CORANGAMITE SHIRE

Domestic Wastewater Management Plan

Operational Document

Corangamite Shire

2014

Contents

Acronyms i
Executive Summary ii
1. Introduction 1
1.1. Development of the DWMP 2
2. Plans and Policies, Legislation, Regulation, Standards and Guidelines Relevant to DWM 4
2.1. Council's Plans and Policies 4
2.2. Legislation 4
2.3. Regulatory Authorities 4
2.4. Administrative Authorities 5
2.5. Standards and Guidelines 5
3. Domestic Wastewater 6
3.1. What is Wastewater? 6
3.2. Wastewater Treatment 6
3.3. Impacts of Poor Wastewater Management 7
3.3.1 Human Health 7
3.3.2 Environmental 8
3.3.3 Social 8
4. Assessment of Current Situation 9
4.1. Local Environment 9
4.2. Domestic Wastewater Management in Victoria 9
4.3. Domestic Wastewater Management in Corangamite Shire Council 9
4.3.1 Greywater Management in Corangamite Shire Council 13
4.3.2 Wastewater Threats in Corangamite Shire Council 13
5. Risk Assessment Framework 17
5.1. Data Acquisition 17
5.2. Domestic Wastewater Management Constraint Maps Overview 17
5.2.1 Lot Characterisation 17
5.2.2 Discrete Domestic Wastewater Management Constraints 18
5.3. Domestic Wastewater Management Consolidated Constraint Map 18
5.3.1 Introduction 18
5.3.2 Classification Framework and Requirements 19
5.3.3 Consolidated Constraint Map Rationale 21

5.3.4 Domestic Wastewater Management Consolidated Constraint Map.....23
5.3.5 Evaluation of the Consolidated Constraint Map.....48
5.3.6 Conclusion.....49
6. Management Strategies.....50
6.1. Implementation and Review.....50
6.1.1 Responsibility for Implementation.....50
6.1.2 Implementation Process.....50
6.1.3 Monitoring and Reporting.....50
6.1.4 Review.....51
6.1.5 Priorities for DWMP.....51
7. References.....54
8. Action Planning.....56
9. Appendix.....59

Acronyms

ARI Annual Recurrence Interval

AWTS Aerated Wastewater Treatment System

CMA Catchment Management Authority

CSC Corangamite Shire Council

DEPI Department of Environment & Primary Industries (Victoria)

DSE Department of Sustainability and the Environment

DWM Domestic Wastewater Management

DWMP Domestic Wastewater Management Plan

DWSC Declared Water Supply Catchment

EHO Environmental Health Officer

EPA Environment Protection Authority

GIS Geographic Information System

LAA Land Application Area

LCA Land Capability Assessment

LGA Local Government Area

MAV Municipal Association of Victoria

PIC Plumbing Industry Commission

SEPP State Environment Protection Policy

VCAT Victorian Civil and Administrative Tribunal

VVG Visualising Victoria's Groundwater (Project)

Executive Summary

Corangamite Shire Council has developed a Domestic Wastewater Management Plan to assist with the efficient and effective management of domestic wastewater within the Shire in a way which will minimise the potential risks posed by domestic effluent upon public health, the physical environment and local receiving environments.

The DWMP responds to the State Environment Protection Policy (Waters of Victoria), which requires local Councils to develop a Domestic Wastewater Management Plan in conjunction with relevant Water Authorities and the community.

The Domestic Wastewater Management Plan has also been prepared to enable Corangamite Shire Council to move towards meeting the requirements of Guideline 1 - *Planning permit applications in open, potable water supply catchment areas* (November 2012) for domestic wastewater management; to ensure existing and future development does not compromise the potable water supply catchments which make up a small proportion of the Shire.

The Domestic Wastewater Management Plan has been prepared to recognise, respond to and link with Council Policies and Plans, current legislation and regulation and the relevant direction of State Regulatory Authorities.

The Domestic Wastewater Management Plan addresses recent changes in codes of practice, Australian Standards and guidelines relating to domestic wastewater management, and recent advances in technology and management practices.

The Domestic Wastewater Management Plan describes the current situation relating to domestic wastewater management and domestic wastewater management systems in the Shire and identifies a range of Actions Council seeks to implement.

A number of key issues for domestic wastewater management in Corangamite Shire Council have been identified:

- There are a number of sensitive receiving environments within the Shire and the protection of these areas is important for the supply of potable water, maintenance of public health and the environment;
- Failing domestic wastewater management systems have the potential to pollute these sensitive environments;
- There are a number of significant constraints, for example challenging soils, proximity to water bodies and existing small lots, which limit the effectiveness of domestic wastewater management systems in some parts of the Shire. To enable improvements to be made in areas where existing domestic wastewater management systems have historically proved problematic, Council needs to develop strategies to assist the community to upgrade or replace systems where appropriate; and
- To ensure that domestic wastewater management systems associated with new development can operate in a sustainable manner, high level design and management is required and Council needs to develop policies and procedures to allow development to proceed in a manner which appropriately protects public health and the environment.

The Domestic Wastewater Management Plan has collated a substantial amount of information on existing domestic wastewater management systems and the various environmental and built constraints on domestic wastewater management. This information is presented as a series of constraint maps developed using Geographic Information Systems, which illustrate both for the whole Shire and the areas of and close to townships, the significance of each of a range of parameters (lot size, slope, soil type, flooding, proximity to surface water and groundwater etc.) to domestic wastewater management.

Individual parameters have been considered in the light of current standards for domestic wastewater management servicing as outlined in the Environment Protection Authority (EPA) Victoria Code of Practice, Australian Standards and other commonly applied industry standards. For each lot, each parameter is considered on the basis of information supplied by Council or relevant State Government agencies and the level of constraint described as low, medium or high depending on the degree of constraint it presents to domestic wastewater management. Consolidated constraint maps bring the various parameters together to present an overall picture.

Where the level of constraint is identified as low, commonly standard approved domestic wastewater management systems could be installed and expected to operate in a compliant manner. Where the level of constraint is identified as moderate, appropriate consideration is required to determine how those parameters which present the constraint can be adequately addressed in the design, operation and management of the domestic wastewater management system. Where the level of constraint is identified as high, it is likely that a high level of investigation and design would be required to identify a sustainable domestic wastewater management system. In some cases it is possible that sustainable wastewater servicing could only be possible by centralised (sewer) system and off-lot management. For existing domestic wastewater management systems the level of constraint 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. Table 1 summarises the minimum domestic wastewater management requirements based on the level of constraint for a given lot. This is to be applied for both lots located within the townships and rural areas within the Shire.

The consolidated constraint mapping identifies approximately 5% of all lots in the Shire with a low level of constraint, 80% with a moderate level of constraint and 15% with a high level of constraint.

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 domestic wastewater management systems and will provide guidance in identifying minimum standards of domestic wastewater management servicing and appropriate technologies. It will also provide Council with guidance in defining areas where centralised wastewater servicing is most required.

Table 1: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced, or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound system or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by a septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

The Domestic Wastewater Management 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 maps for the various parameters for both the Shire and townships and presents minimum domestic wastewater management treatment system and land application area sizing requirements for compliant and sustainable domestic wastewater management systems. This Technical Document can be obtained by contacting the Environmental Health Department at Corangamite Shire Council.

The Domestic Wastewater Management Plan presents a prioritised Action Plan for the Shire with a proposed timeframe for completion of the various tasks. Progress towards completion of the identified tasks will improve the effectiveness of domestic

wastewater management within Corangamite Shire Council to protect public and environmental health.

1. Introduction

Corangamite Shire Council (CSC) has a geographic area of 4,600km^2 and a population of 16,376 (Australia Bureau of Statistics, Census 2011). There have been approximately 747 septic permits issued within the Shire since 2001 and it is expected that there are possibly more systems in the Shire with paper permits which are not on Council's current record system, or systems without permits. Council's rates database indicates that there are 5,126 lots within the Shire that are unsewered and developed. All of these properties will utilise domestic wastewater management (DWM) systems. This Domestic Wastewater Management Plan (DWMP) covers the management of DWM systems within the Shire.

The management of wastewater within CSC is undertaken to protect human health and the environment. The Shire is characterised by small towns, rural residential development, farming, national parks and forests; and includes some areas delineated as a potable water catchments (approximately 0.1% of the Shire). 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.

The DWMP addresses the various aspects of wastewater, its treatment and impacts if allowed to discharge to the environment in an uncontrolled manner. The DWMP also addresses how DWM systems are managed in CSC, from approvals to installation, use and the upgrading of systems, to ongoing monitoring of system performance to ensure public health and the environment are protected. The key recommendations from this DWMP are as follows:

- A prioritised program of inspection of initially all high constraint systems in the Shire and in the longer term all moderate constraint systems in the Shire;
- Implementation of an inspection system to ensure compliance with permit conditions; and
- Implementation of an education program for residents on the maintenance and management of DWM systems.

The Action Plan forms a major component of this DWMP and outlines the steps, timeframes and existing resources to complete the tasks required in order to effectively manage DWM systems within CSC.

1.1. Development of the DWMP

All Councils within Victoria need to develop a municipal DWMP. A DWMP is a planning and management document that provides a mechanism for the development, implementation and review of programs to protect public health, the local environment and local amenity. The DWMP establishes Council's policy on and commitment to sustainable ongoing wastewater management and their programs for compliance and enforcement. The DWMP establishes processes to ensure early and comprehensive consideration of wastewater management in the planning cycle and Council's responsibility for the monitoring and compliance of systems.

For the development of this DWMP a focus group met on the 17 July 2013 to identify issues and ensure that the DWMP focused on the requirements of Council in determining the actions for future DWM within the Shire.

The focus group consisted of Community Representatives, Corangamite Shire Councillors and staff from:

- Corangamite Shire Council;
- Wannon Water;
- Central Highlands Water;
- EPA; and
- Department of Environment and Primary Industries (DEPI).

In addition, Council conducted a number of community meetings between the 9th and 12th September 2013 in townships where DWM issues are of concern or where DWM is of a wider community interest; Derrinallum, Lismore, Noorat and Princetown.

In accordance with Council's Consultation Strategy (2013), consultation was undertaken with the local community and key stakeholders. The Council's website advertised the review of the DWMP and requested any submissions to be made to Council's Environment and Emergency Unit for consideration. CSC understands the importance of community consultation and endeavours to ensure that the aims and outcomes of the DWMP are shared with the community, allowing a chance for feedback and discussion. Submissions made by members of the community were reviewed and incorporated into the DWMP where possible. The general concerns and suggestions raised during the community consultation process are listed as follows:

- the community have limited experience with DWM systems and guidelines so fact sheets should be produced to increase public awareness and understanding. These guidelines should also outline general maintenance requirements. It was suggested that this information could be incorporated more frequently within township newsletters;
- greywater discharges to kerb and channels. Derrinallum and Lismore appear to have significant issues with odours and greywater discharges;
- most systems are currently sized for blackwater only and DWM systems would require upgrades to cater for the greywater loads for those systems with current greywater diversions;

- applying for State funding or subsidies put in place to improve failing systems and to assist with the financial burden of required upgrades. It was noted that there is a high number of pensioners living within the township of Lismore;
- maintaining stormwater systems as odour is an issue due to the input of greywater into the environment;
- regular inspections of systems to ensure correct maintenance and running of DWM systems. Inspections need to be more consistent and follow up actions need to be implemented i.e. re-inspections, letters, fines;
- possible reticulated sewer; and
- rural properties should be allowed to utilise primary treatment DWM systems.

2. Plans and Policies, Legislation, Regulation, Standards and Guidelines Relevant to DWM

All new Domestic Wastewater Management systems in Victoria must be constructed, sized and maintained in accordance with the requirements stipulated by the relevant Codes and Standards listed below.

2.1. Council's Plans and Policies

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

- Council Plan 2013-2017;
- Corangamite Health and Wellbeing Plan 2013-2017;
- Corangamite Planning Scheme 2013; and
- Council Budget.

