DOMESTIC WASTEWATER MANAGEMENT PLAN BACKGROUND REPORT

prepared by brayd consulting

August 2015

Strathbogie shire

Document Information

Prepared by: Dawn Bray, BA Applied Science (Planning), MPIA, brayd consulting
ABN 829 8571 0259

Prepared for: Steven Hicks
Manager Governance and Statutory Services
Strathbogie Shire Council

Name of Project: Strathbogie Shire Domestic Wastewater Management Plan

Acknowledgements:
Brayd Consulting would like to acknowledge the contribution of Steven Hicks (SSC), Fiona Spencer (SSC), Avril Young (SSC), Alan Tyson (Goulburn Valley Water), John Xu (Goulburn Valley Water), Neil Repacholi (Goulburn Murray Water), Robert Graves (Mansfield Shire Council) and all of our online survey respondents in the preparation of this document.

Version	Date	Reviewed by	Approved by	Date
1.0	5 May 2015	Steven Hicks, SSC Alan Tyson, GVW Neil Repacholi, GMW	Steven Hicks SCC	31 May 2015
1.1	14 August 2015	Dawn Bray	Steven Hicks SCC	14 August 2015

Glossary

1: 40 hectare guideline	Guidelines 1 of the *Ministerial Guidelines for Planning Permit Applications in Open Potable Water Supply Catchment Areas* (2012)
Beneficial Use	Defined by SEPP WoV as the different uses and values of water (eg potable water, irrigation water, water for plants and animals)
BGA	Blue green algae
Black water	Wastewater from toilets
CALP Act	*Catchment and Land Protection Act* 1994
Code of Practice	Environment Protection Authority *Code of Practice – Onsite Wastewater Management* (February 2013)
DEPI	Department of Environment and Primary Industries (now DELWP)
DELWP	Department of Environment Land Water and Planning
EPA	Environment Protection Authority
Ephemeral Waterway	Waterways only flow after heavy rainfall
GBCMA	Goulburn Broken Catchment Management Authority
GMW	Goulburn Murray Water
Grey water	Water sourced from a shower, bath, hand basins, washing machine, laundry troughs or kitchen sink
GVW	Goulburn Valley Water
LPPF	Local Planning Policy Framework, Strathbogie Planning Scheme
MAV	Municipal Association of Victoria
Ministerial Guidelines	*Ministerial Guidelines for Planning Permit Applications in Open Potable Water Supply Catchment Areas* (November 2012)
Overland Flow	Path of surface runoff that is not a defined channel or waterway
Potable Water	Treated water that is suitable for human consumption
SEPP (WoV)	State Environmental Protection Policy (Waters of Victoria), Environment Protection Authority 1988
Sewage	Combined black water and grey water
SPPF	State Planning Policy Framework, Strathbogie Planning Scheme
SSC	Strathbogie Shire Council
VPPs	Victoria Planning Provisions; the range of zones, overlays and local controls from which councils construct their planning scheme
Water Sensitive Urban Design (WSUD)	The design of new infrastructure and development to manage stormwater/wastewater through water recycling and the use of onsite detention/filtering systems to improve the quality of stormwater.
Whole of Water Cycle	Integrated multi agency management of, and infrastructure investment in, rainwater, stormwater, recycled water, potable water, wastewater and groundwater.

Table of Contents

List of Tables, Figures, Maps and Attachments

1. Executive Summary

A domestic wastewater management plan (DWMP) is one of the key tools available to councils to meet their legal obligations under the *Environment Protection Act 1970* and the *State Environmental Protection Policy (Waters of Victoria)*. A DWMP is also the mechanism through which water corporations can relax the dwelling density requirement of one dwelling per 40 hectares in declared water supply catchments (DWSC) under the *Ministerial Guidelines*, allowing future growth in these areas.

This Background Report explores the context within which all stakeholders with responsibilities for the management of domestic wastewater, and its potential adverse impacts, operate. It identifies the key issues and challenges that must be addressed by the DWMP to improve the management of domestic wastewater; primarily through investment in infrastructure by a variety of stakeholders.

The philosophy of shared responsibility for wastewater management highlighted in recent State and Regional water strategies also underpins this document.

There are four Declared Water Supply Catchments (DWSCs) within the Shire but only the Seven Creeks/Mountain Hut DWSC provides potable water directly to urban areas. Strathbogie township is located within in this catchment and is, therefore, to be a focus of the DWMP given there are 53 onsite systems (many of which are old septic systems that would not comply with current standards) in the township itself and numerous others scattered in rural areas within this catchment.

Given the importance the Goulburn River, Lake Nagambie and Goulburn Weir to the provision of downstream water supplies for human consumption and irrigation it is essential that the DWMP address domestic wastewater management outside DWSCs. In this way, the DWMP will ensure that all beneficial uses, including recreational use of waterways and human consumption of aquatic creatures, are safeguarded against the potential harmful impacts caused by the pathogens and high levels of nutrients contained in untreated domestic wastewater.

There are around 2140 known onsite domestic wastewater treatment systems within the shire. Eleven percent (11%) of all known onsite systems are located in declared water supply catchment areas. A significant number of know systems are located within the boundaries of sewered townships; Avenel (38 onsite systems), Euroa (77 onsite systems), Nagambie (46 systems) and Violet Town (56 systems). Reticulating these properties is, therefore, a key issue to be addressed with GVW via the DWMP particularly in Euroa, which suffers from significant inundation issues that reduces the efficacy of onsite wastewater treatment and poses a potential environmental hazard.

In terms of unsewered townships, Longwood contains the highest proportion of all township onsite systems at 25%. Strathbogie, which is located in a declared water supply catchment, contains 13%.

GVW operates municipal wastewater treatment plants at Euroa, Violet Town, Nagambie and Avenel. Such facilities are integral to the overall management of domestic wastewater within the shire. In relation to plans for further reticulated sewer investment, GVW has detailed planning in place for all existing sewered townships. It is unclear, however, as to when this

investment is triggered as many areas identified for future sewer extensions are substantially developed. This will be an issue for further consideration by the DWMP.

Centralised wastewater services for townships are a key consideration for the future management of wastewater within the shire, particularly for the Strathbogie Township. Investment in new reticulated infrastructure is, however, very costly. GVW estimate that it can cost between $25,000 – 30,000 per lot to provide a centralised wastewater management facility.

Residential growth within the Shire has been relatively modest over the past decade, with 183 new residents between 2001 – 2011. *Victoria in Future* forecasts annual growth rates of around 0.8% per annum until 2031, or a net increase of 1500 residents. The number of households is expected increase by 1000 to a total of 5,300, or an increase of 1% per year. Census data also shows that the areas around Nagambie and Violet Town experienced the highest growth rates in the number of dwellings between 2001 – 2011 at 10% and 17% respectively, but Avenel and District experienced the highest population growth (of around 10%).

An average of 69 approvals for the construction of dwellings have been issued per year over the past 13 years according to residential building approvals data. The provision of residential lots also appears to be strong, according to planning permit approvals data, with over 90 applications approved for the creation of new lots between 2011 – December 2014.

This growth, however, is tempered by challenges from soil erosion and land inundation, as reflected by the extensive application of the Erosion Management Overlay (particularly in the south of the shire), Urban Floodway Zone (particularly in Euroa township), Land Subject to Inundation Overlay and Floodway Overlay across the central and northern parts of the shire. These environmental constraints are critical factors that determine the efficacy of onsite wastewater systems and must therefore be thoroughly considered by the DWMP.

These challenges, and the potential risks domestic wastewater poses to the environment, are reflected in the stream condition results contained within the *Index of Stream Condition – The Third Benchmark of Condition Report – Goulburn Broken* (2012). Across the Goulburn Basin only 11 – 30% of waterways are in good or excellent condition. Rivers in Strathbogie Shire are rated as either being Poor (6 reaches of waterways) or Moderate (12 reaches). Water quality ratings (where available) are in the moderate range, although water quality south of the Goulburn Weir was rated as being excellent.

Raw water quality within the Nagambie Waterway is a key concern for GMW. The *Lake Nagambie Land and On-Water Management Plan* (2012) identifies pollution from domestic wastewater and untreated stormwater as major threats to water quality, local amenity and the use of the lake for recreation. Careful management of future residential development around the Lake is, therefore, paramount.

GVW, the provider of potable water, extracts raw water from these lakes, as well as other waterways in the east and south. Its potable water infrastructure is focused around Euroa and Violet Town (Abbinga Reservoir) and Longwood (Nine Mile Creek Reservoir); these reservoirs provide potable water to around 3940 people. Around 816 megalitres (ML) were extracted from these reservoirs for consumption in 2013/14. Potable water for Avenel is piped from Seymour.

Assessing the levels of risk to human health, water quality and the environment will be the means through which the DWMP prioritises future investment by stakeholders. Adopting a risk analysis approach is essential if Council is to meet the requirements of key legislation and if it is to achieve a relaxation of the one dwelling per 40 hectare dwelling density in declared water supply catchments.

By highlighting the areas at greatest risk of contamination through the analysis of potable water infrastructure, soil type, slope, unsewered dwelling density and the potential density of future infill development, the DWMP will enable all stakeholders to focus scarce financial resources into the areas where most benefit will be derived.

A Shire-wide analysis of these risk factors highlights the following areas where the adverse impacts of domestic wastewater poses the highest risk:

- there are two high risk Minor Catchments; Hills Catchment No 12 Seven Creeks and Castle Creek and Plains Catchment No 22 Pranjip Creek. The former contains the unsewered township of Strathbogie while the latter contains Longwood Township.
- Minor Catchments containing the townships of Nagambie, Violet Town, Avenel and Euroa are all rated as being Medium Risk.

Lastly the small number of online surveys completed by local land capability assessors, plumbers and land owners/residents was disappointing. Having said that the four surveys completed by local experts told a consistent story about landowners not being aware of the basics around onsite system installation/design (including just how much land has to be dedicated to a system), ongoing maintenance requirements and how to take care of their system on a day-to-day basis.

All groups supported the provision of information sessions, local workshops for experts, improved information on the Shire's website to provide for a greater level of awareness across these stakeholder groups. Such matters will be considered during the preparation of the DWMP's Action Plan.

2. Our DWMP

2.1 Purpose and Objectives

The purpose of this Domestic Wastewater Management Plan (DWMP) is to provide a comprehensive strategy to enable Strathbogie Shire Council (SSC), water corporations and other stakeholders to effectively manage and mitigate potentially adverse impacts of wastewater on public health, the environment, catchment health and water quality.

Our objectives are to:

- ***ensure SSC meets its legislative obligations*** regarding domestic wastewater management across the Shire in an effective and affordable way;
- ***provide certainty to the community and investors*** about future development parameters in sewered and unsewered areas;
- ***enable appropriate residential development in water supply catchments*** by meeting all requirements of the *Ministerial Guidelines for Planning Permit Applications in Open, Potable Water Supply Catchment Areas, November 2012* (the Ministerial Guidelines) for the relaxation of the 1 dwelling per 40 hectares Guideline by water corporations;
- ***work collaboratively with water corporations and government agencies*** to establish a long term, multi agency approach to domestic wastewater management and infrastructure investment within Strathbogie Shire;
- ***ensure existing reticulated sewerage infrastructure expands*** in response to residential growth in key townships such as Euroa to minimise reliance on individual wastewater treatment systems;
- ***explore opportunities to install cost effective community treatment plants*** in key townships such as Strathbogie and Longwood;
- ***introduce the concept of 'whole of water cycle management'*** and how it can assist with wastewater management and the attainment of environmental and public health benefits;
- ***identify strategic and statutory planning tools to guide appropriate future development*** and effectively manage domestic wastewater within DWSCs and in areas around potable water offtake points, Lake Nagambie, Goulburn Weir and along the Goulburn River;
- ***specify clear standards and requirements*** for land capability assessments, permits to install an onsite wastewater management system and certificates for their use; and
- ***develop an appropriate monitoring program*** for the maintenance of approved onsite wastewater management systems.

2.2 Memorandum Of Understanding for Planning Applications in Open Potable (Special) Water Supply Catchment Areas, June 2013

In June 2013 Strathbogie Shire Council and GMW signed a Memorandum of Understanding (MOU) to provide certainty and consistency around the application of the Ministerial Guidelines in declared water supply catchments.

The MOU outlined interim measures for development while Strathbogie Shire awaited the finalisation of the development of a new type of DWMP by Mansfield Shire Council and while Council prepare its own DWMP. It expires on 31st December 2015.

This MOU is relevant to this DWMP in that it established a risk-based approach to the application of the 1:40 hectares dwelling density guideline in declared water supply catchments.

2.3 Project Partners

Responsibilities for the management of domestic wastewater are shared by a number of stakeholders. This DWMP Background Report has been undertaken with the support and input of:

- Goulburn Valley Water (GVW), the provider of potable reticulated water, reticulated sewerage infrastructure to townships and the manager of municipal wastewater management plants; and
- Goulburn Murray Water (GMW), the provider of raw water and manager of Lake Nagambie and the Goulburn Weir;

in an effort to achieve a multi agency approach to wastewater management.

The relationship between SSC and GMW was fostered by the MOU process outlined in Section 2.2 above. Clause 7 of the MOU states that SSC and GMW will work in partnership with other relevant authorities to develop a DWMP, with focus on wastewater management issues in high-risk areas.

Meetings with the urban water corporation, GVW, have been held over the past year to create communication channels between our agencies.

