and application of wastewater on-site. This may include the following: • Storm water management • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and DWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐

Report Element	Detailed Requirements	Completed
9. Conclusion	Conclusion summarising all the important design, sizing and mitigation requirements to ensure sustainable on-site DWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones and overlays and/or restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays and DWSCs).	☐
	Type of catchment (i.e. potable or other special water supply catchment).	☐
	North arrow.	☐
	Location of groundwater bores.	☐
	Contour lines (2m intervals from survey plan), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface waterways (dams, creeks, reservoirs and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐
	Location, depth and specified use of groundwater bores on the site and adjacent properties from Water Measurement Information System web database maintained by DELWP http://data.water.vic.gov.au/monitoring.htm Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice (2016).	☐
	Location of existing and proposed buildings, sheds, driveways, paths and any other improvements.	☐
	Available effluent management area(s).	☐
	Location of proposed land application area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the land application area.	☐
	Location of proposed DWM system (nominal).	☐
	Location of reserve land application area (sized to scale).	☐
11. Appendices	Copy of the monthly water balance calculations.	☐
	Figures.	☐
	Site Plan.	☐
	Soil bore logs for all test pits or auger holes.	☐
	Certificate of Title (s) for lot (plan).	☐
	Proposed building plans.	☐
	Planning Permit application (where applicable).	☐
	Septic Tank Permit application.	☐

Table C3: Minimum Requirements for a Comprehensive LCA Assessment and Report

Report Element	Comprehensive Requirements	Completed
1. Introduction and Background	Report summary/ executive summary.	☐
	Confirmation of Sensitivity Rating.	☐
	Confirmation of any relevant sensitivity overlays (e.g. landslip) as per communications with Council.	☐
	Confirmation that lot(s) meets minimum lot size criteria for BBSC Planning Scheme Zone.	☐
	Current land use and development overview (including occupancy); single lot, subdivision, rezoning, or non-domestic development. Refer to Section 5.3.6 for subdivisions or rezoning.	☐
	Name, contact details and qualifications (insurances) of LCA assessor (author).	☐
	Site location (including address and lot details) and owner.	☐
	Allotment size.	☐
	Proposed/existing water supply.	☐
	Availability of sewer.	☐
	Locality map showing the site in relation to surrounding region.	☐
	Site survey plan (2m contours) will need to be conducted by a qualified surveyor.	☐
2. Site Inspection and Field Investigations	Gather information on relevant Council, Water Corporation, Catchment Management Authority and State Government requirements, including restrictions and caveats on title, and planning/building/bushfire/flood controls, e.g. zones and overlays. Note Environmental Significant Overlays, potable water supply and DWSCs. Impose this information on a base map (or site plan) which shows their location with respect to title boundaries.	☐
	Broad overview of locality and landscape characteristics that may pose a constraint to the sustainable application of wastewater on the Site and adjacent land, e.g. climatic information, groundwater and bore water information. (Refer to stage 3 pp.34 EPA Code of Practice (2016)).	☐
	Details of date, time and methodology of site inspection and field investigations.	☐
	Site assessment that considers all of the parameters as per Table 1 of the Victorian LCA Framework (2014). Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints.	☐
	Minimum of two soil test pits or auger holes within the identified available effluent management area with additional test pits required for more than one soil type (multiple soil landscapes or facets) as per the current EPA Code of Practice.	☐
	Soil assessment that considers all of the parameters in Table 2 of the Victorian LCA Framework (2014): • colour and mottling; • electrical conductivity; • Emerson Aggregate Class; • permeability and design loading rate (using soil texture); • pH; • rock fragments; • soil depth; • soil texture (field textural analysis); • watertable (depth to); • cation exchange capacity (CEC); and • sodicity (Exchangeable Sodium Percentage ESP).	☐