2.2. Legislation

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

- *Local Government Act 1989;*
- *Environment Protection Act 1970;*
- *Public Health and Wellbeing Act 2008;*
- *Planning and Environment Act 1987;*
- *Water Act 1989;*
- State Environmental Protection Policy Waters of Victoria; and
- State Environmental Protection Policy Groundwater of Victoria.

2.3. Regulatory Authorities

DWM involves, to varying degrees, the areas of activity of a number of regulatory and Government agencies:

- Council (Corangamite Shire Council);
- Environment Protection Authority Victoria (EPA);
- Plumbing Industry Commission (PIC);
- Municipal Association of Victoria (MAV);
- Water Corporations;

- Department of Environment and Primary Industries (DEPI); and
- Catchment Management Authorities (CMA): Corangamite CMA and Glenelg-Hopkins CMA.

2.4. Administrative Authorities

The Victoria Civil and Administrative Tribunal (VCAT) is a tribunal by which civil disputes, administrative decisions and appeals can be heard before a 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 Land Capability Assessments (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 the way in which the minimum development guideline of one dwelling per 40 hectares should be applied in the potable water supply catchments.

2.5. Standards and Guidelines

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

- EPA Code of Practice – Onsite Wastewater Management, Publication 891.3 (2013);
- Land Capability Assessment – Onsite Wastewater Management, Publication 746.1 (2003);
- AS/NZS *1547:2012* On-site Domestic Wastewater Management;
- AS/NZS *3500:2003* Plumbing and Drainage; and
- Guidelines – Planning Permit Applications in Open, Potable Water Supply Catchment Areas (DSE, 2012).

3. Domestic Wastewater

3.1. What is Wastewater?

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 liquid;
- 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. Table 2 outlines typical values for domestic wastewater quality parameters.

Table 2: Typical Domestic Wastewater Quality

Parameter	Raw Effluent* mg/L	Septic Effluent* mg/L
Biological Oxygen Demand ($BOD_{5)}$	340	160
Total Suspended Solids (TSS)	260	50
Ammonium (NH^{4+})	9	39
Organic Nitrogen	30	16
Nitrate (NO^{3-})	2	1
Ortho Phosphate	9	12
Organic Phosphorus	11	3

*All concentrations are highly variable

3.2. 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 generally managed by a variety of treatment systems, including but not limited to:

- Septic Tanks;
- Aerated Wastewater Treatment Systems (AWTS);
- Composting Systems;
- Sand Filters; and

- Fabric Filters.

Following treatment, depending on the type of system used, the effluent is then disposed of on-site by absorption trenches, beds, or through irrigation or sand mounds.

3.3. Impacts of Poor Wastewater Management

The management of domestic wastewater onsite poses a number of risks due to the variable nature of wastewater quality and treatment. The aim of effective DWM is to minimize these risks and their associated impacts. The risks associated with wastewater include:

3.3.1 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, 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 *E.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. Polio Virus is also transmitted in wastewater. Viruses can cause widespread illness in epidemic patterns. Viruses are more common and diverse than bacteria in the aquatic environment.

Nitrogen in the form of nitrate is highly mobile in the soil/water environment and can also be a potential public health risk.

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

3.3.2 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. In excess, they may encourage nuisance growth of algae and aquatic plants in sensitive surface water systems and in some cases (nitrate) may pose a threat to human health. Both N and P are found in a variety of forms in domestic wastewater.

3.3.3 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 do 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.

4. Assessment of Current Situation

4.1. Local Environment

CSC is characterised by large areas of farming throughout the entire Shire, rural residential development within a number of small to medium sized township areas, public conservation and resource zones particularly along the coastline and the southeast of the Shire, and rural conservation zone adjacent to the coastline. There is lush hinterland, fertile grasslands, wetlands, rolling hills and volcanic cones. The South of the Shire hosts the renowned Twelve Apostles and expanses of eroding limestone cliffs. There are a number of State and National Parks in the Shire including; Port Campbell National Park, Great Otway National Park, Otway Forest Reserve, Cooriemungle Creek Forest Reserve, Timboon Reserve, Lake Bullen Merri Reserve, Glenormiston Streamside Reserve, Lake Corangamite Reserve, Bookar Wildlife Reserve. The Shire consists of three defined river Basins; Barwon River-Lake Corangamite, Otway Coast, and Hopkins River. The Shire has two Declared Water Supply Catchments (DWSC), Gellibrand River (South Otway) (61) and Gellibrand River (35), that are protected under the State Environment Protection Policy (SEPP) Waters of Victoria.

4.2. Domestic Wastewater Management in Victoria

Historically the management of DWM systems throughout Victoria has been difficult. Local Councils are the regulatory authority for DWM and have generally been limited by time and financial support in order to implement effective DWMPs. Many Councils throughout Victoria (and Australia) have previously provided very limited programs for DWM, providing an approval scheme for new systems and a basic system monitoring program if 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 provide improved DWM so that existing and future development does not impact on the health and environment of Victoria.

Victoria is characterised by a unique environment including potable drinking water catchments, large expanses of bushland and natural waterways as well as complex soils which all effect the way wastewater is managed within a Council's Local Government Area (LGA).

Problems with DWM system operation are common across Victoria and include; poor system design, poor installation practices and lack of maintenance, which can all contribute to potential public and environmental health impacts. CSC is not alone in dealing with problems with DWM and Councils throughout Victoria can all relate to similar problems with DWM.

4.3. Domestic Wastewater Management in Corangamite Shire Council

Figure 1 outlines the unsewered lots that are currently developed and undeveloped within the Shire and shows the locations of the current sewered lots. There are approximately 20,125 lots in the Shire, of which approximately 6,238 are currently

sewered. There are approximately 13,887 lots which are not located within reasonable distance to a sewer, or no sewer connection exists; however, 8,761 of these lots are currently undeveloped. Of those 13,887 lots there are approximately 747 lots for which a septic permit has been issued by Council since the electronic recording system was introduced in 2001; it is assumed that there are a large number of paper based permits for sites which have not been recorded electronically. It is also expected that there are many lots within the Shire which have DWM systems which are unknown to CSC. Therefore, all of these numbers are approximate. Based on the CSC rates database, there are approximately 5,126 lots that are unsewered and developed; hence, potentially have a DWM system.

Historically, greywater was managed separately to blackwater and permitted to discharge off-site, but EPA and Council no longer permits off-site discharge of greywater; however, there will be a number of systems still operating in this manner. The majority of older systems include a conventional septic tank with absorption trenches. These can operate effectively in many cases; however, they do require regular maintenance. Common practice with these systems in Victoria is to bury the septic tank underground. Thus the septic tanks are often difficult to locate and many property owners do not know where they are. This results in a lack of maintenance of the septic tank and in particular a lack of desludging being undertaken as required, typically every 3-5 years. Without periodic desludging, tanks become overloaded and do not provide adequate residence time for solids to settle out. These solids then carry over to the absorption trench in the Land Application Area (LAA) and can cause it to block up and fail.

New systems installed in CSC tend to provide higher levels of treatment through the use of AWTS, sand filters or composting systems, and no longer discharge greywater separately. These systems provide secondary treatment of the wastewater before discharge to irrigation systems. These systems do require more maintenance than a septic tank and servicing every three months is a requirement of the EPA approval.

Wannon Water provides sewerage services for the towns of Camperdown, Cobden, Terang, Timboon, Port Campbell, and Simpson. The town of Skipton is also sewered by Central Highlands Water.

The management of domestic wastewater at CSC is undertaken by the Council's Environment and Emergency Unit. Within this Unit, Environmental Health Officers (EHOs) are responsible for issuing permits to install or alter systems, permits to use systems as well as monitoring systems and investigating complaints relating to DWM systems. The Council Officers will complete three inspections of each new system during the course of installation, as well as ongoing inspections of operating systems if complaints are lodged.

Existing DWM systems that are working correctly are only required to meet the standards enforced at the time the permit was issued; although, considering the date of issue of many of the permits, there may be a large number of systems operating which do not meet current Council or EPA requirements. It is expected that issues may be identified with systems and works required to repair or upgrade systems, through the Council inspection program.

The purpose of the inspections is to provide education to system owners in order to improve system maintenance and performance. CSC will only enforce upgrades of

systems which are failing and potentially causing a human or environmental health impact, or where upgrades to systems are required due to new development, complaints or routine inspections. It is recommended that Council provide information to assist homeowners to select a financially viable solution which meets the requirements of Council and this DWMP.

Legend

- Sewered Lots [6238]
- Unsewered and Developed Lots [5126]
- Unsewered and Undeveloped Lots [8761]
- CSC LGA Boundary
- Surface Waterways

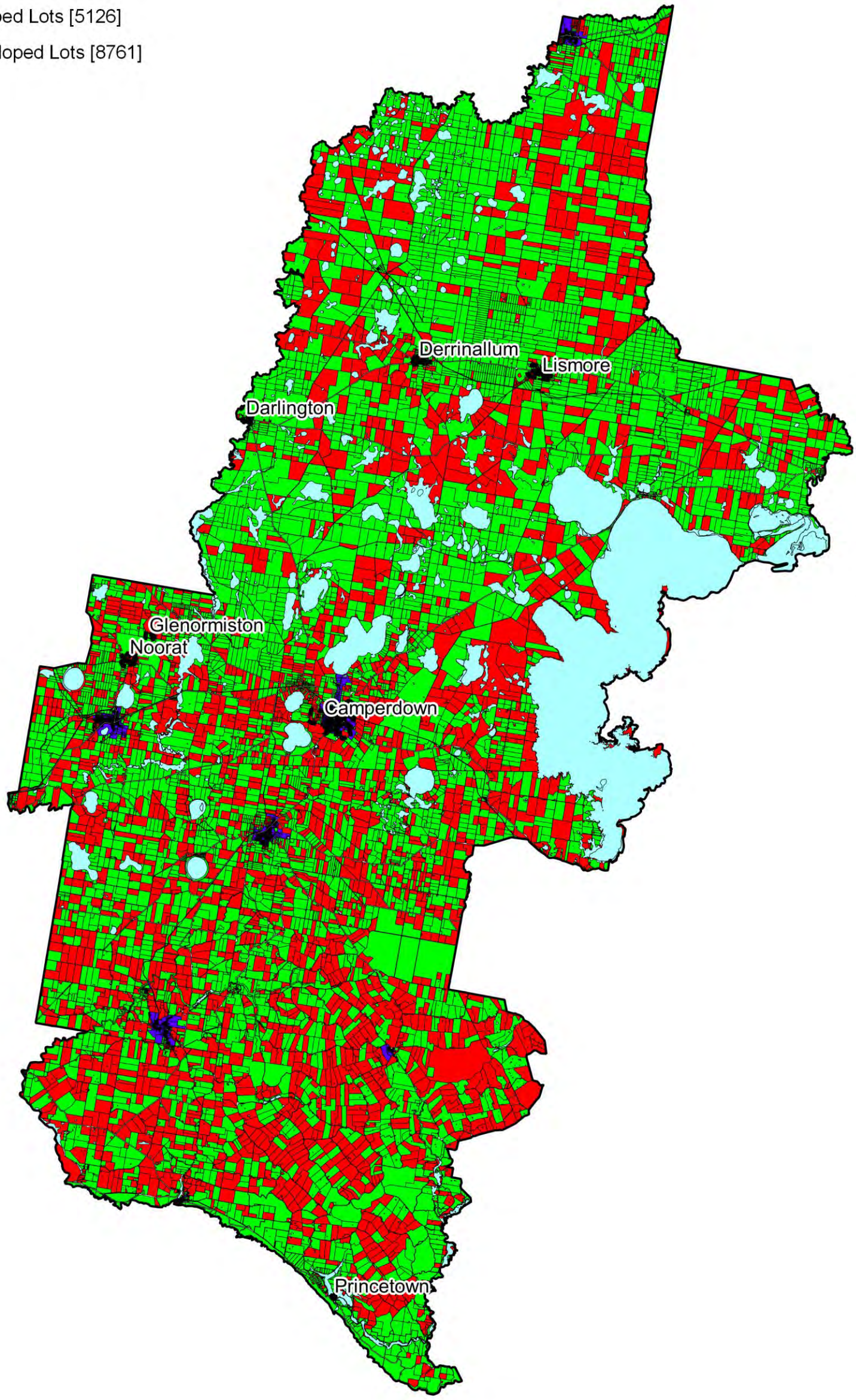

Figure 1: Unsewered Lots: Developed vs. Undeveloped - Shire

Corangamite Shire Council DWMP Review

N

Whitehead & Associates
Environmental Consultants

0 10 20 30 40 50 km

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

4.3.1 Greywater Management in Corangamite Shire Council

Domestic greywater originates from non-toilet plumbing fixtures, such as laundry, basins and showers. Kitchen wastewater, however, is not recommended as a component to be incorporated into the greywater faction due to the high concentrations of fats, oils, grease and high organic matter loads that are difficult to treat. It is a common misconception that greywater doesn't contain chemical or biological pathogens harmful to the environmental and public health, and that it is only sewage and blackwater that requires treatment before disposal or recycling.