By working with our project partners SSC is being consistent with a range of State Government water related strategies and the requirements of the Ministerial Guidelines that state local water corporations need to be satisfied with the DWMP prior to considering a relaxation of the 1:40 hectare guideline.

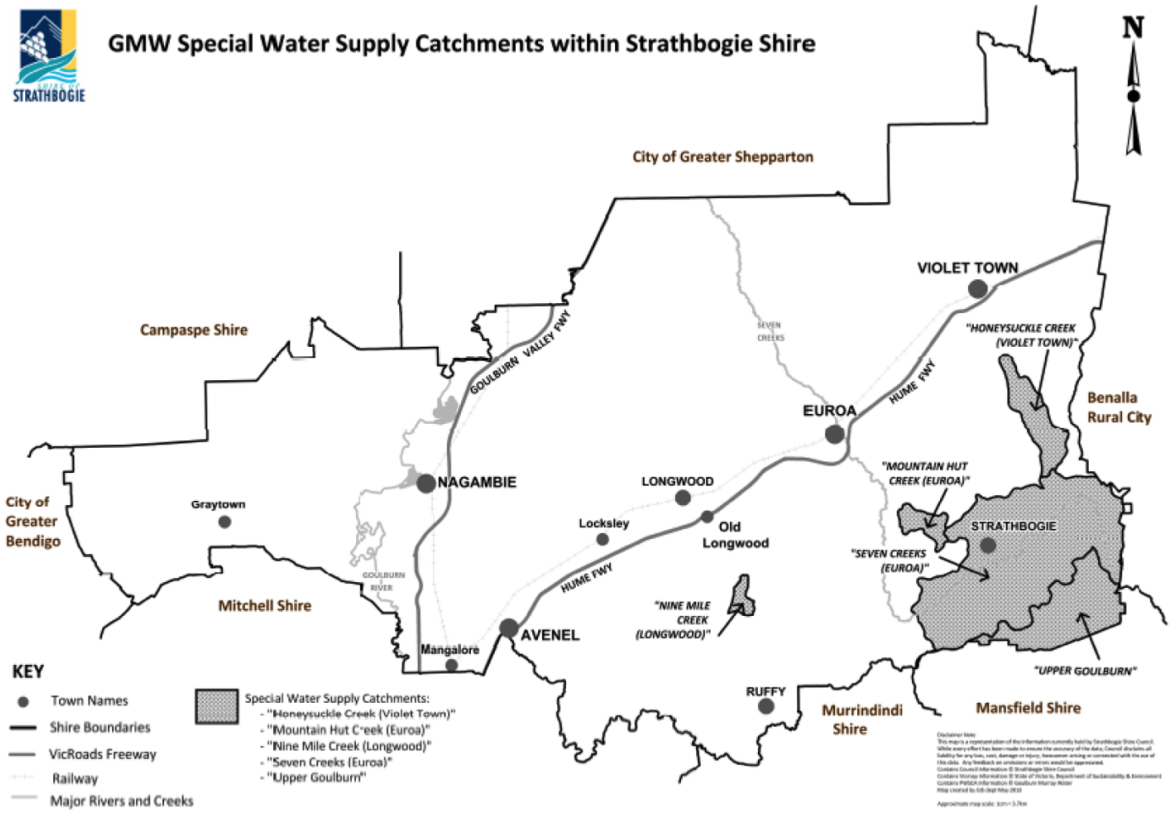
3. Scope

3.1 Declared Water Supply Catchments in Strathbogie Shire

The Ministerial Guidelines apply to private land within Declared Water Supply Catchments (DWSC), of which there are four in Strathbogie Shire:

- Honeysuckle Creek, Violet Town;
- Seven Creeks, around Strathbogie and Euroa (which is the only of the four DWSCs defined as a source of potable water);
- Nine Mile Creek, Longwood; and
- A very small portion of the Upper Goulburn Catchment (to the south of Strathbogie township).

Map 1 Declared Water Supply Catchments Within Strathbogie Shire (grey shading)



Source: Strathbogie Shire Council Planning Committee Meeting Minutes, 11 June 2013

Table 1 Declared Water Supply Catchments Within Strathbogie Shire

Catchment Name	Status	Area	Date Declared
Honeysuckle Creek (Violet Town)	Declared Water Supply Catchment	2,460 ha	2 June 1976
Seven Creeks/Mountain Hut (Euroa)	Declared Water Supply Catchment (Potable Water)	18,991 ha	4 April 1984
Nine Mile Creek (Longwood)	Declared Water Supply Catchment	400 ha	October 1989
Upper Goulburn (only a very small portion lies in Strathbogie Shire)	Declared Water Supply Catchment (Potable Water)	Approx. 500 ha	January 1957

Source: Extract from the Department of Environment and Primary Industries' website December 2014

3.2 Land Outside Declared Catchments

This DWMP will also consider wastewater management issues and strategies for areas outside of declared catchments to ensure it is truly a municipal wide wastewater management strategy. Such an approach will ensure Council is mindful of the impacts of land management and development around sensitive waterways including the Goulburn River, which is a heritage river under the Heritage Rivers Act 1992.

4. Our Methodology

This DWMP has been informed by the work undertaken by other municipalities in recent years, particularly the Mansfield Shire Domestic Wastewater Management Pilot Project, along with guidance from GMW, GVW, the Environment Protection Authority, our Environmental Health Officer and land capability/wastewater systems experts operating within the Shire.

4.1 Risk Analysis Mapping

The scientific work commissioned by Mansfield Shire Council[1] and aspects of their risk analysis methodology have been used as the basis for our risk mapping methodology following its acceptance by the former State Government, VicWater and the EPA. There have, however, been some modifications to Mansfield's risk mapping methodology to ensure the risk analysis reflects local conditions.

GMW and GVW have peer reviewed our maps and GIS layers and risk parameters.

Context maps were generated to provide an overview to inform the DWMP (see Attachments 1A and 1B):

Map 1A: **Overview Map** depicting townships, existing dwelling location, sewered and unsewered properties;

Map 1B: **Minor Catchment Map** depicting the 25 minor catchments within the Shire. Minor catchments have been identified using data on watersheds from the GBCMA, township boundaries and an analysis of the risk factor maps to create logical boundaries.

A series of layers have been added to the Shire's Geographical Information System (GIS) that can be used to generate shire and catchment wide risk maps, as well as providing the ability to interrogate the GIS system to ascertain risk at a more localised level.

For ease of use, each risk factor has been categorised into three risk levels; **high** (coloured red), **medium** (coloured orange) and **low** (coloured green).

The shire-wide risk maps are discussed in more detail in Section 12 and can be found at Attachments 8A - C.

The outcomes of the risk analysis will be used to shape key aspects of the DWMP including the Action Plan; initiatives to manage future development, infrastructure investment and the impacts of existing onsite systems will be made for high, medium and low risk areas. This is to ensure resources of all stakeholders are focused on high and medium risk areas where the greatest benefits to public health, water quality and the environment will be gained.

---

[1] *Approaches for Risk Analysis of Development with Onsite Wastewater Disposal in Open Potable Catchments*, prepared for Mansfield Shire Council by Dr Robert Edis, April 2014, *A Discussion Paper for the Initial Work Associated with the Preparation of a Shire Domestic Wastewater Management Plan* by Larry White April 2014, *A Review for Risk Analysis of Development with Onsite Wastewater Disposal in Open Potable Water Catchments* by Dr Robert van de Graaff, Van de Graaff and Associates Pty Ltd March 2014

4.2 Consultation

Section 5 will outline the wide range of stakeholders that play a part in the management of domestic wastewater. It is essential that all be involved, in some manner, in the preparation and implementation of this DWMP.

Internal input into this DWMP has been sought from:

- Council
- Environmental Health
- Information Technology (Geographical Information Systems)
- Asset Services
- Planning.

External stakeholders and authorities (in addition to GMW and GVW) have also been engaged in this project through requests for information, DWMP workshops and online surveys:

- Environment Protection Authority
- Goulburn Broken Catchment Management Authority
- Mansfield Shire Council
- Land capability assessment consultants
- Local plumbers and onsite system technicians
- Local residents and landowners.

GMW and GVW are critical partners in this project. Key officers from these organisations have been involved in the provision of background information, the development of the risk analysis methodology and the peer review of this Background Report.

4.3 How Our DWMP Responds to the Ministerial Guidelines

It is important that the DWMP effectively responds to the Ministerial Guidelines as a means of allowing water corporations to consider the relaxation of the 1:40ha dwelling density guideline in DWSCs.

Although a more detailed overview as to how the Plan will respond to the Guidelines will be provided in the DWMP itself, their requirements will be met by:

- exploring and prioritising initiatives to minimise impacts of domestic wastewater;
- investigating wastewater management options and subsequent future infrastructure;
- investment in key townships and in DWSCs, including indicative costings;
- outlining how Strathbogie Shire Council will monitor compliance with permits and maintenance requirements;
- working with all key stakeholders in the development of the Plan;
- inclusion of an Action Plan to guide resourcing and work programs over the next 5 years; and
- identifying mechanisms for the ongoing review, monitoring and reporting of the DWMP's implementation to water corporations and other stakeholders.

5. Our Key Stakeholders' Roles and Responsibilities

Legislation, policies and strategies define the roles and responsibilities of stakeholders around domestic wastewater management, whole of water cycle planning and the protection of catchment health.

Figure 1 Key Stakeholders in Managing Domestic Wastewater Impacts

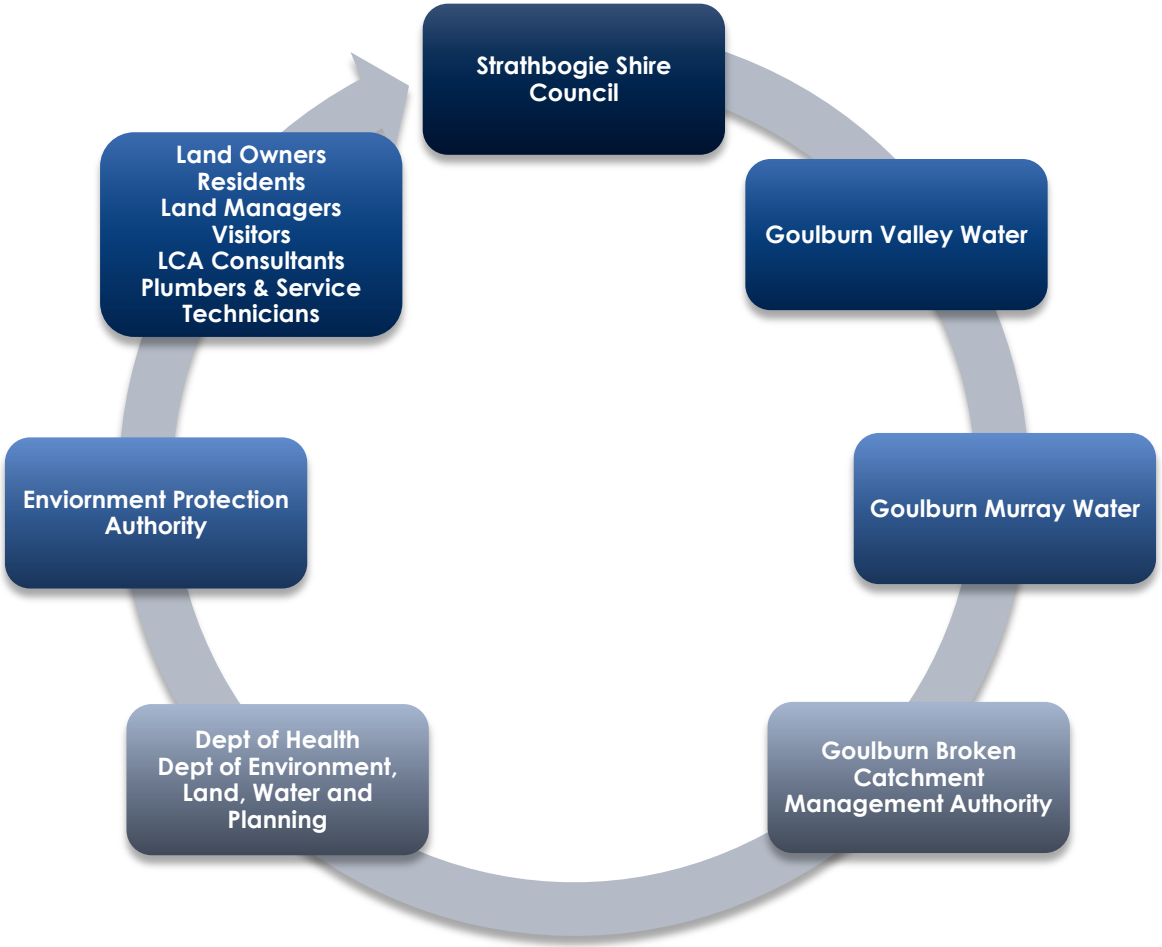
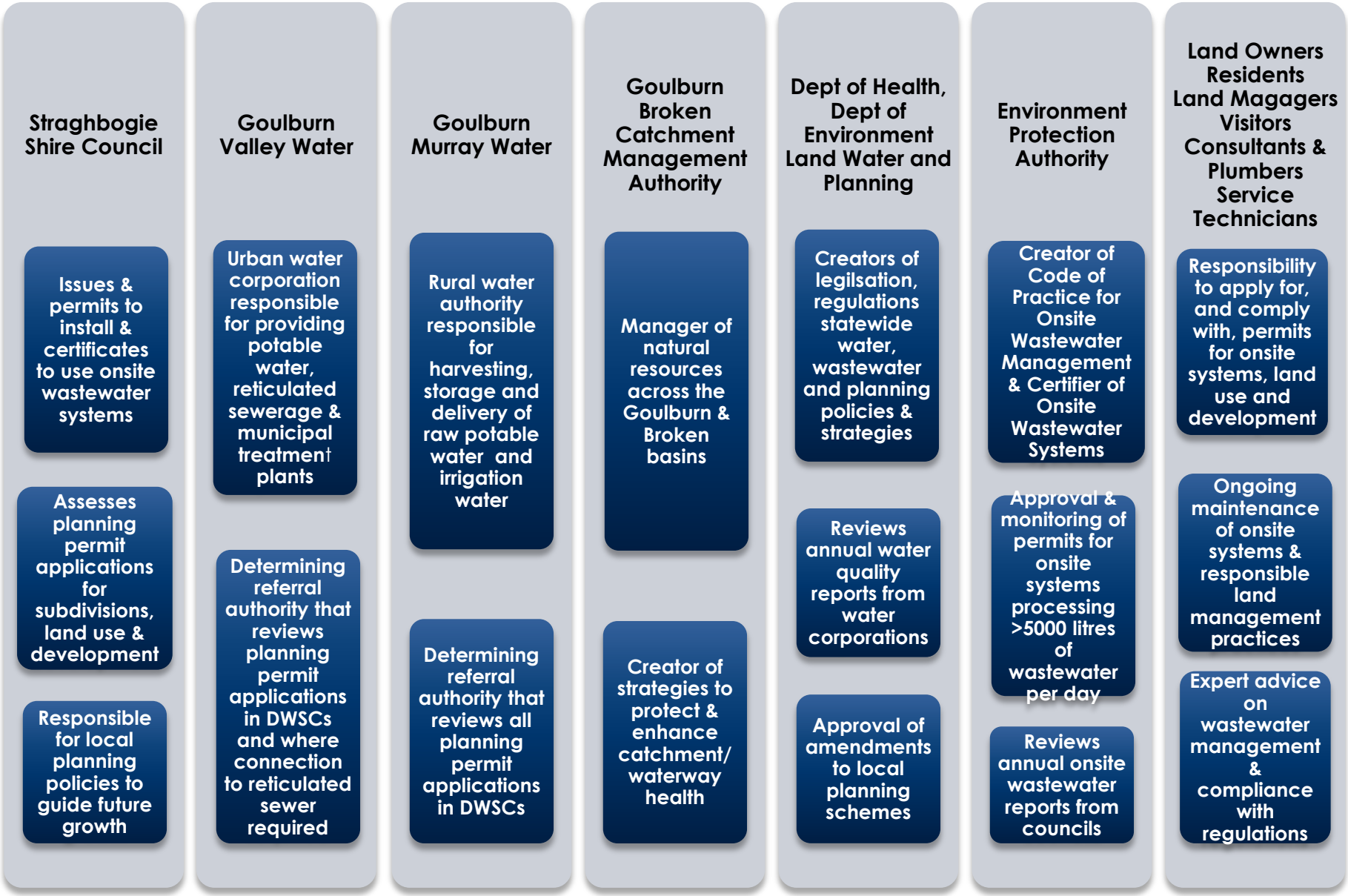