Report Element	Comprehensive Requirements	Completed
	Phosphorous Sorption Capacity is also required to be measured for the soil to which the effluent will be applied to. Detailed explanation of the level of constraint with regards to DWM and recommended mitigation measures to overcome these constraints. Soil permeability testing conducted in situ for the soil within the available effluent management area as per constant head well permeameter method (*AS/NZS 1547:2012*) must be undertaken to determine the sustainable daily effluent loading rates.	
	Detailed review of available published soils information for the site. Soil landscapes and different soil facets should be mapped on the Site Plan.	☐
3. Available Area and Setback Distances	Calculation of available effluent management area and location on Site Plan.	☐
	Discussion regarding the achievability of the applicable setback distances (Table 5 of the EPA Code of Practice (2016)). Justification required.	☐
4. LCA Confirmation	Confirm the results from Stages 1-3 of the LCA checklist with Council to assess the final Sensitivity Rating for the site to confirm LCA requirements for system selection and design. Provide a Site Plan showing the available effluent management area(s) and completed Sensitivity Proforma Checklist.	☐
5. Cumulative Impacts	Using the desktop and site assessment information for the site, comment on any possible cumulative detrimental impacts that the development may have on beneficial uses of the surrounding land, surface water and groundwater.	☐
	Viral Die-off Modelling to address pathogen transport concerns from the proposed land application area (e.g. Cromer *et al.* 2001).	☐
6. System Selection and Design	Design maximum wastewater load (generation rates) and organic load for the proposed development.	☐
	Description of existing system (if applicable).	☐
	Target effluent treatment quality.	☐
	Assess the capacity of the land to assimilate the treated wastewater based on the data collected and the total dissolved salts (TDS) in the potable water supply (see Section 2.3.4 and Appendix G of EPA Code of Practice (2016)) for both levels of effluent quality; primary and secondary.	☐
	Description and location of applicable DWM treatment system options (refer to EPA website for list of currently approved systems).	☐
	List of effluent land application options and detailed description of preferred option and location. Land application area to be sized on the most limiting balance as detailed below.	☐
	A water balance is required to size the preferred effluent land application area for the proposed development scenario. A monthly water balance using the prescribed 70th percentile climate data must be used for your location, as detailed in Section 7.3.2 of the Technical Document or a daily water balance (i.e. MEDLI) using average climate data must be undertaken. A copy of the 70th percentile climate data is attached in Appendix C of the Technical Document. All inputs, results and justification to be shown in the report.	☐
	Undertake an annual nutrient balance (refer to pp.33 MAV (2014) for example methodology) for the proposed development scenario. All inputs, results and justification to be shown in the report.	☐
	Prepare a site specific detailed hydraulic design for the land application area suitable for supplier quotation and construction.	☐

Report Element	Comprehensive Requirements	Completed
7. Mitigation Measures	Detailed discussion of mitigation measures to overcome any site or soil constraints posed to the sustainable treatment and application of wastewater on-site. This may include the following: • Storm water management • Soil amelioration; and • Vegetation establishment and management.	☐
8. Site Management Plan	Description of ways to improve wastewater and DWM system performance for residents' reference.	☐
	Operation and Management Plan.	☐
9. Conclusion	Conclusion summarising all the important design, sizing and mitigation requirements to ensure sustainable on-site DWM.	☐
10. Site Plan Requirements	Site address, including lot number and street number.	☐
	All title boundaries.	☐
	All relevant zones and overlays and/or restrictions (e.g. Council zoning and overlays, including Environmental Significant Overlays and DWSCs).	☐
	Type of catchment (e.g. potable or other special water supply catchment).	☐
	North arrow.	☐
	Location of groundwater bores.	☐
	Contour lines (2m intervals from survey plan), direction of slope and grade.	☐
	Location of soil test pits or auger holes.	☐
	Location of any significant site features e.g. rock outcrops or waterlogged regions.	☐
	Location of intermittent and permanent surface waterways (dams, creeks, reservoirs and springs).	☐
	Location of 1% and 5% Annual Exceedance Probability flood level contours lines (if applicable).	☐
	Location, depth and specified use of groundwater bores on the site and adjacent properties from Water Measurement Information System web database maintained by DELWP http://data.water.vic.gov.au/monitoring.htm Depth to groundwater table in winter (if less than 2.1m deep).	☐
	Vegetation cover (can use aerial image as base map).	☐
	Relevant setback distances as per Table 5 EPA Code of Practice (2016).	☐
	Location of existing and proposed buildings, sheds, driveways, paths and any other improvements.	☐
	Available effluent management area(s).	☐
	Location of proposed land application area (sized to scale).	☐
	Location of proposed stormwater cut-off drains adjacent to the land application area.	☐
	Location of proposed DWM system (nominal).	☐
	Location of reserve land application area (sized to scale).	☐
11. Appendices	Copy of the water (hydraulic) balance calculations.	☐
	Copy of the nutrient balance calculations.	☐
	Figures.	☐
	Site Plan.	☐
	Soil bore logs for all test pits or auger holes.	☐