Greywater can be treated separately from the blackwater load and reused for garden irrigation purposes. If the greywater is treated to specifications, it can also be utilised for internal reuse via toilet flushing.

If wastewater is separated in new systems, all greywater must be treated using an EPA approved system as listed on the EPA website; www.epa.vic.gov.au/your-environment/water/onsite-wastewater, and meet all the requirements as specified in the EPA Code of Practice (2013) and the Draft AS1546.4 'Domestic Greywater Treatment Systems'. A Council 'Permit to Install' is required before greywater treatment systems are installed.

There are notable greywater issues throughout the Shire, whereby greywater is uncontrollably discharged offsite into stormwater drainage systems. EPA and Council no longer permit off-site discharge of greywater; however, there will be a number of systems still operating in this manner. If these systems were approved and installed with this greywater disposal method and are not causing a nuisance, they will be allowed to continue operation until a system upgrade is required. Community consultation has highlighted concern with regards to greywater within the townships of Princetown, Derrinallum and Lismore. Mitigation of this issue is detailed in Section 4.5 in the DWMP Technical Document and the Action Plan in Section 8.

4.3.2 Wastewater Threats in Corangamite Shire Council

Many DWM issues are common across all of Victoria; however, there are some specific issues which arise due to site location. Section 5 outlines and discusses the specific threats from DWM within the entire Shire and the priority townships within the Shire.

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.

Secondary treatment systems such as 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.

Factors that may lead to DWM system failure include poor installation, lack of maintenance or user neglect resulting in failures. For a system to operate and perform as it was designed; the system must be installed in accordance with the manufacturers' requirements and regular maintenance must be undertaken. 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:

- Regular desludging of primary tank;
- Check 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; 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 system can operate effectively without major problems, however, a lack of care for any one of or all of these items can result in system failures. Often system failures will occur as a result of poor installation practices. The installation of DWM systems should 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.

Where a new system or major upgrade works (for example substantial repair, expansion or replacement of either the treatment system and/or land application system) are proposed in CSC, the system must comply with the current Standards and EPA Code of Practice (2013). Where an existing system is operating effectively but does not comply with the current EPA Code of Practice (2013) or Standards then the system will be monitored; however, unless a failure occurs, the owner will not be required to upgrade or replace the system.

The issues outlined above are common for all DWM systems. Table 3 outlines the risks common to all DWM systems within the Shire and Table 4 outlines the impacts of failing systems. 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 installed correctly and effectively managed, they will not necessarily impact on the downstream environment.

Table 3: Risks of Domestic Wastewater Management Systems

Risk	Cause	Impacts
Failure of treatment system	Lack of maintenance/ poor	Environmental, Health and

Risk	Cause	Impacts
	installation/age of system	Social
Disinfection failure	No chlorine/poor upstream treatment	Health
Ineffective regulation	Lack of staff/time	Environmental, Health and Social
Offsite discharge	Failing/unapproved/illegal system	Environmental, Health and Social
Land application area/trench	Peak loads/overload of system/inadequate settlement in primary chamber	Environmental, Health and Social
Human contact	Maintenance/inappropriate disposal methods	Health and Social
Pollution	Inappropriate effluent disposal/ damaged system	Environmental and Health
Owner ignorance	Lack of knowledge of system	Environmental, Health and Social
Damage to system by animals (domestic, farm and wild)	Inappropriate effluent disposal area	Health and Social
Odour	Poor treatment occurring in the primary tank	Social
Effluent disposal area failure on-site	Area inappropriately sized, located or overloaded	Health and Environmental
Groundwater contamination	Effluent disposal area overloaded	Environmental and Social
Surface water contamination	Surface runoff of effluent in area with reduced buffer distances	Environmental and Social
Human or animal disease outbreak	Poor treatment and management of system	Health

Table 4: Potential Impacts of Failing Domestic Wastewater Management Systems

Human Health	Environmental	Social
Spread of disease (human and animal)	Pollution of surface water	Decreased amenity
Contaminated drinking water supply	Pollution of groundwater	Odour
Spread of minor illnesses	Degradation of soils	Impacts on infrastructure (water supply)
	Degradation of native vegetation	Financial impacts for system owners
	Increased weed growth	

5. Risk Assessment Framework

A detailed risk assessment of the potential risks to DWM systems within CSC was conducted. This risk assessment aims to provide Council with a reasoned and justified tool to prioritise investment in future developments, monitoring and upgrading of DWM systems within the Shire. It incorporates tools that assess the bio-geophysical capability for DWM in:

- Existing unsewered towns and villages;
- Recently developed unsewered subdivisions; and
- Undeveloped unsewered land.

5.1. Data Acquisition

Geographic Information System (GIS) data, covering a wide variety of physical and planning components, has been acquired from CSC, Department of Environment and Primary Industries (DEPI), Visualising Victoria's Groundwater (VVG) Project by University of Ballarat, and the Department of Sustainability and the Environment (DSE) (now known as DEPI). The GIS data supplied was used to generate DWM constraint maps of the Shire. This information provided a comprehensive basis for the risk assessment.

The data obtained included: property and proposed parcel information (cadastre), roads, local government area (LGA) and township boundaries (urban centres), planning scheme zonings and overlays, surface elevation contours (a range of levels), hydrology and drainage, flood prone land (land subject to inundation), 1 in 100 year annual recurrence interval (ARI) flood level, soil landscape, lithology and land system information, groundwater bore locations and information, watertable depths and potable water catchment boundaries.

5.2. Domestic Wastewater Management Constraint Maps Overview

5.2.1 Lot Characterisation

Using data supplied by the Council, in the form of a GIS planning overlay, the risk assessment identified approximately 20,125 existing discrete parcels within the Shire. Some discrepancy may be found between other published total lot numbers and those that were used in this risk assessment due to issues associated with properties and parcels and how they have been amalgamated and/or subdivided over time and the version of information provided by the Council.

There were found to be approximately 13,887 lots within the Shire that were unsewered; with 5,126 of these unsewered lots known to be developed and approximately 8,761 undeveloped. Approximately 6,238 lots were estimated to be connected to the reticulated sewer. The reticulated sewer, provided by Wannon Water, services the townships of Camperdown (~2,221 lots), Cobden (~1,049 lots), Terang, Timboon, Port Campbell and Simpson. The reticulated sewer in the township of Skipton (~465 lots) is provided by Central Highlands Water. Figure 1 in Section 4.3 of this DWMP spatially differentiates between the unsewered developed and undeveloped lots and the sewered lots.

5.2.2 Discrete Domestic Wastewater Management Constraints

The constraint maps were created using a GIS based risk assessment, through QGIS™ v2.0.1 and MapInfo™ v11.5, which applied constraint classes for a number of built constraints and land capability constraints, including site and soil parameters. Eight discrete constraints were selected, and when consolidated, contribute to assessing the overall land capability for DWM systems. These were selected based on the availability of digital data, which was limited, and in the light of experience gained in designing and auditing DWM systems. The discrete constraints chosen were:

- Lot size;
- Planning scheme zones[1];
- Proximity to surface watercourses;
- Proximity to groundwater bores;
- Groundwater depth;
- Proximity to flood prone land;
- Slope (surface elevation); and
- Soil suitability and associated geology (soil landscapes).

There were other parameters that could have been considered in a more detailed constraint assessment, however, such data was not available for this risk assessment and the scope of the project did not permit its collection. Nevertheless, the constraints chosen were considered acceptable for the purpose of this broad-scale risk assessment. The discrete constraint maps for both the Shire and townships are described in detail within the 'CSC DWMP Technical Document'. The methodology and results of the consolidated DWM constraint mapping are described in more detail below.

5.3. Domestic Wastewater Management Consolidated Constraint Map

5.3.1 Introduction

The primary objective of the risk assessment was to assess the allotments within CSC to determine whether they could sustainably manage domestic wastewater on-site. The inter-relationship of a wide range of individual constraints and variables affect the specific land capability and associated constraints for sustainable on-site DWM. Understanding this inter-relationship can be difficult, particularly in terms of assessing the relative contributions of individual discrete constraints in a broad-scale evaluation. To address the limited resolution and spatial variability in the individual discrete constraint analysis, a consolidated constraint map has been prepared by combining the outputs of the preliminary discrete constraint analyses for each allotment.

The maps have been produced for use at a broad scale (~1:400,000) and the limitations of the data used in the creation of these maps must be recognised. The scale of some of the data inputs is too coarse for the map itself to be used as a tool to diagnose likely individual DWM system performance; however, it does have substantial value as a development assessment tool and as a defensible justification for

[1] Planning scheme zones thematically mapped and not included in the consolidated constraint analysis.

prioritisation of existing management issues within the townships. 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;
- As a guide to develop a monitoring strategy for existing DWM systems in the Shire;
- As a guide to Council for strategic planning of future rural residential and other unsewered development; and
- To identify priority existing unsewered townships that require more detailed investigations to determine needs.

5.3.2 Classification Framework and Requirements

For each of the discrete constraints mentioned above in Section 5.2.2, the degree of constraint (or constraint) in relation to DWM for all lots within the Shire was assessed and individually assigned either a “high”, “moderate” or “low” constraint class. The criteria used to determine constraint categories were based on previous constraint assessments for unsewered towns in Australia undertaken by the authors, and relevant Australian and Victorian guidelines for DWM.

The consolidated constraint map uses the same classification framework. Table 5 provides a rationale for the interpretations that were used to derive the constraint classes used in this risk assessment. The constraint classes give guidance towards the DWM requirements as stipulated by Council.

For existing DWM systems the level of constraint 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.

Table 5: Rationale for Domestic Wastewater Management Constraint Ratings

Constraint Class	Description
High	The constraint is present at a high level and this significantly restricts opportunities for sustainable DWM. Conventional systems (septic tanks and trenches) are ‘typically’ not appropriate and a high level of investigation and design would be required to identify a sustainable DWM system. In some cases it is possible that sustainable DWM servicing could only be possible by centralised (sewer) system and off-lot management. Larger rural lots will require detailed consideration of the parameters which present constraint to determine if they can be adequately addressed without the need for an LCA. This will be to the discretion of and in discussion with Council.
Moderate	The constraint is present at a moderate level and this limits the range of DWM options that are appropriate for a given lot. Appropriate consideration is required to determine how those parameters which present the constraint can be adequately addressed in the siting, design, sizing and operation and management of the DWM system.
Low	The constraint is present at a low level and is unlikely to substantially

	limit opportunities for DWM. In most cases appropriately designed and managed commonly approved DWM systems could be installed and expected to operate in a compliant manner.

The Council requirements for each of the constraints outlined in Table 5 are outlined below for both lots within the townships and rural lots. A matrix based approach, as presented in Table 6, was developed, with the aim to clarify the requirements for each lot and associated constraint class for DWM within the Shire.

Lots within Townships:

A LCA must be prepared for all lots identified as a high constraint within the townships, and might also be required for a moderate constraint lot at the discretion of Council. For the lots which are deemed to be a moderate or low constraint where an LCA is not required. It is mandatory for new DWM systems or failing DWM systems requiring upgrade through new or extended development onsite or through Council inspections of existing DWM systems, to meet a minimum secondary treatment standard, unless a LCA justifies otherwise.