Figure 2 Stakeholders' Roles and Responsibilities



6. The State, Regional and Local Context

There are a wide range of legislation, strategies, standards and guidelines that guide domestic wastewater management, catchment management and water quality; key Federal, State, Regional and local documents are outlined below.

6.1 Raw and Potable Water Quality

Federal

- Australian Drinking Water Guidelines (Version 2.0) 2011
- National and New Zealand Water Quality Management Strategy
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)

State

- Water Quality Act 1989
- Safe Drinking Water Act 2002 & Regulations 2005
- State Environmental Protection Policy (Waters of Victoria) (1988)
- State Environmental Protection Policy (Groundwaters of Victoria)(1997)
- Victorian Waterway Management Strategy (2013)
- Our Water Our Future - Securing Our Water Future Together (2013)
- Living Melbourne, Living Victoria Roadmap (2011)
- Ministerial Guidelines for Planning Permit Applications in Open Potable Water Supply Catchment Areas (2012)
- Water Industry Statement of Obligations (2012)

Regional

- DEPI Northern Region Sustainable Water Strategy (2009)
- GBCMA Goulburn Broken Regional Catchment Management Strategy 2013 - 19 (2013)
- GBCMA Draft Goulburn Broken Regional Waterway Strategy 2013 - 21 (2013)
- GBCMA Goulburn Broken Water Quality Strategy (1996/7)
- North East Planning Referrals Committee Guidelines for the Protection of Water Quality (2001)
- GMW Nagambie Waterways Land and On Water Management Plan (2012)
- Heritage Rivers Act 1992

Local

- Stormwater Management Plan 2005
- Environmental Strategy 2011
- Municipal Strategic Statement (Clause 21 Strathbogie Planning Scheme)

6.2 Wastewater Management

Federal

- AS/NZS 1546.1 Onsite Domestic Wastewater Treatment Units Part 1: Septic Tanks
- AS/NZS 1546:2 Onsite Domestic Wastewater Treatment Units Part 2: Waterless Composting Toilets
- AS/NZS 1546:3 Onsite Domestic Wastewater Treatment Units Part 3: Aerated Wastewater Treatment Systems
- AS/NZS 1547 Onsite Domestic Wastewater Management

State

- Environment Protection Act 1970
- Public Health & Wellbeing Act 2008
- Local Government Act 1989
- State Environmental Protection Policy (Waters of Victoria) 1988
- State Environmental Protection Policy (Groundwaters of Victoria)1997
- EPA Code of Practice - Onsite Wastewater Management (2013)
- EPA Information Bulletin on Land Capability Assessments for Onsite Domestic Wastewater Management
- MAV/DEPI/EPA Victorian Land Capability Framework (2014)
- DEPI Living Melbourne, Living Victoria (2011)
- DEPI Whole Cycle Planning Business Strategy(2012)

Regional

- GMW Nagambie Waterways Land and On Water Management Plan (2012)
- DTPLI Hume Region Strategic Plan 2010 - 2020 (2010)
- DTPLI Goulburn Valley Regional Sub Plan (2013)

Local

- Environmental Strategy 2011
- Municipal Strategic Statement (Clause 21 Strathbogie Planning Scheme)
- Various township structure plans and strategic plans
- Development Plan Report - Euroa and Avenel Rural Residential Development
- Nagambie Growth Management Study
- Rural Residential Study 2004
- Sustainable Land Use Strategy

6.3 Catchment Management

Federal

- Murray Darling Basin Plan (2012)

State

- Catchment & Land Protection Act 1994
- EPA State Environmental Protection Policy (Waters of Victoria) (1988)
- EPA State Environmental Protection Policy (Groundwaters of Victoria)(1997)
- DEPI Victorian Waterway Management Strategy (2013)
- DEPI Our Water Our Future - Securing Our Water Future Together (2013)
- DEPI Living Melbourne, Living Victoria Roadmap (2011)
- DEPI Whole Cycle Planning Business Strategy(2012)
- Heritage Rivers Act 1992

Regional

- DEPI Northern Region Sustainable Water STrategy (2009)
- GMW Nagambie Waterways Land and On Water Management Plan (2012)
- GBCMA Goulburn Broken Regional Catchment Management Strategy 2013-19 (2013)
- GBCMA Draft Goulburn Broken Regional Waterway Strategy 2013 - 21 (2013)
- GBCMA Goulburn Broken Regional River Health Strategy 2005 - 15 (2005)
- DTPLI Hume Region Strategic Plan 2010 - 2020 (2010)
- DTPLI Goulburn Valley Regional Sub Plan (2013)

Local

- Environmental Strategy 2011
- Stormwater Management Plan 2005
- Municipal Strategic Statement (Clause 21 Strathbogie Planning Scheme)
- Violet Town Flood Study Report 2007
- Euroa Post Flood Mapping and Intelligence Project 2014 (draft)

6.4 Planning Policy, Subdivisions, Land Use and Development

State

- Planning & Environment Act 1987
- Subdivisions Act 1988
- Victoria Planning Provisions
- Ministerial Guidelines for Planning Permit Applications in Open Potable Water Supply Catchment Areas 2012
- State Planning Policy Framework (Strathbogie Planning Scheme) Policies on Settlement, Natural Resource Management, Water Quality, Built Environment & Heritage and Infrastructure

Regional

- North East Planning Referrals Committee Guidelines for the Protection of Water Quality (2001)
- GMW Nagambie Waterways Land and On Water Management Plan (2012)
- DTPLI Hume Region Strategic Plan 2010 - 2020 (2010)
- DTPLI Goulburn Valley Regional Sub Plan (2013)
- Hume Region Growth Plan (2013)
- Goulburn Valley Sub Region Growth Plan (2013)

Local

- Stratbogie Shire Council Plan 2013 - 17 (2014 Update)
- Municipal Strategic Statement (Clause 21 Strathbogie Planning Scheme)
- Local Planning Policies (Clause 22 Strathbogie Planning Scheme)
- Avenel 2030
- Development Plan Report - Euroa and Avenel Rural Residential Development
- Euroa Structure Plan
- Nagambie Growth Management Study
- Rural Residential Study 2004
- Sustainable Land Use Strategy
- Violet Town and District Strategic Plan

6.5 Summary of Key Policy Principles

Clearly there is significant breadth and depth in the range of Federal, State, Regional and Local legislation, policies and regulations.

There are several recurring key principles or themes, namely:

- There are a number of ***legal requirements*** for councils, water corporations, catchment management authorities, land managers, land owners and residents ***to actively manage domestic wastewater and onsite wastewater treatment systems***;
- In recent years there has been a clear shift in State and Regional policy to a ***coordinated, multi agency approach*** in relation to tackling water quality and catchment management issues;
- Regional documents, particularly those from the GBCMA, focus on ***all agencies and stakeholders taking responsibility*** for implementing proactive initiatives to address water quality issues;
- Improved and proactive ***management of domestic wastewater is only one of a number of strategies*** which should be employed to improve water quality, catchment health and achieve whole of water cycle objectives;
- All water quality and catchment management documents highlight the need for a ***multi barrier, risk based approach*** to protect natural resources and in particular potable water quality
- ***A DWMP is seen to be one of the primary*** means through which to address water quality issues within a municipality, particularly in areas where unsewered development is located within a DWSC as it allows stakeholders to prioritise, resource and implement monitoring programs/infrastructure improvement initiatives;
- A ***DWMP is critical to the identification of future development potential*** and ensuring land use changes are effectively managed to avoid significant risks to public health and the environment;
- State, Regional and Local planning documents highlight the need for a ***coordinated approach to planning scheme controls to better manage development*** and mitigate potential adverse impacts on waterways and water quality; and
- State, Regional and Local planning documents ***highlight the need for additional infrastructure investment to manage domestic wastewater*** in the form of extensions to reticulated sewerage networks and modern onsite wastewater management systems.

7. Why a DWMP is Important

Domestic wastewater, if not appropriately managed, can have significant impacts on local amenity and risks to public health.

This is why it is important that the cumulative impacts of individual on-site wastewater systems are effectively monitored and managed by all stakeholders. It is important to note that some risks/threats can be relatively short lived, while others have ongoing long-term impacts.

7.1 Potential Risks Associated with Unmanaged Domestic Wastewater

The risks and potential threats posed by domestic wastewater are summarised below.

Table 2 Potential Risks Associated with Unmanaged Domestic Wastewater

Risks to:	**Arising from:**
Our economy: • agriculture • tourism • livability • future population growth	• unmanaged wastewater can add to existing water quality issues affecting agriculture in the Goulburn Valley Water as water stored in Lake Nagambie is used for downstream irrigation and water for livestock; • *reduction in the amenity/livability* of areas due to odour; • *inability for small sites in unsewered townships to meet EPA requirements, restricting future development potential and population growth.* • The *application of the 1:40 hectare dwelling density* potentially affects growth in declared water supply catchments. It is important that the population of our smaller townships is able to grow rather than decline.
Beneficial uses as defined by the *State Environmental Protection Policy (Waters of Victoria)*: • water for human consumption • water for agriculture • aquatic habitats & ecosystems • water based recreation	*Unmanaged wastewater exacerbating existing water quality issues caused by other pollution sources resulting in:* • *high levels of nutrients;* • *increased sediment* in waterways; • *changes to oxygen levels and the pH* of water; • *increased presence of pathogens* (e.g. E coli).
Council meeting its statutory obligations around the implementation and enforcement of legislation/Codes of Practice	• *potential liability issues* if Council fails to meet legislative requirements that clearly place domestic wastewater management as a priority for all councils across Victoria • *damage to Council's reputation* and standing in the community if it does not adequately manage or respond to public health and environmental management issues • *not meeting the requirements of the Memorandum of Understanding* with GMW, requiring a DWMP to be finalised by December 2015.

7.2 Potential Threats from Unmanaged Domestic Wastewater

A range of legislation, policies and strategies identify the potential threats domestic wastewater can have if not adequately managed, which are summarised in the table below.