Report Element	Comprehensive Requirements	Completed
	Copy of the Survey Plan.	☐
	Certificate of Title(s) for lot (plan).	☐
	Proposed building plans.	☐
	Planning Permit application (where applicable).	☐
	Septic Tank Permit application.	☐

Appendix D

System Inspection Proforma

Date & Time of Inspection		**GPS Coordinates of LAA**				
Property Address:		South		East		Aspect:
Property Owners/Contact:		**Owner Present:**				
Inspected By		Yes		No		
Inspection Protocol						
Risk Rating		Low (1)	Medium (2)	High (3)	N/A	**Upgrades Required / Comments**
Treatment System						
Grease Trap						
Is Grease trap adequately sized, maintained and functioning?		Yes	No			
Greywater						
Is greywater directed to street/drain?		No		Yes		
If fitted, is greywater diversion device operating correctly?		Yes	No	No		
Septic Tank						
Is the tank(s) accessible for inspection and maintenance?		Yes	No			
Do the tank(s) and lid(s) appear structurally sound?		Yes		No		
Is the tank(s) adequately sealed?		Yes		No		
Is the tank area subject to stormwater or groundwater inundation?		No		Yes		
Do any tank(s) require urgent repair or replacement?		No		Yes		
Tank dimensions:						
Type	Plastic Concrete Other:					
Volume (L)						
Baffle?	Yes No Damaged	Yes	Damaged	Damaged		
Outlet height (mm)						
Liquid height (mm)						
Scum Depth (mm)						
Sludge Depth (mm)						
Operation:	Are Both T pieces (junctions) attached and working?	Yes	No			
	Does the tank require desludging?	No	Yes			
	Is septic tank providing adequate anaerobic treatment?	Yes	No	No		
Pump/ pump wells/controls						
Is the pumpwell(s) of adequate capacity (e.g. emergency storage)?		Yes	No			
Is the system fitted with a high level alarm?		Yes		No		
Are there any electrical hazards / issues with the system?		No		Yes		
Is there a suitable control system for the pump?		Yes	No			
Is the pump operational and in a satisfactory condition?		Yes	No	No		
Is pump well in satisfactory condition? (Yes - Low, No - Medium or High)		Yes	No	No		
AWTS						
Is the AWTS operating satisfactorily? (Yes - Low, No - Medium or High)		Yes	No	No		
Are the blowers working?		Yes	No			
Is there sludge or scum accumulation in aeration chamber, clarification chamber or irrigation chamber?		No	Yes	Yes		
Is the chlorine dispenser filled and functioning?		Yes	No	No		
Resdiual Chlorine (mg/L)						
Is system regularly serviced by a contractor?		Yes	No	No		

Land Application Area						
Absorption Trenches/Beds						
Dimensions (m)	Slope (%) approx.	<8%	8-12%	>12%		
Is the land application area of adequate size?		Yes	No	No		
Is there a suitable vegetation cover over the land application area?		Yes	No	No		
Is there adequate exposure of the land application area? (i.e. not too shaded, or southerly aspect?)		Yes	No			
Is the land application area wet or boggy?		No	Yes	Yes		
Is there evidence of surface ponding or runoff from the land application area?		No	Yes	Yes		
Is the area prone to poor drainage, flooding or high groundwater?		No	Yes	Yes		
Are there any damaged or collapsed sections of the land application area?		No	Yes	Yes		
Is there evidence of or access for vehicle and animal traffic?		No	Yes			
Does the land application area appear to be level and in line with contours?		Yes	No	No		
Are buffer distances to trenches/beds adequate?		Yes	No	No		
Surface/Subsurface Irrigation						
Dimensions (m^2)	Slope (%) approx.					
Is the land application area wet or boggy?		No	Yes	Yes		
Is there evidence of surface ponding or runoff from the land application area?		No	Yes	Yes		
Are buffer distances to irrigation area adequate?		Yes	No	No		
Are all sprinklers working?		Yes	No	No		
Overall Assessment						
Were you able to locate and access the whole system?		Yes	No	No		
Was the system discharging effluent to the ground surface in an unsatisfactory manner?		Yes	No	No		
General Condition of system	Good (Low) Satisfactory (Medium) Unsatisfactory (Hi	Good	Satisfactory	Unsatisfactory		
Proximity to Sensitive environments (streams, rivers)		>100m	50-100m	<50m		
Located within a drinking water catchment? Y/N Distance to reservoir/stream:						
Overall Highest Risk Rating						
Are works required on the system?		**Minor**	**Moderate**	**Major**	**Nil**	
Details of Required Works:						