Rural Lots:

A LCA must also be prepared for all rural lots identified as a high constraint, unless otherwise justified to the EHO at Council. For the high constraint lots where a LCA is not required, it is mandatory for all new DWM systems or failing DWM systems requiring upgrade through new or extended development onsite or through Council inspections of existing DWM systems, to meet a minimum secondary treatment standard. A LCA is not required for moderate and low constraint rural lots and these lots must meet a minimum secondary treatment standard or primary treatment standard to the discretion of Council.

Table 6: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

5.3.3 Consolidated Constraint Map Rationale

For the consolidated constraint analysis, the cumulative effect of the following individual discrete constraints; lot size, proximity to surface watercourses, proximity to groundwater bores, proximity to flood prone land, average lot slope, soil suitability and depth to groundwater, was assessed. The first six discrete constraints were assigned a high, moderate and low constraint class, whereas depth to groundwater was classified as either compliant or non-compliant. A total of 20,125 lots within the Shire were included in the consolidated constraint analysis. The rationale for the method for the development of the consolidated constraint map is as follows:

Total Score Method:

A numeric value, or score, was assigned to each constraint class ("high" = 3, "moderate" = 2, and "low" = 1) and the sum of the scores for the first six individual discrete constraints was calculated to produce a total aggregate score for each

allotment. This produced total scores ranging from six to eighteen, with higher total scores representing more highly constrained lots for on-site DWM. All constraints were given equal weighting.

For example:

Discrete Constraint	High Constraint	Moderate Constraint	Low Constraint	
Lot Size	3			
Average Slope			1	
Soil Suitability		2		Summation (Σ) = 11
Proximity to Groundwater Bores	3			
Proximity to Flood Prone Land			1	
Proximity to Surface Watercourses			1	
Depth to Groundwater	Non-compliant			

The total score constraint classes[2] are as follows:

High = 13 - 18

Moderate = 7 - 12

Low = 6

For this example, the tentative consolidated assigned constraint class for this allotment is “moderate”, as the total summation of all the discrete constraints equated to eleven.

The allotments are then assessed by the depth to groundwater discrete constraint. If an allotment is ‘compliant’, then the constraint class remains the same as the one that resulted from the first step in this method. If an allotment is ‘non-compliant’, then the constraint class is increased by one rating. If an allotment was already assigned a high constraint class, this cannot be increased by an additional rating and the final constraint class will remain as high.

The 45 lots that are located within (or partly within) the Drinking Water Supply Catchment (DWSC) are automatically assigned a high constraint rating due the need for a more detailed assessment as required by the Water Authority.

For the example above, the constraint rating in the first step was moderate. As the allotment is deemed to be ‘non-compliant’ in relation to depth to groundwater, then the final constraint rating would increase to high.

Data Justification

[2] For the consolidated constraint of a given lot to be assigned a high constraint class, there needs to be at least one high discrete constraint and the rest all moderate constraints or varying combination with more than one high constraint or the depth to groundwater is ‘non-compliant’ which will increase a moderate constraint to a high constraint.

There were lots where the soil type/properties were unknown, so they were not assigned a constraint class rating for the discrete constraint soil suitability map. However, as consistency of lots was needed between each discrete constraint parameter for reference purposes in the development of the consolidated constraint map, all of the lots that were not currently assigned a constraint class rating were assigned with "unidentified". For the purposes of the total score method, these "unidentified" lots, in terms of soil suitability, needed to have an assigned numeric value. A conservative approach was taken and each of these "unidentified" lots was assigned the "moderate" constraint class value of "2".

A similar approach was followed for those lots that were not assigned a constraint class rating for the discrete constraint depth to groundwater map. For the purpose of development of the consolidated constraint map, a conservative approach was employed, assigning those lots that were not currently assigned a constraint class rating as "non-compliant" with regards to depth to groundwater.

5.3.4 Domestic Wastewater Management Consolidated Constraint Map

Table 7 details the results of the consolidated constraint analysis for the Shire. The consolidated constraint map, Figure 2 (total score method), outlines the variability in constraint to the overall DWM throughout the Shire. The seven subsequent consolidated township constraint maps are shown below in Figures 2a-g.

Table 7: Consolidated Constraint Map Summary

DWM Consolidated Constraint Analysis	**Assigned Constraint Class (Number of Lots)**		
Total Score Method	**High**	**Moderate**	**Low**
Final Constraint Map	3,077 (15.3%)	16,137 (80.2%)	911 (4.5%)
Darlington Township	93 (100%)	0 (0%)	0 (0%)
Derrinallum Township	141 (46.5%)	162 (53.5%)	0 (0%)
Glenormiston Township	0 (0%)	35 (97.2%)	1 (2.8%)
Lismore Township	10 (2.2%)	442 (97.8%)	0 (0%)
Noorat Township	0 (0%)	154 (96.9%)	5 (3.1%)
Princetown Township	40 (100%)	0 (0%)	0 (0%)
Camperdown Township	0 (0%)	2,418 (99.7%)	7 (0.3%)
Township Total	284	3,211	13

Legend

Consolidated (Total Score Method) Assigned Constraint Class - Shire Cadastre [20125]

- High [3077]
- Medium [16137]
- Low [911]
- CSC LGA Boundary
- Surface Waterways

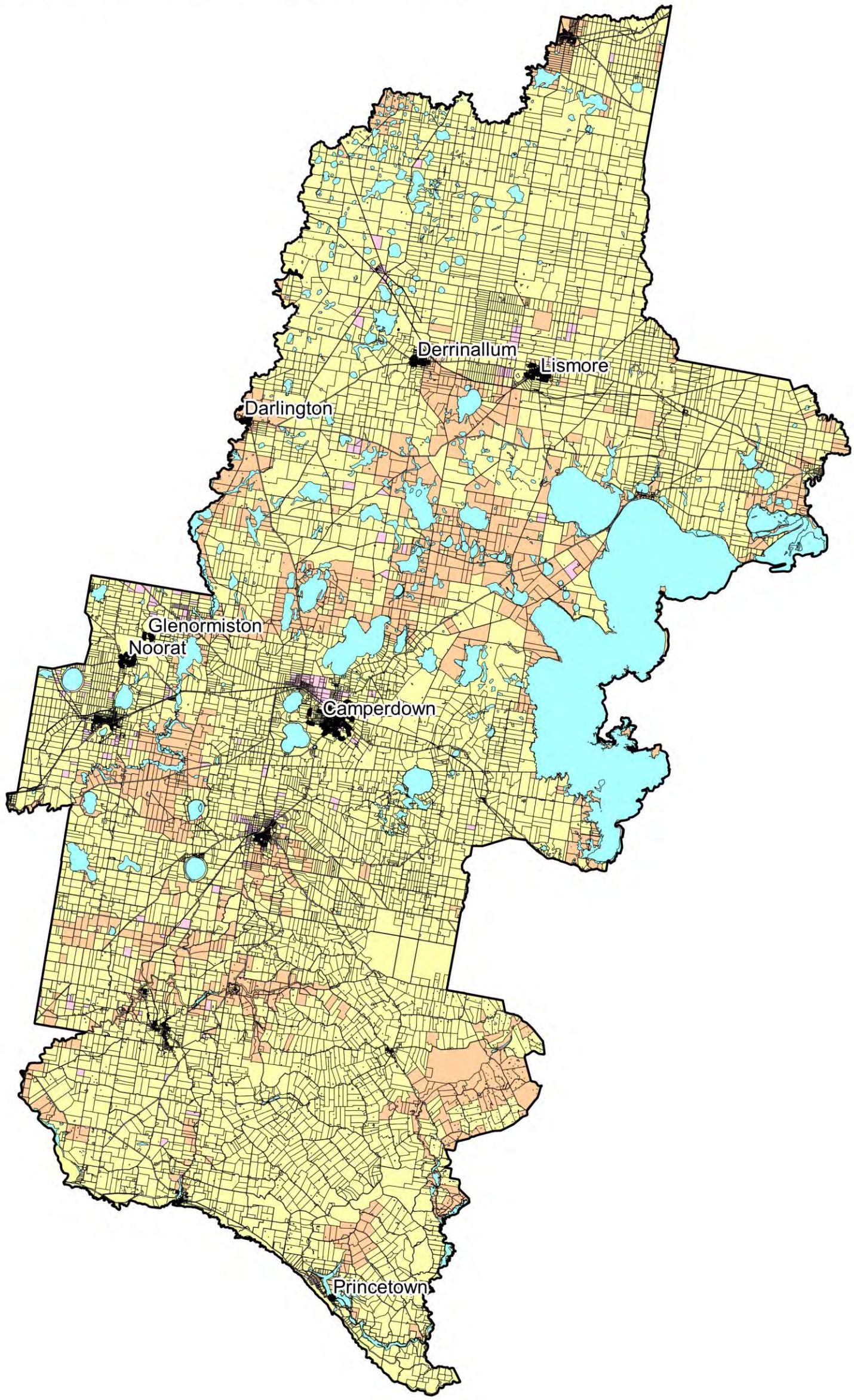

Figure 2: DWM Final Consolidated Constraint Map - Shire

Corangamite Shire Council DWMP Review

N

Whitehead & Associates
Environmental Consultants

0 10 20 30 40 50 km

(Approx Scale)

Revision	2
Drawn	JK
Approved	JW

The consolidated constraint mapping identifies approximately 5% of lots within the Shire with a low level of constraint, 80% with a medium level of constraint and 15% with a high level of constraint. The total score method resulted in the lots throughout the majority of the Shire to be assigned a “moderate” constraint class rating. The spatial distribution of the levels of constraint is spread throughout the entire Shire. The consolidated constraint map helps to highlight the similar inherent relationship that only one or two individual discrete constraints generally affect any given lot. This relationship is described further in the consolidated constraint evaluation for each of the townships within the Shire. Each township has particular DWM constraints that need to be addressed.

The ‘thresholds’ for the discrete constraints are influenced by current Australian and State guidelines but are largely qualitative. Furthermore, the degree of constraint depends on the type of effluent disposal system and generated effluent quality (for example, subsurface irrigation can be installed on slopes up to 15-20% in some cases, but this would be impractical for trenches). 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.

According to the discrete constraint maps as detailed in the DWMP Technical Document (2014), the parameters contributing the most constraint to DWM within the Shire are proximity to surface waters, depth to groundwater, flood prone land, average slope and soil suitability. The depth to groundwater spatial distribution pattern appears to be followed within the final consolidated constraint map. Soil suitability also contributes considerably to the final consolidated constraint for each lot within the Shire, often due to clayey soils derived from the basaltic parent rocks. The majority of the lots within the Shire will not need a LCA or the requirement will be at the discretion of Council. A minimum secondary treatment standard will be required throughout the majority of the Shire, unless a LCA or Council decision deems otherwise. These DWM requirements based on the level of constraint are outlined in Table 6 in Section 5.3.2.

Limitations of the Risk Assessment and Constraint Mapping

There are several limitations inherent in the methodology adopted to assess the variation in on-site DWM related risk 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 consolidated constraint map 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 consolidated

constraint map can be used to target more detailed investigations into suitability for on-site DWM. The consolidated constraint map helps to target the main physical DWM constraints associated with a lot; which with appropriate individual lot assessment and design can be overcome. A summary of each of the townships is as follows.

Legend

Consolidated (Total Score Method) Assigned Constraint Class - Darlington Cadastre [93]

- High [93]
- Moderate [0]
- Low [0]
- CSC LGA Boundary
- Darlington
- Surface Waterways

Figure 2a: DWM Final Consolidated Constraint Map - Darlington

Corangamite Shire Council DWMP Review

Whitehead & Associates
Environmental Consultants

0 100 200 300 400 500 m

(Approx Scale)

N

Revision	1
Drawn	JK
Approved	JW

Darlington:

The consolidated constraint map indicates that the percentage of lots assigned a high constraint rating is 100% for the Darlington township. The majority of the township is zoned as township, with farming to the north. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are soil suitability and depth to groundwater. It is recommended that all lots require a detailed LCA to be conducted for new systems and that the Inspection Program prioritises the existing DWM systems within the township.