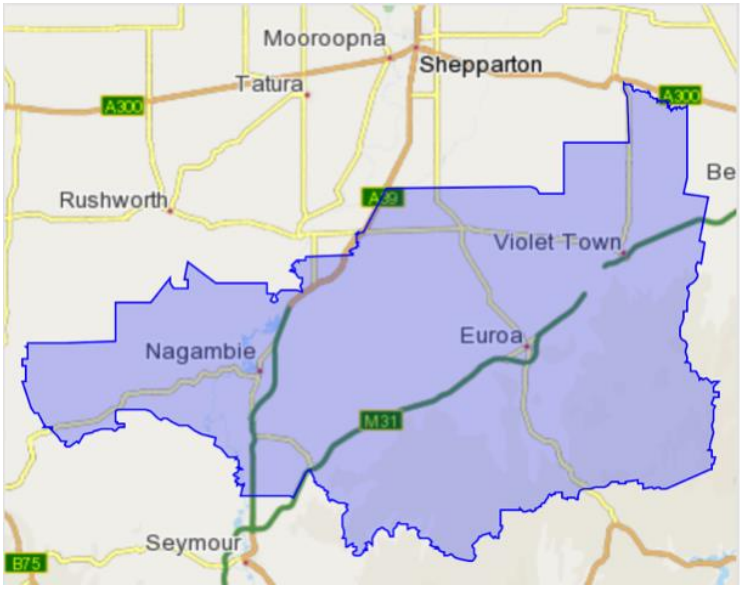
Table 3 Threats from Domestic Wastewater

Potential Threat	Likely Cause	Potential Impacts
Failed on-site systems resulting in wastewater being discharged beyond property boundaries	• damaged effluent disposal drains/trenches • increased loading arising from extensions to dwellings • non compliance with design requirements • faulty installation • new works and land uses impacting on dispersal area • ageing systems • lack of regular emptying (desludging) of septic tanks	Increased nutrients Presence of pathogens Unpleasant odours Reduced visual amenity Oxygen depletion in waterways Local land degradation Pollution of waterways
Discharge of treated effluent beyond property boundaries	• legal and illegal systems	Pollution of waterways Reduced visual amenity
Discharge of treated effluent within property boundaries	• legal and illegal systems	Pollution of groundwater Reduced visual amenity
Reuse of treated wastewater	• low water supplies • poor management by resident / landowner • unauthorised use of wastewater to water gardens	Presence of pathogens Unpleasant odours
Discharge of untreated wastewater offsite	• poorly maintained systems • off site wastewater discharge • systems with insufficient disposal area or poor soil absorption (eg at times of high rainfall)	Increased nutrients Presence of pathogens Unpleasant odours Reduced visual amenity Pollution of waterways
Ineffective enforcement and regulation of on-site systems	• failure of landowners to comply with permit requirements • incomplete council databases • lack of effective public education about maintaining onsite systems • lack of a comprehensive compliance/monitoring regime.	Increased incidence of preventable pollution and environmental degradation Increased risks to public health through pathogens Potential liability issues relating to public health and environmental incidents Prohibition of further residential development in declared water supply catchments due to lack of active management

8. Our Population and Residential Development Profile

Strathbogie Shire has an area of 3,303 km^2. The major townships are Euroa, Nagambie, Violet Town, Longwood and Avenel. Centres such as Euroa and Nagambie are located on or near major highways and the Melbourne to Sydney rail line bisects the Shire, with a station at Euroa. Nagambie Township is located on the shores of Lake Nagambie. There are several smaller townships located within DWSCs such as Longwood, Strathbogie and Violet Town.

Map 2 Strathbogie Shire Census Map



Source: Australian Bureau of Statistics 2011 Census Quick Stats
http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/LGA26430

8.1 Shire-Wide Population and Growth Trends

According to 2001 and 20011 Census Data the Shire's population has grown modestly by 1.5% or 183 people in the past decade.

Victoria in Future 2011 – 31, released by DELWP in August 2015 predicts future population growth based on the Census data. It suggests that in the next 16 years the Shire's population will increase by 0.8% per annum, increasing from around 9,600 people in 2011 to 11,100 in 2031.

Table 4 provides an overview of the predictions in relation to overall population and the number of households.

Table 4 2006 and 2011 Census Data and 2016 – 2031 Projected Population and Household Trends

	2006*	2011*	2021 (Projection)	2031 (Projection)
Total Population	9,295	9,486	10,300	11,100
Net Increase		191	814	800
Ave. annual increase		0.4%	0.7%	0.8%
Total Households	3,790	4,073	4,800	5,300
Net Increase		283	727	500
Ave. Annual Increase		1.5%	1%	1%
Ave. Household Size	2.24	2.19	-	-

* *Census Data 2001 and 2011, Strathbogie Shire LGA, community profile.id*

Source: Victoria in Future 2015, Strathbogie LGA, Department of Environment, Land, Water and Planning

The projected increase in the number of households suggests that somewhere around 1,200 additional households will be created, or on average of around 61 per year resulting from a combination of falling household sizes and population growth.

8.2 Shire Wide Dwelling Composition and Growth Trends

Census data also provides an insight into the increase in the number and type of dwellings across the Shire.

The dominance of detached dwellings is highlighted, however around an additional 100 medium density units were constructed, resulting in a moderate increase in medium density dwellings as a proportion of all dwellings.

Overall an additional 944 dwellings were added to the shire's dwelling stock during this 20-year period (an increase of 23%), or an average of 47 dwellings per year.

Table 5 Dwelling Type – Occupied Private Dwellings 1991 – 2011

Housing type	1991		2011		
	Number	%	Number	%	% increase or decrease
Detached house	3,740	92	4,532	91	**21%**
Medium density unit	168	4	262	5	**56%**
Caravan, cabin or houseboat	82	2	63	1	**-23%**
Other/Not Identified	93	2	170	3	**83%**
Total Private Dwellings	**4,083**	**100%**	**5,027**	**100%**	**23%**

Source: Strathbogie Shire Community Profile, Dwelling Type, Strathbogie Shire Council website

8.3 Dwelling Size

The size of dwellings is relevant to the DWMP in that, in unsewered areas, it determines the lot size required to adequately treat and retain domestic wastewater on site (ie the greater the number of bedrooms, the larger the area of sub surface irrigation required to absorb wastewater).

Census data shows that the highest growth rates were found in dwellings with four or more bedrooms, while one-bedroom dwellings decreased in numbers. There was also relatively significant growth in three bedroom dwellings.

So, although household sizes are getting smaller as shown in Table 4, dwelling sizes are increasing. This can be partially be attributed to the 30% of dwelling stock being holiday homes which are usually larger due to their function.

Table 6 Dwelling Size – Number of Bedrooms 1991 – 2011

No. of bedrooms	1991		2011		
	Number	%	Number	%	% increase or decrease
1	213	6	204	5	**-4%**
2	715	21	721	18	**1%**
3	1,746	52	2,052	50	**18%**
4+	614	18	837	21	**36%**
Not stated	81	3	259	6	**219%**
Total Dwellings	**3,369**	**100%**	**4,073**	**100%**	**21%**

Source: Strathbogie Shire Community Profile, Number of Bedrooms, Strathbogie Shire Council website

8.4 Population and Dwelling Growth Trends in Key Townships

The Census data shows that the districts around Avenel and Violet Town have experienced the greatest levels of growth in population in the decade between 2001 – 11, while Euroa and District experienced relatively low population growth. The greatest increase in the number of dwellings was in Violet Town at 17% compared to the 5% experienced in Euroa and Nagambie.

Table 7 Township Population and Total Private Dwellings 2001 - 11

Town	2001		2011		2001 - 11	
	Population	Dwellings	Population	Dwellings	% Increase	
					Population	Dwellings
Avenel & District	1,193	569	1,306	597	**10%**	**5%**
Euroa & District	3,812	1,961	3,846	2,062	**1%**	**5%**
Nagambie & District	1,633	808	1,679	885	**3%**	**10%**
Violet Town & District	1,400	667	1,521	778	**9%**	**17%**

Source: Strathbogie Shire Community Profile District Data, Strathbogie Shire Council website

8.5 Development Approval Data and Trends

Data relating to building permit and planning permit approvals provides an insight into the housing market and short-term trends; given the data is published on a quarterly and annual basis it is more current than Census data.

8.5.1 Residential Building Approvals Data

Strathbogie Shire publishes data on residential building approvals on an annual basis, a summary of which is provided in the table below.

While there are some variances in the number of residences approved, with the lowest being 49 in 2008 – 09 and the highest being 85 in 2009 – 10, the average annual number of building permits is 69 dwellings. 'Other' residential buildings relate to 'granny flats' or other such alternative residential structures.

This figure is slightly higher than the actual growth of private dwelling numbers reflected in Census data, which can be attributed to permit holders deciding to either extend the life of the permit or not to proceed with dwelling construction.

Anecdotal evidence from Strathbogie Shire Officers indicates that new residential dwellings are being built across the Shire, rather than just in major centres such as Nagambie or Euroa. Furthermore there is a mixture of new dwellings on standard urban residential lots and larger rural living/lifestyle lots.

Table 8 Residential Buildings Approval Data 2001/2 – 2013/14

Year	Houses	Other residential structures	Total
2013-14	75	4	**79**
2012-13	63	5	**68**
2011-12	75	0	**75**
2010-11	63	4	**67**
2009-10	**85**	**0**	**85**
2008-9	**49**	**2**	**51**
2007-8	63	6	**69**
2006-7	70	0	**70**
2005-6	75	3	**78**
2004-5	78	0	**78**
2003-4	72	0	**72**
2002-3	67	2	**69**
2001-2	63	0	**63**
Total	898	26	**924**

Source: Residential building approvals, Australian Bureau of Statistics, Strathbogie Shire Website – Community Profile

8.5.2 Planning Permit Activity - Residential Development & Subdivisions

Planning permit activity data provides an insight into the way in which land use is changing across Strathbogie Shire and also the nature of residential development; that is whether dwellings are being extended/altered or new dwellings are being constructed.

Important data on the subdivision of land is also included, which indicates the provision of vacant residential land for future development. It is important to note that the subdivision figures may include land in non-residential zones as figures are not provided for residential subdivisions only.

Table 9 provides a summary of planning permit and subdivision data for the past four financial years.

Table 9 Planning Permits Issued for Residential Development and Subdivisions 2011/12 to December 2014

Type of Permit Issued	2011/12	2012/13	2013/14	2014/15 (to 31 Dec 2014)	Total
Extension of an existing dwelling	17	15	12	10	**54**
One new dwelling	30	40	24	9	**103**
More than one new dwelling	8	3	3	2	**16**
Subdivision of land 1 – 9 lots	27	33	17	16 (a breakdown of lot numbers is no longer provided)	**93**
Subdivision of land 10+ lots	1	0	2		**3**
Total	**83**	**91**	**58**	**37**	**269**
Planning permits for permission to change use of the land to residential	3	6	19	8	37

Source: Department of Transport, Planning and Local Infrastructure Planning Permit Activity Reporting System (PPARS) reports for Strathbogie Shire (Annual and Quarterly Reports)

The above shows that there is a relatively consistent level of residential development and subdivision being approved by Council; the main focus of residential activity is in the construction of new dwellings, with very limited medium density development.

There appears to be a relatively healthy subdivision market, indicating that the supply of land for development is more than able to meet the demand for new dwellings.

The change in land use to allow residential development figures indicate lots that are under the minimum lot size prescribed in the Strathbogie Planning Scheme, and hence Council also needs to assess whether or not it is appropriate to use the land for this purpose. Such applications are often located in the Farming Zone.

8.6 Land Use and Strathbogie Planning Scheme Controls

The above data demonstrates that there is a consistent level of growth and residential development activity within Strathbogie Shire. This growth is fostered through the controls of the Strathbogie Planning Scheme; the purpose of this section is to briefly outline what the key planning controls are and to analyse the importance of domestic wastewater management when decisions are being made on applications for residential development and subdivision.

8.6.1 Zoning of Land

Attachment 2 provides an overview of zoning across the Shire. As can be seen from the map, the majority of land within Strathbogie Shire is located in a Farming Zone (coloured light green), reflecting the importance of farming to the municipality. The nature of agriculture is dominated by grazing and dryland cropping, although there are niche land uses such as vineyards and horse breeding/training.

The network of irrigation channels and infrastructure predominantly found in the north west of the Shire is owned and operated by GMW, which is located in a Public Use Zone (PUZ7), can also be clearly identified.

Industrial and commercial zones are located within Euroa (industrial uses are on the northern fringe) and Nagambie (industrial land is to the eastern fringe).

Low Density and Rural Living Land Supply

In terms of residential zonings, (pink and orange on the zoning map) there is relatively little land zoned Low Density Residential or Rural Living; these zones provide for minimum lots of between 0.2 hectares (if connected to reticulated sewerage) to 2 hectares. There is a small area of Low Density Residential land to the east of Longwood and to the north east of Nagambie, with small pockets of Rural Living land to the east of Avenel and the east of Euroa.

The *Strathbogie Shire Rural Residential Strategy 2004*, prepared by Beca Pty Ltd, identifies a number of opportunities for further rezoning of land for rural living and low density residential purposes around the main townships and other areas such as Goulburn Weir, Mangalore, Kirwans Bridge and Bailieston East. Should these recommendations be implemented, they would significantly increase the supply of rural residential land across the Shire.

It should be noted that although many of the Strategy's suggested rezonings have not occurred, the distribution of approvals for onsite wastewater systems and planning permits for dwellings suggest that development in these areas is being permitted regardless of zoning.

Small Townships

The townships of Violet Town, Longwood, Avenel and Strathbogie are predominantly located within a Township Zone, which is the zone most used for unsewered townships. This zone allows for a range of residential, commercial, community and industrial uses. Lots of 300m^2 and below can be created with a planning permit (ie medium density development).