The soils within the township consist of heavy clays with poor internal drainage. These soils are derived from the underlying Newer Volcanic Group basalt flow lithology. Saturated alluvial soils are located to the south of the township adjacent to the creek traversing east-west. Shallow groundwater is found within the township, deeming the entire township as non-compliant with regards to depth to groundwater.

The majority of the lots within the township are of a moderate size, between 1,000m^2 and 4,000m^2, which presents a moderate constraint. Some lots are assigned a moderate constraint rating, with regards to proximity to surface waters, due to the creek located in the south of the township and a number of dams on rural properties in the north of the township. However, the entire township is considered not to be flood prone based on the 1 in 100 year ARI flood level. There is one groundwater bore located in the middle of the township, resulting in four lots being assigned a moderate constraint rating as they are partly located within the prescribed buffer. The majority of the lots have an average slope less than 8%.

According to the DWM requirement matrix outlined in Table 6 from Section 5.3.2, the majority of the lots would require an LCA to be conducted as all the lots within the township have been classified as a having a high constraint for DWM.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

Legend

Consolidated (Total Score Method) Assigned Constraint Class - Derrinallum Cadastre [303]

- High [141]
- Moderate [162]
- Low [0]
- Derrinallum
- Surface Waterways

Derrinallum

Figure 2b: DWM Final Consolidated Constraint Map - Derrinallum

Corangamite Shire Council DWMP Review

N

Whitehead & Associates
Environmental Consultants

0 150 300 450 600 750 m

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

Derrinallum:

The consolidated constraint map indicates that the percentage of lots assigned a high constraint rating is 50% for the Derrinallum township. The remainder of lots are assigned a moderate constraint rating. The majority of the township is zoned as township and is surrounded by farming. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are lot size, proximity to groundwater bores, depth to groundwater and soil suitability. It is recommended that lots within the eastern region require a detailed LCA to be conducted for new systems and that the Inspection Program prioritises the existing DWM systems within this region of the township.

The majority of lots within the township are of a moderate to smaller size, less than 4,000m^2. There are a significant number of registered groundwater bores distributed unevenly throughout the township, resulting in a significant number of lots assigned a moderate or high constraint rating. The eastern portion of the township is associated with alluvial soils that have low permeability. There are regions to the south of the township that are poorly drained and classified as marsh landscapes. The contrast in lithology, soils and landscape between the western and eastern portions of the township is exhibited in the final consolidated constraint map, with the lots in the western portion and eastern portion assigned a moderate and high constraint rating, respectively. Lots in the eastern portion of the township are deemed as non-compliant with regards to depth to groundwater. The higher groundwater level could be attributed to the slowly permeable heavy clay soils, creating a seasonally perched watertable.

Although the eastern portion of the township consists of marshy landscape, there is only one lot within the township that is considered to be flood prone based on the 1 in 100 year ARI. All of the lots have an average slope less than 8%.

According to the DWM requirement matrix outlined in Table 6 from Section 5.3.2, half of the lots within Derrinallum would require an LCA to be conducted as they are classified as having a high constraint to DWM; whereas, the other half of the township would be subject to Council's discretion.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

Legend

Consolidated (Total Score Method) Assigned Constraint Class - Glenormiston Cadastre [36]

- High [0]
- Moderate [35]
- Low [1]
- Glenormiston
- Surface Waterways

Glenormiston

Figure 2c: DWM Final Consolidated Constraint Map - Glenormiston

Corangamite Shire Council DWMP Review

Whitehead & Associates
Environmental Consultants

0 100 200 300 400 500 m

(Approx Scale)

N

Revision	1
Drawn	JK
Approved	JW

Glenormiston:

The consolidated constraint map indicates that the majority of the lots within the township are assigned a moderate constraint rating, with the exception of one lot assigned a low constraint rating in the southwest corner of the township. The majority of the township is zoned as township, with a special use zone to the north and east and farming zone to the south and west of the township. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are lot size and soil suitability. It is recommended that the majority of lots within the township would not require a detailed LCA; however, for lots of moderate constraint, careful design is required and should demonstrate that the specific constraints affecting any particular lot are appropriately addressed.

The majority of the lots within the township are of a moderate size, between 1,000m^2 and 4,000m^2. The underlying lithology consists of Newer Volcanic basalt flows with stony rises in the north western corner of the township, resulting in a low level of constraint for soil suitability. Deep silty loam duplex soils overlying ash deposits are located throughout the majority of the township, with heavy clay soils in the northwest that appear to have formed directly from the basalt flows resulting in a high level of constraint for soil suitability.

There are a small number of groundwater bores within the township; resulting in a few lots assigned a moderate constraint rating as they are located within the prescribed buffer. The entire township is compliant with regards to depth to groundwater. The entire township is considered not to be flood prone based on the 1 in 100 year ARI flood level and is not located within significant proximity to surface waters. The majority of the lots within the township have a low slope constraint, less than 8%, with slope increasing to the southwest due the presence of a remnant volcanic cone and associated hill slopes.

According to the DWM requirement matrix outlined in Table 6 from Section 5.3.2, the majority of the lots within Glenormiston would not require an LCA to be conducted as they have been classified as a moderate constraint; however, they will still be subject to Council's discretion.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

Legend

Consolidated (Total Score Method) Assigned Constraint Class - Lismore Cadastre [452]

- High [10]
- Moderate [442]
- Low [0]
- Lismore
- Surface Waterways

Lismore

Figure 2d: DWM Final Consolidated Constraint Map - Lismore

Corangamite Shire Council DWMP Review

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Whitehead & Associates
Environmental Consultants

0 340 680 1020 1360 1700 m

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

Lismore:

The consolidated constraint map indicates that the majority of the lots within the township are assigned a moderated constraint rating, with a small percentage, 2%, of lots assigned a high constraint rating. These highly constrained lots are located adjacent to the creek that traverses N-S adjacent to the eastern boundary of the township. The majority of the township is zoned as township, with an industrial zone to the west, public park to the south and low density residential lots on the outskirts of the township. The township is surrounded by lots zoned for farming. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are lot size, proximity to surface waters, and soil suitability. It is recommended that the 10 identified lots located adjacent to the creek would require a detailed LCA to be conducted for new systems and that the Inspection Program prioritises the existing DWM systems for these lots within the township.

The lot size is quite variable within the township, with a high number of lots of a moderate to smaller size, less than 4,000m^2. There are a number of lots along the creek that are assigned a moderate constraint rating with regards to proximity to surface waters. The underlying lithology consists primarily of Illoura Granodiorite, with Newer Volcanic basalt flows to the south and alluvium along the creek. Nearly all of the lots within the township are assigned a high constraint rating with regards to soil suitability. The soils derived from the granodiorite are duplex soils with clay subsoils and are found to be waterlogged during the winter months. The alluvial soils along the creek consist of sand; however, the swampy landscape means that the soils are generally quite saturated.

There is one groundwater bore located within the township; resulting in a few lots assigned a moderate constraint rating as they are located within the prescribed buffer. The township is located on undulating plains. The majority of the lots within the township have a low slope constraint, less than 8%, except for ten lots located in the north of the township considered to have an average slope between 8% and 12%. Nearly all of the lots are deemed as compliant with regards to depth to groundwater, except for 10 non-compliant lots located in the northeast of the township adjacent to the creek. There are only two lots that are considered to be flood prone based on the 1 in 100 year ARI flood level; yet again located adjacent to the creek.

According to the DWM requirement matrix outlined in Table 6 in Section 5.3.2, although there is an existing greywater issue within the township, the constraint mapping indicates that the majority of the lots would not require an LCA to be conducted as they have been classified as a having a moderate constraint for DWM. This indicates that if appropriate DWM systems, meeting current standards, are installed, sustainable DWM onsite should be achievable for Lismore.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

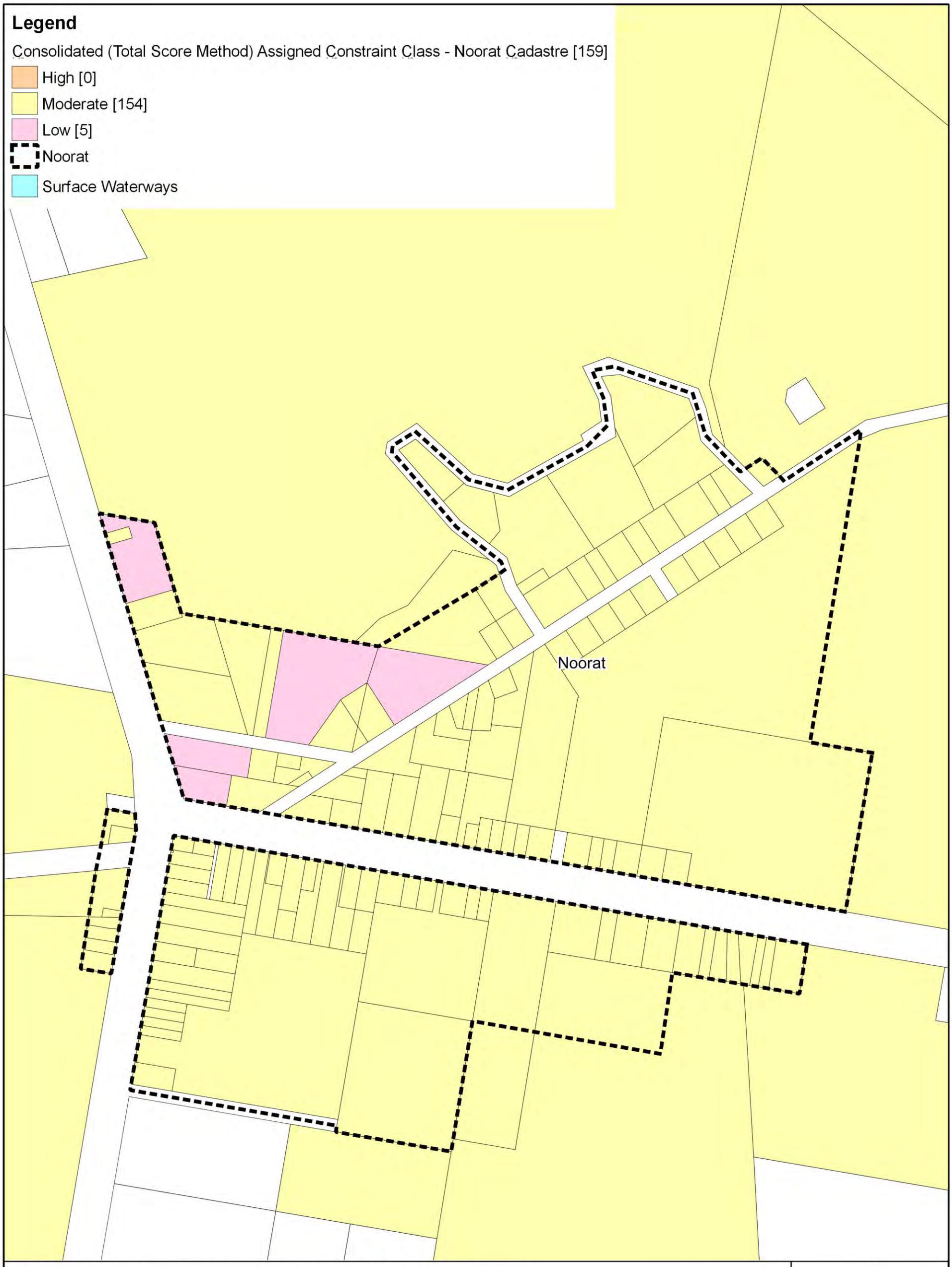

Figure 2e: DWM Final Consolidated Constraint Map - Noorat

Corangamite Shire Council DWMP Review

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Environmental Consultants

0 150 300 450 600 750 m

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

Noorat:

The consolidated constraint map indicates that the majority of the lots within the township are assigned a moderate constraint rating, except for five lots located within the northwest of the township that are assigned a low constraint rating. The majority of the township is zoned as township, with a small region of low density residential in the north and the area surrounding the township is zoned for farming. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are lot size, proximity to groundwater bores, slope and soil suitability. It is recommended that the majority of lots within the township would not require a detailed LCA.

The lot size is quite variable within the township, with a high number of lots of a moderate to smaller size, less than 4,000m^2. There is a significant number of registered groundwater bores, more than 20, located within the township; resulting in a number of lots assigned a moderate and high constraint rating as they are located within the prescribed buffer. The township is located on the hill slopes of a remnant volcanic cone that is located to the north of the township, extending into undulating basalt plains to the south. The majority of the lots within the township have a low slope constraint, less than 8%, except for the lots located along the northern outskirts of the township where slope steadily increases. The underlying lithology primarily consists of Newer Volcanic stony rises, with a small region along the northern outskirts consisting of Newer Volcanic scoria deposits. The soils within the township are observably variable with regards to their location within the landscape and associated underlying Newer Volcanic deposits. Nearly all of the lots within the township are assigned a high constraint rating with regards to soil suitability, except for a small region in the northwest that has loamy soils with scoria deposits.

The lots within the township are considered to have a low constraint with regards to DWM for both proximity to surface waters and flood prone land based on the 1 in 100 year ARI. All lots within the township are deemed as compliant with regards to the depth to groundwater.

According to the DWM requirement matrix outlined in Table 6 from Section 5.3.2, the majority of the lots within Noorat would not require an LCA to be conducted as they have been classified as of moderate and low constraint; however, the moderate constraint lots will still be subject to Council's discretion.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

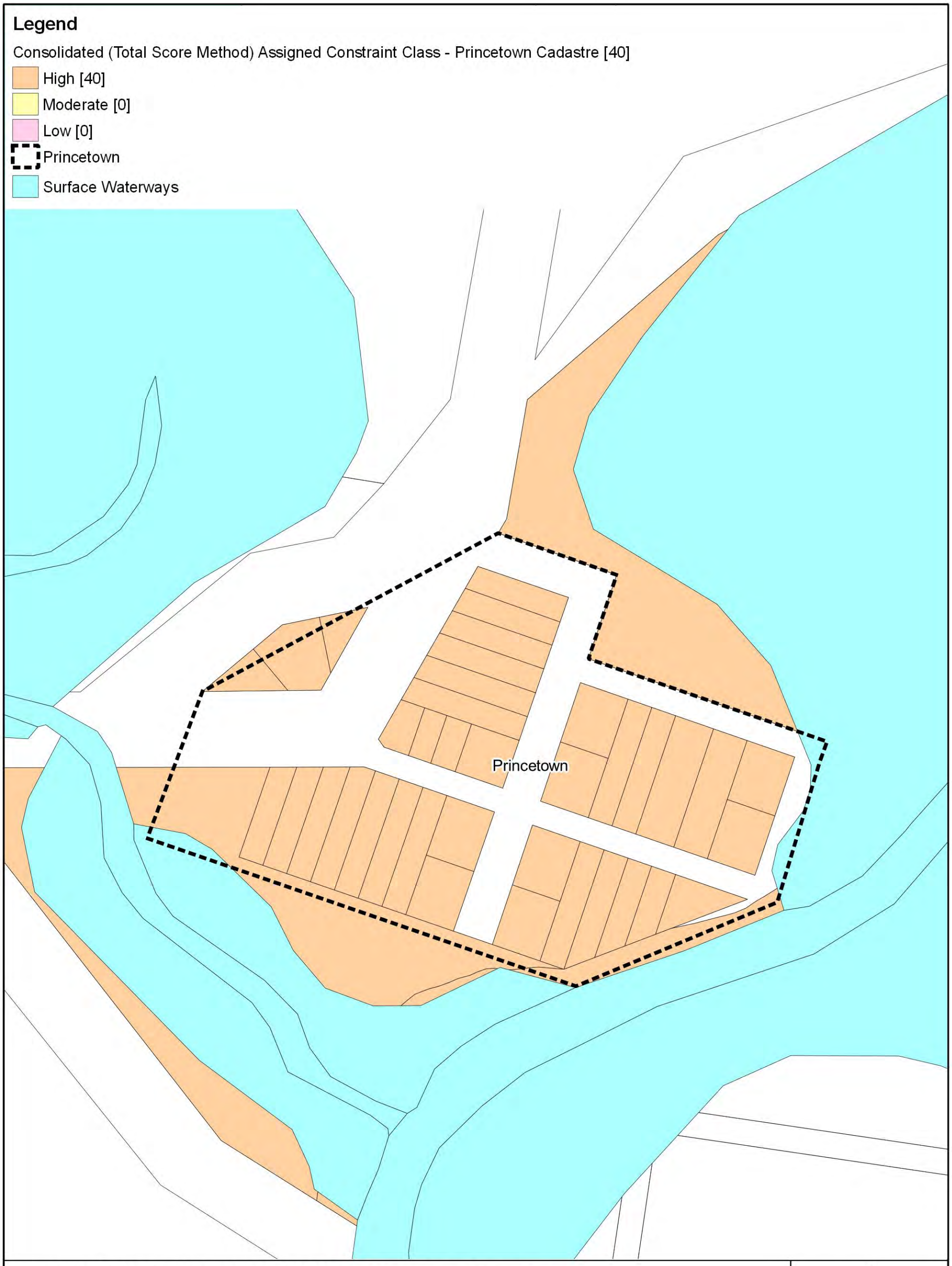

Figure 2f: DWM Final Consolidated Constraint Map - Princetown

Corangamite Shire Council DWMP Review

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Environmental Consultants

0 60 120 180 240 300 m

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

Princetown:

The consolidated constraint map indicates that all of the lots within the township are assigned a high constraint rating. The majority of the township is zoned as rural conservation zone with a few lots within the middle of the township zoned as township. The township is contained on the crest and side slopes of a small isolated hill underlain by Gellibrand Marl and is surrounded by a network of surface waterways and swamp landscape. The township is highly constrained; with the primary parameters that are significantly contributing to constraint, in relation to DWM, within the township being lot size, proximity to surface waters, slope and soil suitability. It is also expected that depth to groundwater parameter would also pose a significant constraint to the lots within the township; however data was not available for this region.

The majority of the lots within the township are of a moderate size, between 1,000m^2 and 4,000m^2, with four smaller lots less than 1,000m^2. Due to the extensive network of surrounding surface waterways, it is expected that the proximity to surface waters parameter will pose a significant constraint on the township. The majority of the lots located on the side slopes are assigned a moderate constraint rating with regard to proximity to surface waters. There are a couple of lots located on the crest of the hill that are not constrained by the prescribed surface water buffers and, inversely, two lots that are entirely constrained. Average lot slope is highly variable within the township, with the majority of the lots assigned a moderate or high constraint rating, increasing in constraint down the side slopes. The underlying lithology primarily consists of Gellibrand Marl with coastal lagoon deposits on the lower side slopes and surrounding swamp landscape. All of the lots within the township are assigned a high constraint rating with regards to soil suitability. The soils primarily consist of clay, with some regions comprising of a coarse river sand topsoil horizons.

There are two groundwater bores located on the crest of the hill within the township; resulting in a few lots being assigned a moderate constraint rating as they are located within the prescribed buffer. The lots located around the base of the hill are considered to be flood prone based on the 1 in 100 year ARI, with the majority of the lots not affected.

According to the DWM requirement matrix outlined in Table 6 in Section 5.3.2, the majority of the lots within Princetown would require an LCA to be conducted as all the lots within the township have been classified as a having a high constraint for DWM.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

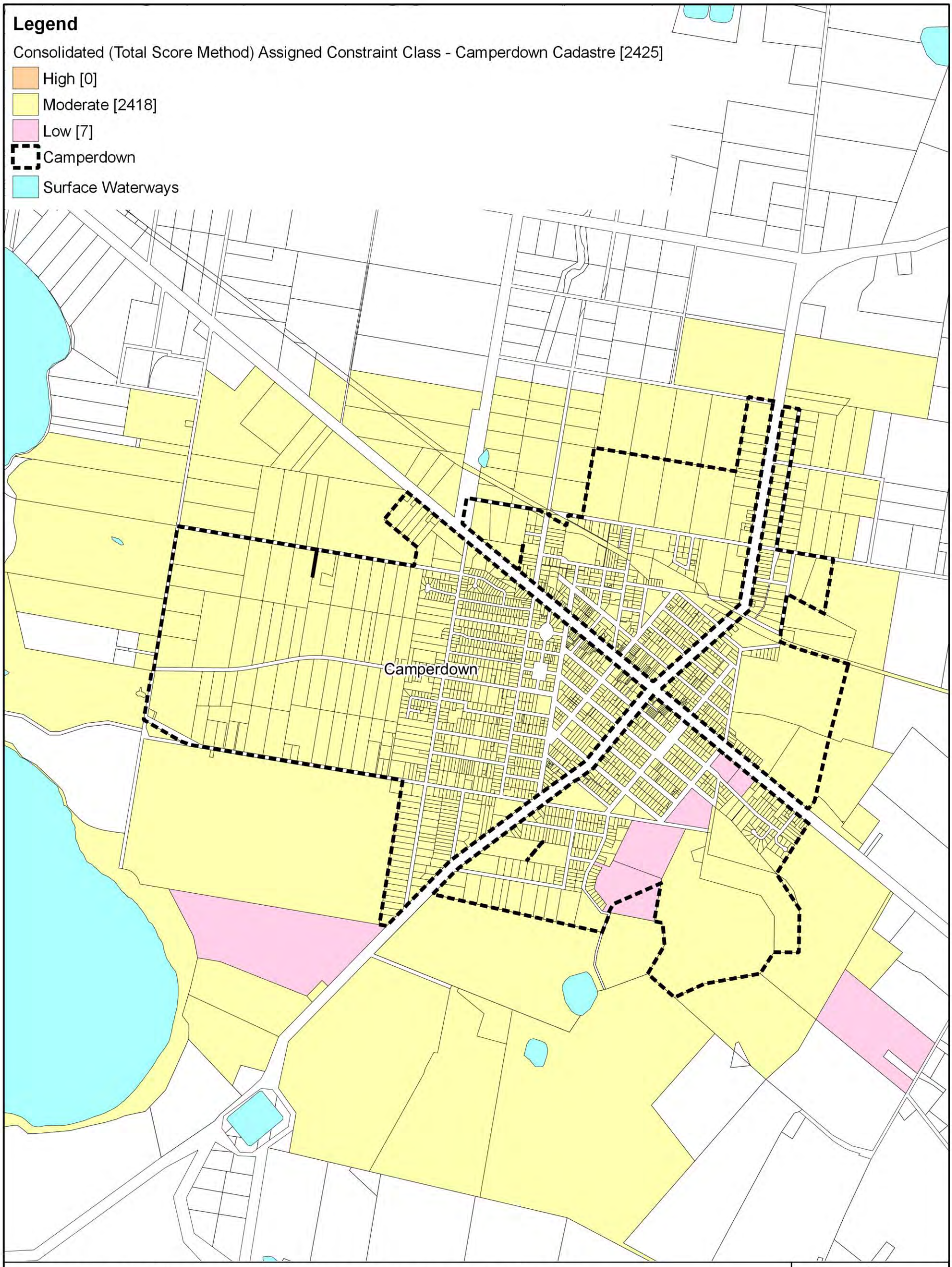

Figure 2g: DWM Final Consolidated Constraint Map - Camperdown

Corangamite Shire Council DWMP Review

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Whitehead & Associates
Environmental Consultants

0 500 1000 1500 2000 2500 m

(Approx Scale)

Revision	1
Drawn	JK
Approved	JW

Camperdown:

Camperdown is the most populated township within the Shire. The majority of the urban centre is currently sewered by Wannon Water. Camperdown was selected as an example to represent the sewered townships and highlight the importance of understanding the lots on the fringe of the township that are not sewered and their potential constraint in relation to DWWM. The consolidated constraint map indicates that the majority of the lots within the township are assigned a moderate constraint rating, except for seven rural lots assigned a low constraint rating. Camperdown is currently zoned for various uses. The lots located on the fringe of the urban centre are zoned for low density residential and are surrounded by farming and rural conservation zones. The primary parameters that are significantly contributing to constraint in relation to DWM within the township are lot size, soil suitability. It is recommended that the majority of lots within the township would not require a detailed LCA.