Euroa

Euroa is zoned General Residential, which is the zone used for larger towns and urban areas. It provides for moderate residential growth, with a focus on respecting neighbourhood character. A limited range of non residential uses are allowed subject to a permit as a means

of providing services and facilities to meet the needs of residents. Lots of 300m^2 and below can be created with a planning permit (ie medium density development).

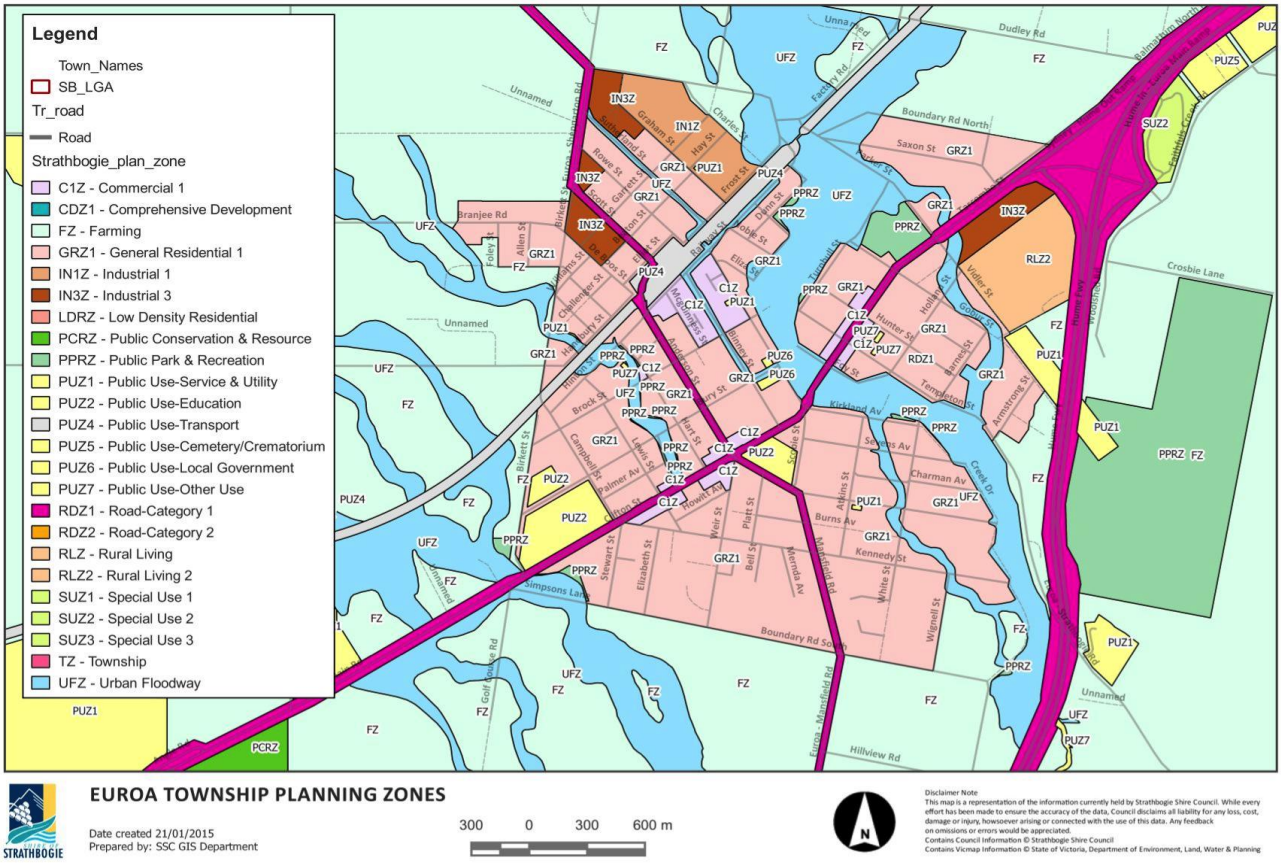
There are also a number of floodways that traverse through Euroa Township, and one through Avenel, denoted by the Urban Floodway Zone. The objectives of this zone are to:

- identify waterways, major floodpaths and urban areas that are at high risk of flooding;
- ensure any development allows floodwater to flow freely, provides for the temporary storage of floodwater, while minimising flood damage, soil erosion, sedimentation and silting; and to
- protect water quality and waterways.

Strict development constraints are placed on land to ensure that floodwaters can flow freely and be detained for later release in appropriate places, while minimising damage to property. No additional lots are to be created within this zone. All planning permit applications must be referred to, and have the consent of, the GBCMA. If the CMA objects to the issue of a planning permit Council must, under the *Planning and Environment Act 1987*, refuse the application.

Although this Urban Floodway Zone is extensive, there are relatively few private properties that are impacted directly by the zone; floodways are generally confined to existing drains, rivers, public open spaces and roads.

Map 3 Zoning Map for Euroa Township



Source: Strathbogie Shire Geographical Information System, January 2015

Nagambie

Nagambie is zoned partly General Residential (generally to the east of the Goulburn Valley Highway) and partly Comprehensive Development Zone (the area to the west of the Highway and south of the Lake). The latter represents the Lake Nagambie Resort, which Schedule 1 to Clause 37.02 of the planning scheme states provides for:

> *"…the development of an integrated residential development comprising residential, commercial, tourism related and recreational facilities (currently known as the Lake Nagambie Resort), in a manner which achieves principles of environmental and sustainability including:*
>
> - *provision of resort style commercial, tourist related and recreational infrastructure;*
> - *housing at a range of densities;*
> - *ensuring protection of existing environmental water resources; generally in accordance with the Lake Nagambie Resort Master Plan."*

And the identification of:

> *"…land suitable for an integrated development consisting of a retirement village; camping and caravan facility; a retail village; not more than 476 accommodation lots including hotel resort accommodation; dwellings and associated roads, utility services, and recreation facilities."*

All lots must be provided with reticulated water, recycled water (unless otherwise approved by GVW), reticulated sewerage and underground electricity. Development must be consistent with the *Lake Nagambie Resort Master Plan* and there are a number of requirements relating to environmental management, landscaping, urban design and infrastructure.

Prior to the commencement of a further stage of development a variety of plans must be prepared and approved by GMW, GVW, the Department of Environment, Land, Water and Planning, the Goulburn Broken Catchment Management Authority and Council.

Areas for future residential growth

The Planning Scheme indicates that Council wishes to minimise new residential development in farming areas, concentrating growth in townships such as Euroa and Nagambie where excellent transport links and community infrastructure exists. It is important to note that both of these towns benefit from reticulated sewerage, although not all lots are connected (such as the Rural Living area to the east of Euroa).

There is also potential for growth in the smaller townships through the development of existing vacant lots, however the absence of reticulated sewerage in these areas means that lot sizes need to be relatively large in order to treat domestic wastewater (and retain it) on site. This will be an important issue for consideration in the DWMP. Residential development in unsewered areas is also challenged by the presence of flood paths and risks of erosion management, which will be discussed in 8.6.2 below.

8.6.2 Overlays

Strathbogie Shire faces some significant environmental challenges from inundation and potential soil erosion, both of which are reflected in the presence of a Floodway Overlay / Land Subject to Inundation Overlay and the Erosion Management Overlay respectively.

Attachments 3 and 4 show the vast area of land that needs to be carefully managed to respond to these environmental challenges.

Both of these issues are highly relevant to the DWMP given that the occurrence of inundation and the nature of soils have significant consequences on the capability of land to absorb domestic wastewater released from onsite systems. Ironically, the very soils that contribute to potential erosion risk can actually be the best soils for the absorption of nutrients, pathogens and water; this will be discussed further in Section 12 – A Risk Analysis of Strathbogie Shire.

Land Subject to Inundation Overlay (LSIO)

The GBCMA is the primary agency that assesses, maps and manages flooding issues across Strathbogie Shire. In addition to the Urban Floodway Zone the CMA uses the Land Subject to Inundation Overlay (LSIO) to land as a key catchment management/water quality management tool.

The LSIO identifies land affected by a 1 in 100 year flood event which been determined by the GBCMA to be a flood storage or 'flood fringe area'. This overlay has the same objectives in relation to passage of floodwaters and protection of water quality as the Floodway Overlay.

While there are still additional controls over the construction of buildings and other structures there is no prohibition on the creation of additional lots through subdivision. Exemptions from requiring a planning permit for a range of structures are outlined in local provisions applying just to Strathbogie Shire in Schedule 1 to the Overlay. These exemptions include:

- a new dwelling within Residential 1 Zone (R1Z) of Euroa where the floor level is at least 300 millimetres above the designated 100-year ARI flood level as shown on Goulburn Broken CMA Plan No. 540219, or a higher level set by the responsible authority;
- a replacement dwelling where the floor level is at least 300 mm above the 100-year ARI flood level, or a higher level set by the responsible authority; and
- a single or multiple dwelling extension where the combined ground floor area of the extension since 14 October 1999 is not greater than 20m^2.

These exemptions are important given the coverage of the Overlay within the townships of Euroa and Violet Town in particular. There are many properties zoned for residential development within these towns that are subject to the LSIO, including a number of vacant lots.

All planning permit applications need to be reviewed, and approved by, the GBCMA. If the CMA objects to the issue of a planning permit Council must, under the *Planning and Environment Act 1987*, refuse the application.

Erosion Management Overlay (EMO)

The primary objective of this overlay is to minimise erosion, landslip and land degradation, which is achieved by minimising land disturbance that may occur through development and works.

Strict controls on development, buildings and works apply; all buildings and works undertaken on properties subject to this overlay require a planning permit. The removal of vegetation also requires a planning permit in most circumstances (exemptions do apply) given that vegetation is key to stabalising soils and minimising erosion.

Detailed statements about the slope of land, extent of any existing erosion, landslip or land degradation, extent of proposed earthworks and the measures that will be applied to maximize soil stability must be submitted with every permit application.

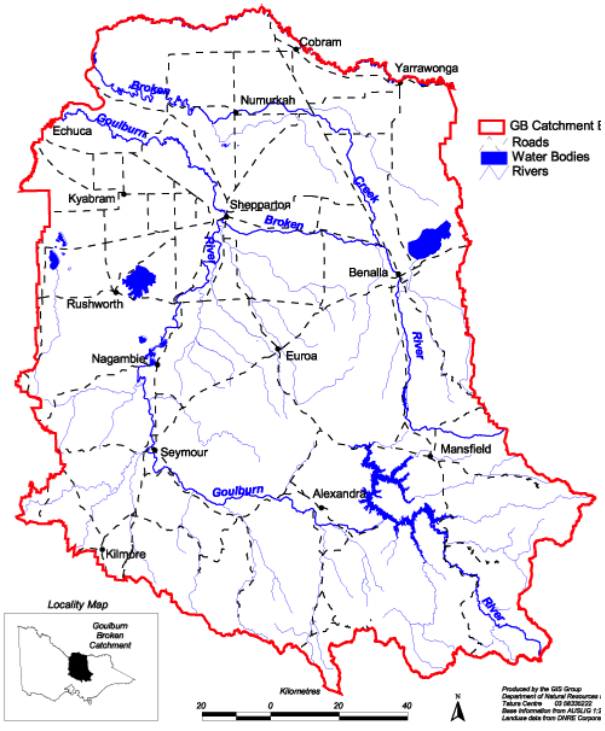
Given the installation of an onsite domestic wastewater management system requires significant earthworks, a planning permit would be required in addition to normal permits to install and certificates to use a system.

9. Declared Water Supply Catchments

9.1 Catchment Health

Strathbogie Shire lies within the Goulburn Basin, which forms part of the broader Broken Goulburn region managed by the GBCMA. There are around 8,300 kilometres of streams and rivers within the Goulburn Basin. The Goulburn River is a declared heritage river under the Heritage River Act 1992 and therefore specific land use and land management practices must be applied in and around this river.

Map 4 The Goulburn Broken Catchment Management Region



Source: Goulburn Broken Catchment Management Authority Website

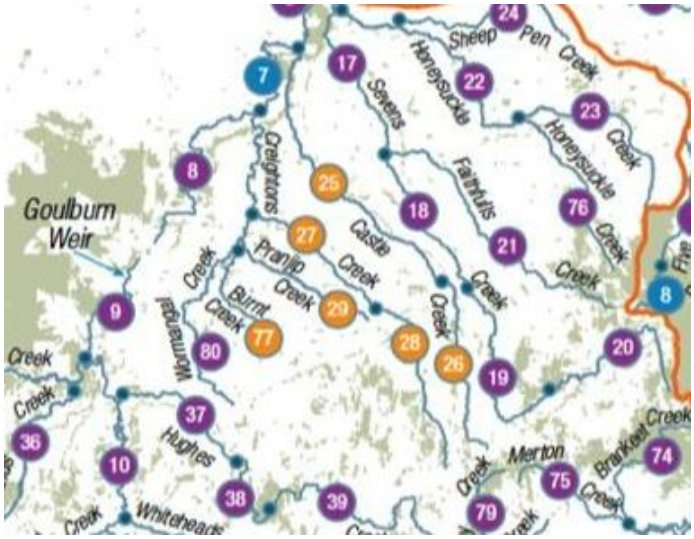
Several authorities monitor raw water quality within the Goulburn Broken Catchment Region; GMW, the GBCMA and DELWP. Several monitoring stations used to collect data on the quality of water in streams and rivers are located within Strathbogie Shire.

Data from these stations was used to inform the *Index of Stream Condition - The Third Benchmark of Condition Report – Goulburn Broken* in 2012, analysing changes in water quality since the previous report in 2004.

The report shows that in 2010 the percentage of river length in good or excellent condition within the Goulburn Basin has stayed static at between 11 – 30% when compared to data from 2004. This provides the basin with a rating of Poor for this key indicator.

The overall rating for all rivers within Strathbogie Shire is either Poor (6 reaches) or Moderate (12 reaches). The poor ratings are concentrated around the Longwood/Ruffy area, some of which would feed the GVW Longwood reservoir. Water quality ratings, where available, are around the moderate range, however the quality of water in the reach of the Goulburn River south of the Goulburn Weir has an excellent rating.

Map 5 River Monitoring Stations within Strathbogie Shire



Source: Index of Stream Condition – The Third Benchmark of Victorian River Condition, DEPI 2012

Table 10 Details of River Monitoring Stations

The reach details of where the monitoring stations are located are as follows:

Reach No.	Reach Length	River	Stations Located in a DWSC
9	31.2 km	Goulburn River	
10	22.3 km	Goulburn River	
18	27.5 km	Seven Creeks	Sevens Creek/Mountain Hut DWSC (Potable)
19	31 km	Seven Creeks	Sevens Creek/Mountain Hut DWSC (Potable)
20	38 km	Seven Creeks	Sevens Creek/Mountain Hut DWSC (Potable)
21	53.7 km	Faithfulls Creek	Sevens Creek/Mountain Hut DWSC (Potable)
23	39.7 km	Honeysuckle Creek	Honeysuckle Creek DWSC
25	71.6 km	Castle Creek	
26	30.4 km	Castle Creek	
27	59.4 km	Creightons Creek	
28	30.3 km	Creightons Creek	
29	40.7 km	Pranjip Creek	

Reach No.	Reach Length	River	Stations Located in a DWSC
37	23.6 km	Hughes Creek	
38	16.3 km	Hughes Creek	
39	44.7 km	Hughes Creek	
76	35.2 km	Honeysuckle Creek	Honeysuckle Creek DWSC
77	22.2 km	Burnt Creek	
80	36.4 km	Wormangal Creek	

Source: Index of Stream Condition – The Third Benchmark of Victorian River Condition, Goulburn Broken Region, DEPI 2012

Table 11 summarises the findings of the water quality observations outside DWSCs. Data from stations within the declared catchments will be provided under each respective catchment. Each measure is given a rating out of 10, with 1 - 2 being very poor, 3 – 4 being poor, 5 - 6 being moderate, 7 – 8 being good and 9 -10 excellent. Attachment 5 contains details of the metrics that comprise each measure.

Table 11 River Condition Ratings – Monitoring Stations Outside DWSCs

Reach No	River	Hydrology	Physical Form	Streamside Zone	Water Quality	Aquatic Life	Condition
9	Goulburn	7	7	7	9	4	Moderate
10	Goulburn	7	5	7	N/D*	5	Moderate
25	Castle Creek	2	7	7	N/D	N/D	Poor
26	Castle Creek	2	5	6	N/D	5	Poor
27	Creightons Creek	1	8	7	N/D	5	Poor
28	Creightons Creek	1	7	6	6	8	Poor
29	Pranjip Creek	1	7	6	N/D	5	Poor
37	Hughes Creek	4	7	7	6	8	Moderate
38	Hughes Creek	4	7	8	N/D	9	Moderate
39	Hughes Creek	4	7	7	N/D	9	Moderate
77	Burnt Creek	1	7	6	N/D	8	Poor
80	Wormangal Creek	5	7	6	N/D	8	Moderate

* N/D – No data available

Source: Index of Stream Condition – The Third Benchmark of Victorian River Condition, Goulburn Broken Region, DEPI 2012

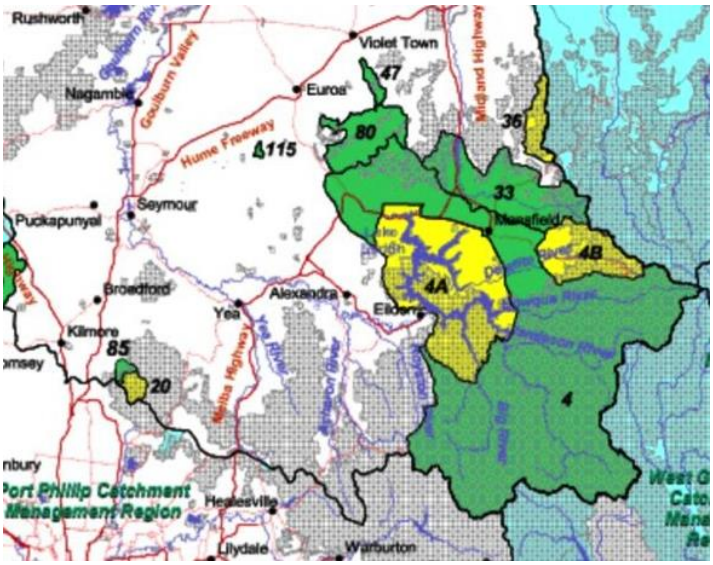
9.2 Declared Water Supply Catchments in Strathbogie Shire

The four declared water supply catchment areas that lie within Strathbogie Shire cover around 22,000 hectares, or 7% of the Shire:

- Honeysuckle Creek (Violet Town) (shown as Catchment 47 on the map above);
- Seven Creeks/Mountain Hut (Euroa) (Catchment 80 supplying potable water);

- Nine Mile Creek (Longwood) (Catchment 115); and
- A small proportion of the Upper Goulburn (Catchment 4 supplying potable water).

Map 6 Declared Water Supply Catchments in Strathbogie Shire



Source: Victorian Water Resources Online, Department of Environment, Land, Water and Planning, http://vro.depi.vic.gov.au/dpi/vro/map_documents.nsf/pages/gb_dwsc

9.3 Honeysuckle Creek DWSC (No. 47)

This catchment provides the potable water supply for Violet Town. The main reservoir fed by this catchment opened in 1973. Around 20% of the catchment is forest, with the remainder being predominantly grazing land. The catchment is subject to relatively high rainfall of around 900mm per annum in low-lying areas to 1200mm on the highest slopes.

A report supporting the declaration of the catchment, prepared by the Soil Conservation Authority and Land Conservation Council in 1976, highlighted the challenges faced in the catchment as being:

- unstable soils;
- steeply sloping land (with slopes of up to 40%); and
- the agricultural use of the freehold land which comprises the catchment.

The Third Benchmark of Victorian River Condition 2012 provides the following data from two monitoring stations in this catchment to provide a snapshot of river health:

Table 12 River Condition Ratings – Monitoring Stations in Honeysuckle Creek DWSC

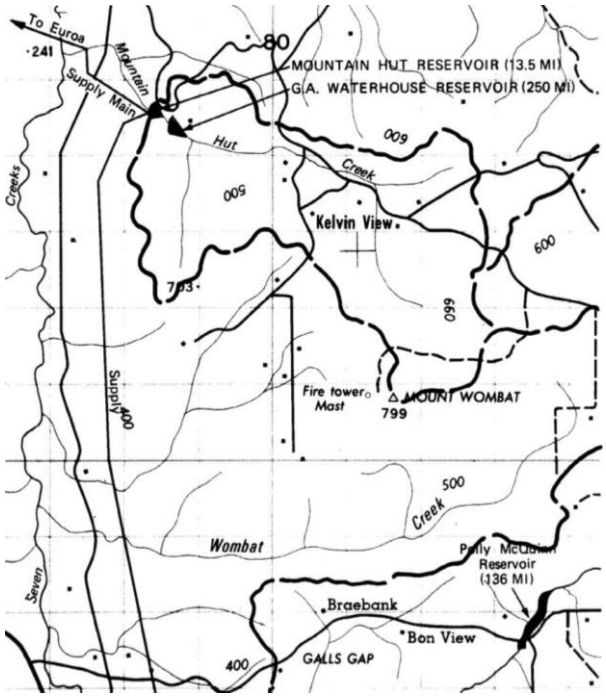
Reach No	River	Hydrology	Physical Form	Streamside Zone	Water Quality	Aquatic Life	Condition
23	Honeysuckle Creek	5	7	7	N/D	6	Moderate
76	Honeysuckle Creek	6	7	6	N/D	5	Moderate

Source: Index of Stream Condition – The Third Benchmark of Victorian River Condition, Goulburn Broken Region, DEPI 2012

9.4 Seven Creeks/Mountain Hut DWSC (No. 80 – Potable Water)

This catchment provides potable water to Euroa and Violet Town. Mountain Hut Creek is a tributary of Seven Creeks. It contains several offtake points; Polly McQuinn Reservoir, Gooram Diversion Weir, GA Waterhouse Reservoir and the Mountain Hut Reservoir.

Map 7 Location of Water Storages, Seven Creeks/Mountain Hut DWSC



Source: A Report on the Seven Creeks and Mountain Hut Catchment Area (Euroa Water Supply) – A Proposal for Proclamation for the Consideration of the Land Conservation Council (1984)

Around 90% of the combined catchment is freehold land, however 25% of the Mountain Hut catchment is public land. Much of the land within the combined catchment is used for agriculture (grazing, orchards, vineyards and seed production). The town of Strathbogie lies within the Seven Creeks Catchment. Rainfall within the catchment varies from 900mm in lower lying areas to around 1200mm per annum in the upper slopes.

The Soil Conservation Authority prepared a submission in support of the declaration of this catchment in 1984. The hazards to water supply were summarised as being:

- development pressure for 'hobby' farms and lifestyle properties;
- agricultural land use (grazing, stock access to waterways and erosion caused by cleared land used for orchards and seed production);
- erosion and siltation;
- urban water run off and failing septic systems within the Strathbogie township area;
- use of the Mountain Hut Creek Camp (up to 300 people can be accommodated), with potential wastewater contamination; and
- public access to streams for water based recreation (Polly McQuinn Reservoir is highlighted).

The Third Benchmark of Victorian River Condition 2012 provides the following data from two monitoring stations in this catchment to provide a snapshot of river health.

Table 13 River Condition Ratings – Monitoring Stations in Seven Creeks/Mountain Hut DWSCs

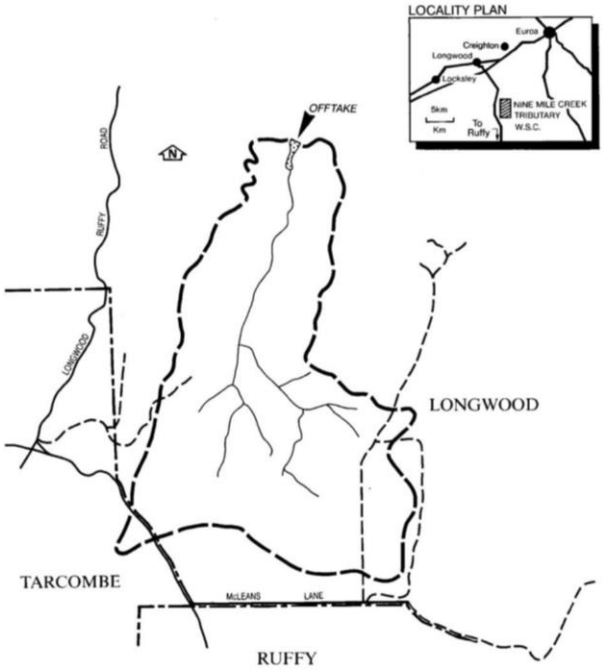
Reach No	River	Hydrology	Physical Form	Streamside Zone	Water Quality	Aquatic Life	Condition
18	Seven Creeks	4	5	7	6	7	Moderate
19	Seven Creeks	4	7	6	6	8	Moderate
20	Seven Creeks	4	9	8	N/D	7	Moderate
21	Faithfulls Creek	6	9	6	N/D	7	Moderate

Source: Index of Stream Condition – The Third Benchmark of Victorian River Condition, Goulburn Broken Region, DEPI 2012

9.5 Nine Mile Creek DWSC (No. 115)

This catchment provides potable water to Longwood Township. The offtake point, from which water is stored in a small reservoir, is located at the northernmost point of the catchment.

Map 8 Location of Potable Water Storage, Nine Mile Creek DWSC



Source: Nine Mile Creek (Longwood), Proposal for Proclamation, Statement Prepared by the Land Conservation Council, October 1989

All land within this catchment is privately owned and predominantly used for grazing. The land is lower lying and more undulating than in the other catchments within the Shire. Annual rainfall is also far lower at around 750mm.

The Land Conservation Council prepared a brief report on the Catchment to support its declaration in October 1989. Relatively little information is provided in terms of the hazards faced in this catchment, although it does note that the raw water supply has high levels of turbidity, E-coli and is strongly coloured.

9.6 Upper Goulburn DWSC (No 4)

This vast catchment of 279,000ha was first declared in January 1957. Only a relatively small portion lies within Strathbogie Shire, in the far southeast corner of the municipality to the south east of Strathbogie Township. Water from this catchment flows into tributaries feeding Lake Eildon, supplying potable water to Eildon, Bonnie Doon and Mansfield.

The majority of this land is forested and steeply sloping. There are scattered residences and farms within this part of the catchment.

10. Raw and Potable Water Resources

Although the proportion of declared catchments as a percentage of total land is relatively low within Strathbogie Shire, potential adverse impacts caused by unmanaged domestic wastewater not only affects potable water for human consumption but also water used for agriculture and industry.

The extensive network of irrigation channels in the north west of the Shire and water storages have been discussed earlier in this report. Given that agriculture is a key component of Strathbogie Shire's economic profile, and that water sourced from within the shire is also used by others downstream in the Goulburn Valley, it is important for the DWMP to consider impacts of domestic wastewater on both raw and potable water resources.