The lot size is quite variable within the township, with the smaller sized lots located in the centre of the township surrounded by larger rural sized lots. There are two volcanic cones located to the west of the township. The underlying lithology consists of variable Newer Volcanic material. Tuff rings are located to the west and east of the township around the vents, with basalt flows in the centre of the township and scoria deposits within the south eastern corner. The soil is, therefore, inherently variable and predominately presents a moderate constraint to DWM, except for a high constraint within drainage depressions and a lower constraint with an increase in scoria material which improves the soils internal drainage.

The majority of lots within the township have a low slope constraint, less than 8%, with slope increasing to the west and south of the township in association with the volcanic cone hill slopes. There are only a few groundwater bores and these are primarily located on the larger lots around the fringe of the township; the majority of the lots within the township are assigned a low constraint with regards to proximity to groundwater bores. All of the lots within the township are deemed compliant with regards to depth to groundwater. The majority of the lots within the township are assigned a low constraint with regards to proximity to surface waters and are not considered to be flood prone based on the 1 in 100 year ARI. There are a few lots with an increased constraint that are located adjacent to the creek network to the north of the township and those surrounding the crater lakes to the west.

According to the DWM requirement matrix outlined in Table 6 in Section 5.3.2, the majority of unsewered lots within Camperdown would not require an LCA to be conducted as the majority of lots within the township have been classified as a having a moderate constraint for DWM; however, they will still be subject to Council's discretion.

Table 6 from Section 5.3.2: Minimum domestic wastewater management requirements matrix based on level of constraint

Level of Constraint	LCA Requirement	Minimum Treatment Standard
Lots within Townships		
High Constraint	Required	Secondary[2]
Moderate Constraint	Subject to Council's Discretion[1]	Secondary[2]
Low Constraint	Not Required	Secondary[2]
Rural Lots		
High Constraint	Subject to Council's Discretion[1]	Secondary[2]
Moderate Constraint	Not Required	Secondary[2] or Primary[3]
Low Constraint	Not Required	Secondary[2] or Primary[3]

[1]Subject to Council's Discretion: Council will assess all of the individual discrete constraints i.e. proximity to surface waters and soil suitability, and approximate the available area for DWM on the lot to determine whether the level of constraint prescribed for the lot can be reduced or prescribe alternate requirements that need to be met to overcome a given constraint. This is applicable for moderate constraint lots within the townships and for high constraint rural lots.

[2]Minimum Secondary Treatment Standard: As per the EPA Code of Practice (2013), the secondary effluent treatment standard is <20mg/L BOD_5, <30mg/L TSS and, where disinfected, *E.coli* <10cfu/100mL. Typically this can be achieved, for example, by an AWTS, sand filter, mound or reed bed/wetland system.

[3]Primary Treatment Standard: For moderate and low constraint rural lots, Council will determine if primary treatment is acceptable without requiring a LCA. Typically, this can be achieved, for example, by septic tank discharging to trenches or beds. Primary treatment can only be utilised for moderate or low constraint rural lots where Council deems it suitable or for any lot where a LCA shows that it is a sustainable option.

5.3.5 Evaluation of the Consolidated Constraint Map

The following options offer possible approaches to addressing specific constraints:

Constraint	Possible approach
Small lot size	Secondary treatment with an AWTS or sand filter Secondary treatment with land application to trenches at higher loading rate as outlined in AS/NZS 1547:2012 Increase loading rate by use of a sand mound
Proximity to watercourse	Secondary treatment with an AWTS or sand filter Move land application area to increase buffer distance Replace surface irrigation with subsurface irrigation
Proximity to groundwater bore	Secondary treatment with an AWTS or sand filter Move land application area to increase buffer distance Replace surface irrigation with subsurface irrigation
Shallow groundwater depth	Secondary treatment with an AWTS or sand filter Increase separation distance between point of application and water table by constructing raised bed or sand mound
Proximity to flood prone land	Secondary treatment with an AWTS or sand filter Use pressure compensating subsurface irrigation Raise level of application by constructing raised bed or sand mound
Steep slope	Apply at a lower rate over a larger area Design irrigation system to ensure even distribution over slope Terrace to create a level land application area
Unsuitable soil	Secondary treatment with an AWTS or sand filter Apply at a lower loading rate Improve soil by amelioration or import good quality soil

5.3.6 Conclusion

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

6. Management Strategies

6.1. Implementation and Review

6.1.1 Responsibility for Implementation

The DWMP provides a list of recommended actions to improve the management of DWM systems across the Shire. In order to ensure that these actions are carried out, it is recommended that Council assign existing staff to be responsible for the implementation of the DWMP.

The responsibilities of the staff include:

- Manage any resources allocated 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, CMA, Water Corporations, EPA, and DEPI;
- Monitor the effectiveness of the DWMP; and
- Report to Council on a range of parameters as set out below.

6.1.2 Implementation Process

Timeframes have been suggested for each component of the Action Plan. The actions should be implemented in the order set out in the Action Plan, and according to funding and resource availability.

6.1.3 Monitoring and Reporting

The effectiveness of the DWMP should be measured by a comprehensive monitoring and reporting process. It is recommended that the EHO should monitor and report annually on a range of performance indicators listed in this DWMP, including:

- The number of complaints about poorly functioning DWM systems;
- The number of system inspections for each risk category;
- The number of systems needing rectification (following inspection);
- The number of systems rectified;
- The number of systems still needing rectification;
- Progress on implementation of improved treatment systems, such as community sewerage systems or greywater treatment systems; and
- Reporting on funding and expenditure.

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

6.1.4 Review

The review will be reported to Council to determine the effectiveness of the implementation of the Action Plan every five years. At this milestone, the DWMP should also be reviewed according to this progress and any changes to legislation, standards, or funding arrangements. The annual reporting and review process should also be used to inform the community and other stakeholders as to the effectiveness of the DWMP.

6.1.5 Priorities for DWMP

Councils' capacity to address DWM issues is constrained by resources, staffing and available budget, however, there are a number of priorities which have been identified during the preparation of this DWMP which have been prioritised in the Action Plan. These are important actions which will assist with the future management of domestic wastewater within the Shire and ensure enhanced protection of human and environmental health. It is recommended that Council endeavour to address these as resources become available.

Priorities include (with reference to the Action Plan):

- Actions 4 and 6 – Reinforcing system owner responsibilities and education of owners through one on one system audits;
- Action 2 – Identify existing systems within the Shire without a permit and record system performance in Council records so that future inspections can be undertaken;
- Actions 1 and 4 – Improvement to system audit procedure and assigning a performance based risk assessment to systems in operation, for example refer to Figure 3;
- Actions 2 and 3 – Ensure historical and future data is placed on the TechOne data management system. Development of all DWM in the Shire with records managing current approvals and inspections. The database should include the following details as a minimum
    - Location;
    - Type of system;
    - System risk rating;
    - Owner contact details;
    - Last Council inspection;
    - Service inspections; and
    - Date of last desludging of the septic tank;
- Action 1 – Development of procedures for Council staff to undertake system inspections on a regular basis in accordance with the constraint map risk assessment;

- Action 6 – Development and distribution of educational material to residents via Council's website about the ongoing management and maintenance of their DWM system;
- Action 5 – Follow up on compliance for existing failing systems;
- Action 2, 3 and 7 – Investigation of technology for streamlining records of field work; and
- Actions 1 and 5 – Development of a compliance audit system for ensuring new DWM systems comply with permit conditions.

The complete Action Plan is included in Section 8 of the DWMP.

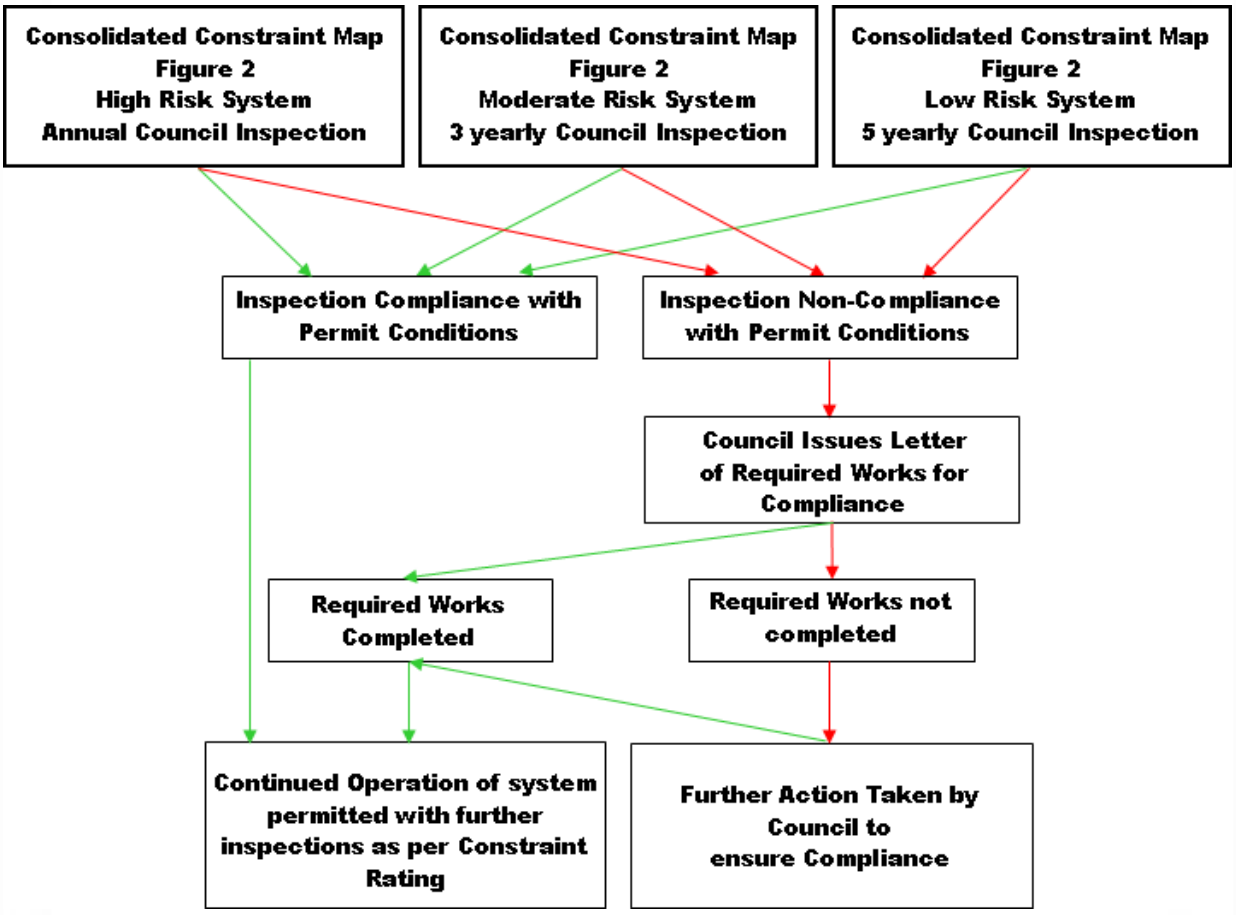

Figure 3: Inspection Process

Corangamite Shire Council DWMP Review

Whitehead & Associates
Environmental Consultants

Revision	1
Drawn	JK
Approved	SM

7. References

Australian Bureau of Statistics (2011). *Population and Dwelling Statistics - Corangamite Shire Council.*

Centre for Environmental Training (2012). *Land Capability Assessment for On-site Wastewater Management Systems Course.*

Department of Primary Industries. *Declared Water Supply Catchments in Victoria Catchment Management Areas*. Retrieved from: http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/catchment, Accessed November 2012.

Department of Primary Industries (2006). *Grow West: Land Capability Analysis of the Shire of Corangamite*. Primary Industries Research, Victoria.

Department of Primary Industries (2008). Geomorphological Units for Corangamite CMA. *Victoria Resources Online.*

Department of Primary Industries (2012). Geological Units 1:250,000. *GeoSciences Victoria.* Earth Resources.