This section is designed to explore the network of infrastructure, future plans for investment by Council and water corporations and the quality of both raw and potable water; in turn, it will inform the DWMP in terms of the level of management required to address water quality issues and potential future growth through the investment in reticulated services.

10.1 Raw Water Storages and Supplies

Nagambie Waterway
The Nagambie Waterway, managed by GMW, is defined as extending from the junction of the Goulburn River and Hughes Creek northwards to the Eildon Weir.

The Weir is located on the Goulburn River around 8 kilometres north of the township of Nagambie. Construction of the weir was completed in 1891; the Weir was the first structure for the storage of irrigation water in Australia. It has a capacity of 25,500 megalitres.

The key function of the Weir is to regulate the height of the Goulburn River downstream so that water can be diverted along the Stuart Murray, Cattanach and East Goulburn Main Channels. Other beneficial uses include recreational fishing and use of the surrounding parkland; swimming is prohibited.

Lake Nagambie plays an important role in the regulation of levels in the Goulburn River. GVW extracts raw water from the Lake to supply potable water to the Nagambie Township. GVW also provides non-potable water from the Lake to other townships such as Kirwans Bridge and Goulburn Weir.

In 2012 GMW released the *Nagambie Waterways Land and On-Water Management Plan* as a means of actively managing the range of beneficial uses provided by the Lake, its backwaters, nearby reaches of the Goulburn River and the Goulburn Weir pool. It highlights the importance of these waterways as a tourism and recreation asset for the region, providing a range of activities such as fishing, swimming and camping. As outlined in Section 8.6, Lake Nagambie is also a key residential development growth area, with housing development close to the shoreline.

The Plan has a five year life and outlines a wide variety of actions and initiatives aimed at managing the balance between the sometimes competing beneficial uses derived from these waterways; importantly the responsibility for these actions is shared between all key stakeholders, not just GMW as the storage manager.

10.2 GVW Potable Water Storages, Offtake Points and Supply Lines

The location of potable water infrastructure, particularly reservoirs and offtake points, are an important consideration for the DWMP as poorly managed domestic wastewater around these facilities can adversely impact water quality through increased nutrient levels and the presence of pathogens.

As outlined in Section 9, potable water storages managed by GVW within the Shire are located at:

- Abbinga Reservoir (Euroa) and Mountain Hut Reservoir servicing around 3660 people, including Violet Town servicing around 990 people; and
- Nine Mile Creek Reservoir (Longwood) servicing around 280 people.

Supply lines extend from Euroa to Violet Town and Seymour to Avenel (water to Avenel is from the Heywood's Hill Raw Water Storage, treated at the Seymour water treatment plant).

Water treatment plants within the Shire are located at:

- Euroa;
- Longwood; and
- Nagambie.

GVW also supplies water to the following townships but it is not to be used for human consumption (ie it is not potable water but it is disinfected as a precautionary measure for unintended consumption):

- Strathbogie;
- Goulburn Weir (Baxters Road); and
- Kirwans Bridge.

GVW's *2013/14 Annual Report* highlights that during the year hundreds of kilometres of water mains were replaced in Avenel, Euroa, Longwood and Nagambie.

Map 9 GVW's Network of Potable Water Storages and Supply Lines

Source: Goulburn Valley Water Annual Report 2013/14

The table below details the bulk water entitlements held by GVW for raw water supplies, including Water Shares, and the volume taken in 2012/13 and 2013/14.

Table 14 GVW's Bulk Raw Water Entitlements and Volumes Taken 2013/14

Supply System	Source	Bulk Entitlement Available (ML)	Raw Water Volume Taken	
			2012/13	2013/14
Euroa	Seven Creeks and Mountain Hut Creek	1,900	738	680
Longwood	Nine Mile Creek	120	78	62
Nagambie	Lake Nagambie	825	N/D	N/D
Violet Town	Honeysuckle Creek	20	0	0
Goulburn Weir (Baxters Road) (non potable)	Goulburn River (Water Share Allocation)	47	N/D	4
Kirwans Bridge (non potable)	Goulburn River (Water Share Allocation)	129	N/D	12
Strathbogie (non potable)	Seven Creeks	23	12	13
Total		**2219**	**828**	**771**

N/D No Data

Source: Water Quality Annual Reports 2012/13 and 2013/14, Goulburn Valley Water

GVW Offtake points used to supply water storages are identified in the map at Attachment 6. As for the volume of water consumed within the Shire the GVW *Annual Report 2013/14* provides the following data (please note data for Avenel is combined with the townships of Mangalore and Tallarook and has therefore not been included):

Table 15 Water Consumption – Residential and Non Residential Customers

District	Total Treated Water Volume (ML)	Residential Customers	Non-residential Customers	Total Customers	Total Treated Water Consumption (ML)
Euroa (inc Longwood, Longwood East, Strathbogie & Violet Town)	676	2,087	272	2,359	676
Nagambie (Goulburn Weir, Kirwans Bridge and Nagambie Mushroom Farm)	1252	875	115	990	581

Source: Annual Report 2013/14, Goulburn Valley Water

GVW's *Annual Report* also mentions Avenel and Euroa as being within the top ten townships for the development and connection of new lots to reticulated services, based on the following data:

Table 16 GVW Identified Growth Areas within Strathbogie Shire

Growth Area	2008/09	2009/10	20110/11	2011/12	2012/13	2013/14
Avenel	32	14	7	6	7	12
Euroa	4	4	23	29	12	9
Total	**36**	**18**	**30**	**35**	**19**	**21**

Source: Annual Report 2013/14, Goulburn Valley Water

10.3 Raw Water Quality

GMW provides raw water to GVW for treatment to produce potable water for the townships of Avenel (from the Goulburn River at Seymour) and Nagambie (at the Lake Nagambie offtake). GVW operates their own raw water offtakes and storages at Euroa and Violet Town.

GMW must prepare an annual report to comply with the requirements of the *Safe Water Drinking Act* 2003. In this report the corporation must identify any high level environmental incidents such as blue green algal blooms. The *Safe Drinking Water Annual Report* 2013/14 prepared in September 2014 shows that there were no such reportable incidents for either the water storages or irrigation network within Strathbogie Shire.

Lake Nagambie's Water Quality

The *Nagambie Waterways Land and On Water Management Plan* highlights water quality as a key issue and ongoing challenge for GMW and other stakeholders. Key threats to water quality identified in the Plan include:

- Levels of nutrients (particularly nitrogen and phosphorus), sediments and silt, resulting in tributaries from Hughes Creek downstream to the Lake being at high or very high risk of poor water quality (a high proportion of these nutrients are derived from livestock living around, and having direct access to, waterways);
- Effluent from reticulated sewerage systems and on-site domestic wastewater systems entering the Lake and tributaries due to failing and unmanaged systems;

- Untreated stormwater run off going directly into the Lake from surrounding roads and urban areas (increasing levels of pollutants, nutrients and sediment); and
- The Nagambie township stormwater discharge point is adjacent to the water supply offtake point (and a popular swimming area).

Key actions identified by the Plan to manage and address these threats are:

- Implementation of the Strathbogie Planning Scheme's requirement that all onsite systems must demonstrate there will be no adverse impacts on surface water or groundwater;
- Improving the monitoring and management of onsite systems to avoid failing systems;
- Adopting a whole of system approach to increase reuse of stormwater and wastewater – it is noted that the Nagambie wastewater treatment plant provides reclaimed water for agricultural use;
- Investigating alternative technologies to manage wastewater around the Lake's foreshore;
- Implementing recommendations of Strathbogie Shire Council's wastewater management plans; and
- Ensuring all new development around the Lake meets Planning Scheme requirements for the preparation of stormwater management plans.

10.4 Treated Water Quality

Raw water can either be directly treated at GVW's water treatment plants to ensure compliance with potable water drinking standards set by legislation, or alternatively it can be stored at reservoirs to provide an opportunity for silt to settle and pathogens/viruses to die off naturally prior to treatment.

GVW's *Water Quality Annual Report 2013/14* highlights the following in relation to drinking water quality within Strathbogie Shire:

- All fifty two (52) of the weekly samples taken at Avenel, Euroa, Longwood, Nagambie and Violet Town met standards for the presence of E coli, showing no presence of this organism;
- All fifty two samples showed a complete absence of potentially harmful water treatment by-products;
- All samples met standards for turbidity (ie cloudiness in water caused by minute particles of suspended solids), with Euroa having the lowest reading (0.2 NTU) and Nagambie the highest (1.0 NTU), both well within the recommended maximum of 5 NTU;
- All samples complied with standards for the levels of pathogens, algae and other substances potentially harmful to human health; and
- The only non-compliance was the level of pH of water at Avenel in some samples due to the water being in contact with concrete lined pipes as this supply travels from Seymour.

11. Our Current Approach to Domestic Wastewater Management

The purpose of this section is to identify areas where reticulated sewerage infrastructure is provided by GVW, future investment plans for reticulated services, details of the numbers and types of onsite wastewater systems in unsewered areas and Council's current approval and monitoring systems for domestic wastewater systems. Such information provides a context for the development of the DWMP and its five-year Action Plan.

11.1 GVW Sewered Townships and Municipal Treatment Plants

According to Strathbogie Shire Geographical Information Systems mapping there are ***5032 dwellings within Strathbogie Shire, 2892 of which are sewered (57.5%) and 2140 with onsite wastewater systems (42.5%)***. There are 3175 dwellings (or 63%) within townships and 1857 dwellings (37%) in outlying areas.

The majority of properties within Euroa, Nagambie and Violet Town benefit from reticulated sewerage services, however not all developed properties within these towns are connected to the system. This may be due to the fact that development occurred prior to the provision of reticulated services and connections have not been enforced by GVW or through a lack of the requirement for larger rural living type lots on the fringes of townships to connect to the sewerage network as subdivisions have occurred.

The number of sewered properties and the total number of properties within township boundaries (ie land within a General Residential, Comprehensive Development or Township Zone) are as follows:

Table 17 Number of Unsewered Dwellings in Townships with Reticulated Sewerage

Township	No. of Unsewered Dwellings	% of All Unsewered Dwellings in Township Areas (405 onsite systems in total)
Avenel	38	10
Euroa	77	19
Nagambie	46	11
Violet Town	56	14
Total	**217**	**54**

Source: Strathbogie Shire Council Geographical Information System

Avenel, Euroa, Nagambie and Violet Town contain a relatively large proportion of township properties with onsite systems at 54% of all unsewered properties in all townships.

This is an issue that needs to be addressed by the DWMP, particularly in Euroa given the coverage of the Urban Floodway Zone and flood related overlays across this township. Inundation significantly affects the performance of onsite systems and there are environmental risks resulting from untreated wastewater flowing into floodwater that need to be considered.

Municipal Treatment Plants

GVW operates plants to treat wastewater collected from the reticulated sewerage systems within the townships of:

- Euroa
- Violet Town
- Nagambie
- Avenel.

Lagoons are the primary treatment method, which produces by-products such as recycled water and bio-solids for agricultural use.

11.2 Capacity in the Existing Reticulated Sewer Network for Future Growth

GVW has kindly provided information to Council on their infrastructure investment strategy for sewered townships over the next 20 years.

Their strategy is based on *Victoria in Future* population growth projections (outlined in Section 8 of this report) and data for historic growth rates and connections. The zoning of land for residential development is also an important factor in the development of GVW's strategy.

Overall, GVW identify that there is potential for around 3130 new residential sewer connections over the next two decades.

Table 18 Potential Sewer Connections by Township

Town	Number of Potential Connections
Avenel	564
Euroa	292
Nagambie	1897
Violet Town	377
Total	**3130**

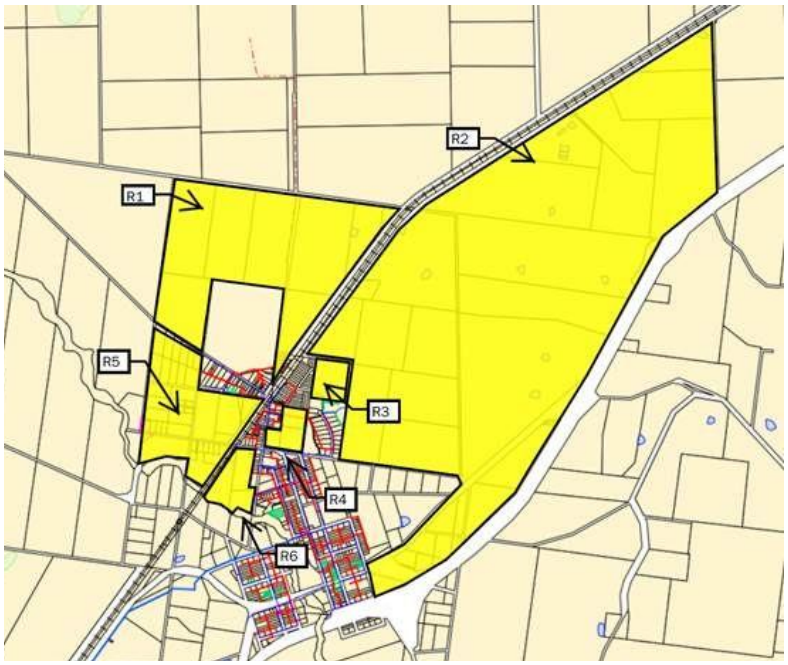
Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

GVW has also provided the potential number of connections and a guideline costing of the total works required to service each area, as outlined by township below. Please note that the costings are an 'order of magnitude' figure and are designed to provide a general estimation of value for the capital works required to service these areas.