Department of Sustainability and Environment (2012). *Planning Permit Applications in Open, Potable Water Supply Catchment Areas.* Victoria.

Draft Standards Australia. (2014). *AS 1546 On-site Domestic Wastewater Treatment Units,* Part 4: Domestic Greywater Treatment Systems.

Environment Protection Authority (1970). *Environment Protection Act.*

Environmental Protection Authority (1997). *State Environment Protection Policy (Groundwaters of Victoria).*

Environment Protection Authority (1996). Publication 451 *Onsite Domestic Wastewater Management.*

Environment Protection Authority (2002). *Guidelines for Aerated On-site Wastewater Treatment Systems.*

Environment Protection Authority (2003). State *Environment Protection Policy (Waters of Victoria).*

Environment Protection Authority (2003a). Publication 746.1 *Land Capability Assessment for Onsite Domestic Wastewater Management.*

Environment Protection Authority (2013). Publication 891.3. *Code of Practice – Onsite Wastewater Management*.

Municipal Association of Victoria (2003). *Domestic Wastewater Management: A Planning Guide for Local Government*.

Municipal Association of Victoria (2006). *Model Land Capability Assessment Report*.

Robinson et al. (Department of Primary Industries). 2003. *A Land Resource Assessment of the Corangamite Region*. Primary Industries Research Victoria. Bendigo.

Rowan J., Russell L., Ransom S. & Rees D. (Ed). 2000. Land Systems of Victoria. Ed 3:2. Centre for Land Protection Research. Technical Report 56.

Southern Rural Water. January 2014. Otway-Torquay Groundwater Catchment Statement.

Southern Rural Water. July 2013. Hopkins Corangamite Groundwater Catchment Statement.

Standards Australia/ Standards New Zealand (2003). *AS/NZS 3500 Plumbing and Drainage,* Part 1: Water Services and Part 2: Sanitary Plumbing and Drainage.

Standards Australia/ Standards New Zealand (2012). AS/NZS 1547:2012 *On-site Domestic-wastewater Management.*

8. Action Planning

This Action Plan outlines the management strategies and actions to address DWMP priorities within CSC.

Action	Description	Term	Due Date	Responsibility
1. Preparation of policies and procedures	Prepare and document the following procedures for DWM to ensure they are in line with DWMP: a) DWM system Inspection Procedure b) Non-Compliant Inspection Procedure c) Complaint Investigation Procedure d) Rectification/Upgrade Works Procedure e) Issuing of Fines/Notice Procedure f) Approval to Install Procedure g) Approval to Use Procedure	Short	2014	Manager of Environment & Emergency EHO
2. Data base management	a) Update/expand Councils DWM system data base to record all property and system details.	Short	2014	Manager of Environment & Emergency IT/GIS (assistance)
3. Continuation of improvement of data collection	a) Develop a GIS layer for DWM systems in the Shire.	Medium	2015	GIS Officer
4. Develop a system audit strategy for the Shire based on constraint maps	a) Undertake system audits of High Risk systems.	Short-Ongoing	2015	EHO
	b) Undertake system audits of Moderate Risk systems.	Medium - Ongoing	2016	EHO

Action	Description	Term	Due Date	Responsibility
	c) Undertake system audits of Low Risk systems.	Long-Ongoing	Ongoing	EHO
5. Septic Tank Permit Conditions and Compliance	a) Undertake compliance audits of new installations.	Ongoing	Ongoing	Manager of Environment & Emergency, EHO
	b) Require upgrades of systems within the setback zones as system issues are identified.	Ongoing	2014	Manager of Environment & Emergency, EHO.
	c) Encourage an appropriate level of maintenance of systems and enforce maintenance of systems where system failures and adverse public health or environmental impacts have been identified for both all-waste and split-waste (greywater/blackwater) systems.	Ongoing	2016	EHO
6. Community Education Program	a) Develop educational material for distribution to residents. b) Develop material that can be given to new property owners advising of their system.	Short	2015	Environment & Emergency Unit
	c) Provide educational material on Council's website. d) Provide details about permit process on Council's website.	Short	2014	Environment & Emergency Unit and PR Officer
7. Resource Allocation	a) Investigate staffing requirements for the implementation of the DWMP including system monitoring, compliance	Short	2014	Manager of Environment & Emergency

Action	Description	Term	Due Date	Responsibility
	and enforcement of DWMP.			
	b) Investigate funding requirements and allocations for implementation of inspection, compliance and enforcement programs.	Medium	2015	Manager of Environment & Emergency
	c) Investigate funding to support improvement works associated with greywater treatment systems	Medium	2015	Manager of Environment & Emergency
8. Review DWMP	a) Evaluate existing DWMP. b) Undertake a review of the DWMP update. Legislation and Action Plan. c) Implement DWMP.	Long	2017	Manager of Environment & Emergency

9. Appendix

Recommended Maximum Design Loading/Irrigation Rates (Table 9, Appendix A, EPA 891.3)

150 **Daily Water Use Per Equivalent Persons (EP) (L)**

Soil Category AS/NZS *1547:2012*	Measured or Indicative Ksat (m/day)	House Size (Number of Bedrooms)	Wastewater Volume (L/day)	Primary Effluent: Absorption Trenches/Beds & Wick Trench/Beds DLR (mm/day)	Base Area (m^2)	Length 0.5m Wide Trench	Primary Effluent: Evapotranspiration - Absorption Beds & Trenches DLR (mm/day)	Base Area (m^2)	Length 0.5m Wide Trench	Primary Effluent: Mounds DLR (mm/day)	Base Area (m^2)	Secondary Effluent: Absorption Trenches/Beds & Wick Trench/Beds DLR (mm/day)	Base Area (m^2)	Length 0.5m Wide Trench
1	>3.0	1	300	NA			NA			24	13	25	12	24
		2	450								19		18	36
		3	600								25		24	48
		4	750								31		30	60
		5	900								38		36	72
2a	>3.0	1	300	NA			NA			24	13	30	10	20
		2	450								19		15	30
		3	600								25		20	40
		4	750								31		25	50
		5	900								38		30	60
2b	1.4 - 3.0	1	300	15	20	40	15	20	40	24	13	30	10	20
		2	450		30	60		30	60		19		15	30
		3	600		40	80		40	80		25		20	40
		4	750		50	100		50	100		31		25	50
		5	900		60	120		60	120		38		30	60
3a	1.5 - 3.0	1	300	15	20	40	15	20	40	24	13	30	10	20
		2	450		30	60		30	60		19		15	30
		3	600		40	80		40	80		25		20	40
		4	750		50	100		50	100		31		25	50
		5	900		60	120		60	120		38		30	60
3b	0.5 - 1.5	1	300	10	30	60	10	30	60	16	19	30	10	20
		2	450		45	90		45	90		28		15	30
		3	600		60	120		60	120		38		20	40
		4	750		75	150		75	150		47		25	50
		5	900		90	180		90	180		56		30	60
4a	0.5 - 1.5	1	300	10	30	60	12	30	60	16	19	30	10	20
		2	450		45	90		45	90		28		15	30
		3	600		60	120		60	120		38		20	40
		4	750		75	150		75	150		47		25	50
		5	900		90	180		90	180		56		30	60
4b	0.12 - 0.5	1	300	6	50	100	8	38	75	8	38	20	15	30
		2	450		75	150		56	113		56		23	45
		3	600		100	200		75	150		75		30	60
		4	750		125	250		94	188		94		38	75
		5	900		150	300		113	225		113		45	90
4c	0.06 - 0.12	1	300	4	75	150	5	60	120	5 (See Note to Table N1)	60	10	30	60
		2	450		113	225		90	180		90		45	90
		3	600		150	300		120	240		120		60	120
		4	750		188	375		150	300		150		75	150
		5	900		225	450		180	360		180		90	180
5a	0.12 - 0.5	1	300	5	60	120	8	38	75	8	38	12	25	50
		2	450		90	180		56	113		56		38	75
		3	600		120	240		75	150		75		50	100
		4	750		150	300		94	188		94		63	125
		5	900		180	360		113	225		113		75	150
5b	0.06 - 0.12	1	300	(See Notes 2 and 3 in Table L1)			5 (See Notes 2, 3 and 5 in Table L1)			5 (See Note to Table N1)		10	30	60
		2	450										45	90
		3	600										60	120
		4	750										75	150
		5	900										90	180
5c	<0.06	1	300									8	38	75
		2	450										56	112.5
		3	600										75	150
		4	750										94	187.5
		5	900										113	225
6a	0.06 - 0.5	1	300									5	60	120
		2	450										90	180
		3	600										120	240
		4	750										150	300
		5	900										180	360
6b	<0.06	1	300										60	120
		2	450										90	180
		3	600										120	240
		4	750										150	300
		5	900										180	360
6c	<0.06	1	300										60	120
		2	450										90	180
		3	600										120	240
		4	750										150	300
		5	900										180	360

Recommended Maximum Design Loading/Irrigation Rates (Table 9, Appendix A, EPA 891.3)

DIR values from this Table may be used in the MAV Water & Nutrient Balance Model

150 **Daily Water Use Per Equivalent Persons (EP) (L)**

Soil Category AS/NZS *1547:2012*	Measured or Indicative Ksat (m/day)	House Size (Number of Bedrooms)	Wastewater Volume (L/day)	Secondary Treated Effluent			
				Sub-surface and Surface Irrigation (See Table M1 in AS/NZS *1547:2012*)		LPED (See Table M1 in AS/NZS *1547:2012*)	
				DIR (mm/day)	Irrigation Area (m^2)	DIR (mm/day)	Irrigation Area (m^2)
1	>3.0	1	300	5 (See Note 2 in Table M1)	60	NA	
		2	450		90		
		3	600		120		
		4	750		150		
		5	900		180		
2a	>3.0	1	300		60		
		2	450		90		
		3	600		120		
		4	750		150		
		5	900		180		
2b	1.4 - 3.0	1	300		60	4	75
		2	450		90		113
		3	600		120		150
		4	750		150		188
		5	900		180		225
3a	1.5 - 3.0	1	300	4 (See Note 1 in Table M1)	75	3.5	86
		2	450		113		129
		3	600		150		171
		4	750		188		214
		5	900		225		257
3b	0.5 - 1.5	1	300		75		86
		2	450		113		129
		3	600		150		171
		4	750		188		214
		5	900		225		257
4a	0.5 - 1.5	1	300	3.5 (See Note 1 in Table M1)	86	3	100
		2	450		129		150
		3	600		171		200
		4	750		214		250
		5	900		257		300
4b	0.12 - 0.5	1	300	3.5 (See Note 1 in Table M1)	85.7	3	100
		2	450		128.6		150
		3	600		171.4		200
		4	750		214.3		250
		5	900		257.1		300
4c	0.06 - 0.12	1	300	3.5 (See Note 1 in Table M1)	85.7	3	100
		2	450		128.6		150
		3	600		171.4		200
		4	750		214.3		250
		5	900		257.1		300
5a	0.12 - 0.5	1	300	3 (See Note 1 in Table M1)	100	2.5 (See Note 4 in Table M1)	120
		2	450		150		180
		3	600		200		240
		4	750		250		300
		5	900		300		360
5b	0.06 - 0.12	1	300	3 (See Note 1 in Table M1)	100	2.5 (See Note 4 in Table M1)	120
		2	450		150		180
		3	600		200		240
		4	750		250		300
		5	900		300		360
5c	<0.06	1	300	3 (See Note 1 in Table M1)	100	2.5 (See Note 4 in Table M1)	120
		2	450		150		180
		3	600		200		240
		4	750		250		300
		5	900		300		360
6a	0.06 - 0.5	1	300	2 (See Note 2 in Table M1)	150	NA	
		2	450		225		
		3	600		300		
		4	750		375		
		5	900		450		
6b	<0.06	1	300	2 (See Note 2 in Table M1)	150		
		2	450		225		
		3	600		300		
		4	750		375		
		5	900		450		
6c	<0.06	1	300	2 (See Note 2 in Table M1)	150		
		2	450		225		
		3	600		300		
		4	750		375		
		5	900		450		