11.2.1 Future Reticulated Sewerage Extensions in Avenel

The map below outlines GVW's plans for future extensions to existing sewerage infrastructure across Avenel.

Map 10 Future Reticulated Sewerage Extensions in Avenel



Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

Table 19 Potential Number of Additional Sewered Lots and Approximate Cost of Works – Avenel

Development Area	Number of lots that can be serviced by the sewer network	Total lots within the Development Area	Order of Magnitude of Cost $,000
R1	117	126	1,500
R2	47	122	1,000
R3	30	30	500
R4	56	56	1,000
R5	70	150	1,500
R6	80	80	1,500
Total	**400**	**564**	**7,000,000**

Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

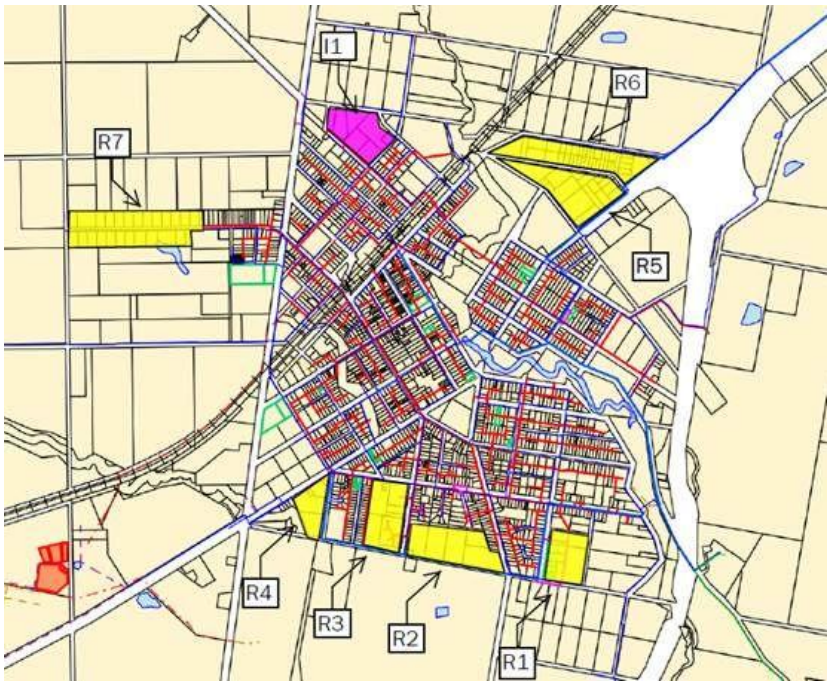
Overall, the table shows that the planned capital investment will not be sufficient to sewer the expected lot yields within the township. It is interesting to note that while the northern half of R2 is Farming Zone, and on the face of it not earmarked for residential development, the *2004 Strathbogie Shire Rural Residential Strategy* prepared by Beca Pty Ltd identified this land as being suitable for rural residential development and strategic rezoning. The southern half of R2 is already zoned Rural Living and therefore can be subdivided into minimum 2 hectare lots.

There are sections of Development Areas R4 and R5 that contain subdivided lots with dwellings and onsite wastewater management systems.

Land in area R1 is zoned Low Density Residential where the minimum lot size is 0.4 hectares for unsewered properties and 0.2 hectares for sewered properties. Sewering this area, therefore, would allow more lots to be created.

11.2.2 Future Reticulated Sewerage Extensions in Euroa

Map 11 Future Reticulated Sewerage Extensions in Euroa



Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

Table 20 Potential Number of Additional Sewered Lots and Approximate Cost of Works - Euroa

Development Area	Number of lots that can be serviced by the sewer network	Total lots within the Development Area	Order of Magnitude of Cost $,000
R1	44	44	500
R2	70	70	500
R3	25	25	<500
R4	22	22	<500
R5 & R6	102	102	1,000
R7	24	24	1,000
I1 (Industrial Land)	5	5	500
Total	**292**	**292**	**<4,500,000**

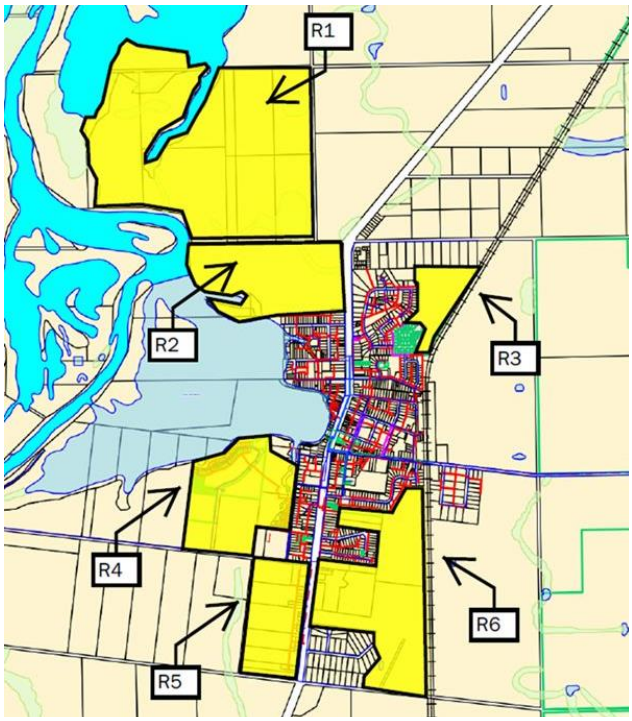
Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

Land within R1 – 4 is zoned General Residential, with a mixture of vacant and developed land. A retirement village is currently under development on part of R3 and there are also a number of standard residential lots in this area.

R5 and R6 are around 80% developed with standard residential lots. R7 represents over twenty existing dwellings; two thirds of which are located in a Farming Zone and the other third in an Urban Floodway Zone. Interestingly the *2004 Rural Residential Strategy* does not identify this area for future rezoning. Together these three Development Areas would appear to be logical frontrunners for infrastructure investment. I1 is land zoned for industrial purposes and is partially developed.

11.2.3 Future Reticulated Sewerage Extensions in Nagambie

Map 12 Future Reticulated Sewerage Extensions in Nagambie



Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

Table 21 Potential Number of Additional Sewered Lots and Approximate Cost of Works - Nagambie

Development Area	Number of lots that can be serviced by the sewer network	Total lots within the Development Area	Order of Magnitude of Cost $,000
R1	123	123	3,500
R2	300	300	4,500
R3	170	170	2,500
R4	664	664	8,500
R5	320	320	4,500
R6	240	320	3,500
Total	**1817**	**1897**	**27,000,000**

Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

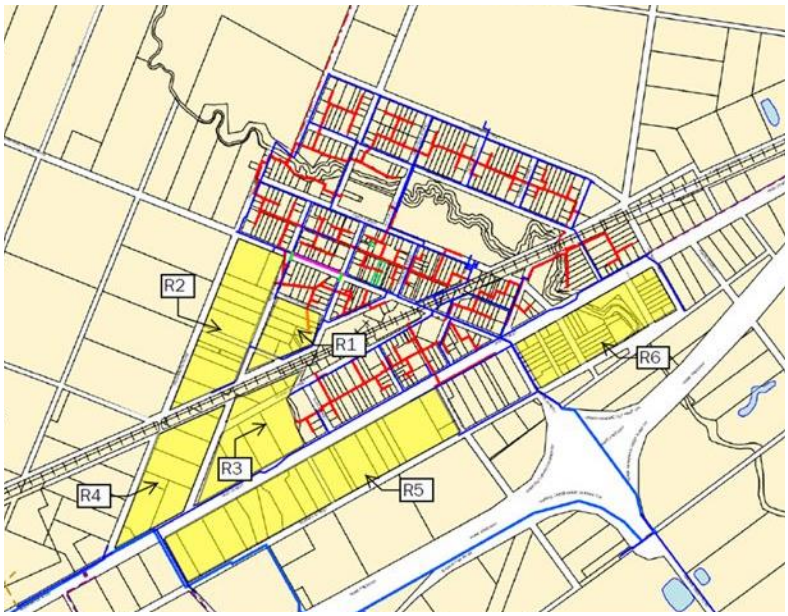
R1 is zoned Low Density Residential and is yet to be developed; if sewered, lots could be as small as 0.2 hectares but if left unsewered lots would need to be 0.4 hectares or greater. R2 is

an area that is currently zoned for farming purposes, however the *2004 Rural Residential Study* recommends further strategic rezoning of land for residential development in this area.

R3, R5 and R6 are all zoned General Residential and contain some existing dwellings with onsite systems. Curiously, a developed area to the south west of R6 has been excluded from the future service area despite being 90% developed. Land within R6 can be subject to inundation and so reticulated sewer would be crucial to avoid adverse environmental impacts from domestic wastewater. R4 is zoned Comprehensive Development Zone and there is already a reticulated network in the northern part of this area. Given that R3 – 6 are earmarked for future residential subdivision the bulk of the cost of servicing these areas will be mostly borne by developers.

11.2.4 Future Reticulated Sewerage Extensions in Violet Town

Map 13 Future Reticulated Sewerage Extensions in Violet Town



Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

Table 22 Potential Number of Additional Sewered Lots and Approximate Cost of Works – Violet Town

Development Area	Number of lots that can be serviced by the sewer network	Total lots within the Development Area	Order of Magnitude of Cost $,000
R1	20	20	<500
R2	69	69	500
R3	44	44	<500
R4	53	53	1,000
R5	139	139	1,000
R6	52	52	1,000
Total	**377**	**377**	**<4,500,000**

Source: Data from Goulburn Valley Water's Asset Planning Department, March 2015

There is significant potential for future development within Violet Town identified by GVW, mainly focused along High Street. Around 50% of all properties are currently undeveloped. All are located within the Township Zone, signifying their potential for future residential development. The extension of reticulated sewerage infrastructure across Violet Town, as proposed by GVW, would result in environmental and public health benefits given that around 35- 40% of lots within these areas are subject to inundation (ie the LSIO has been applied to these lots by the Strathbogie Planning Scheme, see Section 8.6.2 above).

Summary
Overall it is clear that there are plans to extend existing networks to the fringes of the other towns, however the 'trigger points' for the commencement of these capital works are unclear. A number of the identified future service areas are either partially or almost fully developed.

There also appear to be some areas with existing development that could be serviced but are not included in GVW's strategic planning. These issues will be the subject of further discussion with GVW and will be addressed in the DWMP given such future investment is a key component of wastewater management within Strathbogie Shire.

11.3 GVW Parameters for Investing in Centralised Wastewater Treatment Facilities in Unsewered Townships

As discussed earlier in this report, the township of Strathbogie is the only concentrated settlement within a DWSC that provides potable water. A key issue for consideration by the DWMP is the viability of providing a centralised wastewater management system for this township in lieu of onsite systems, many of which are pre 1995 systems and prone to failure.

Furthermore the connection of all properties within the sewered townships of Euroa, Violet Town and Nagambie to reticulated services must also be considered, particularly given the environmental sensitivities of Euroa (due to inundation risks) and Nagambie (the proximity of settlement around Lake Nagambie).

GVW advise that the following parameters would apply to any form of reticulated wastewater infrastructure being provided for currently unsewered townships:

- Centralised systems typically cost between $25,000 – 35,000 per lot to install;
- There are currently no State or Federal funding programs in place for centralised infrastructure, although there have been subsidies provided by previous State governments;
- GVW does not have the resources to install reticulated sewerage infrastructure in townships without an existing network; and
- The full cost of any centralised wastewater treatment infrastructure must be recovered from property owners and agencies that benefit from these new services.

11.4 Existing Onsite Domestic Wastewater Management Systems

As outlined in Section 8 development across Strathbogie Shire is relatively scattered, although as discussed above the greatest proportion of development is contained within township areas. Attachment 7 contains a Shire Wide map showing the distribution of unsewered dwellings outside township areas. Please note that Strathbogie is the only unsewered township within a DWSC.

The following table outlines the number of dwellings with onsite systems, based on available data from Council's GIS system. Town boundaries are defined by land zoned General Residential, Low Density Residential, Township Zone, Comprehensive Development Zone or Rural Living 1 Zone.

Table 23 Number of Known Unsewered Dwellings within Unsewered Townships

Township	Number of Known Unsewered Dwelling within Town Boundaries	% of all Known Unsewered Dwellings in Townships (405 in total)
Locksley	5	1
Longwood	101	25
Mangalore	11	3
Miepoll	2	0.5
Old Longwood	13	3
Ruffy	3	0.5
Strathbogie (located within a DWSC)	53	13
Total	**188**	**46**

Source: Data from Strathbogie Shire Geographical Information System

Just under half of all onsite systems within Strathbogie Shire are located in unsewered townships. Longwood has the highest concentration of onsite systems at 25%. Strathbogie, which is located in a declared water supply catchment, contains 13% of all unsewered township properties.

Table 24 Number of Known Unsewered Dwellings within DWSCs

Catchment Name	Number of Unsewered Dwellings
Honeysuckle Creek	9
Seven Creeks/Mountain Hut	201 (53 in Strathbogie township)
Nine Mile Creek	1
Upper Goulburn	17
Total	**228**

Source: Data from Strathbogie Shire Geographical Information System

Around 11% of all onsite systems within the Shire are located in declared water supply catchments. Seven Creeks/Mountain Hut contains half of all systems within a DWSC, of which 53 are located in the Strathbogie Township.

11.5 Recent Onsite Wastewater Management Systems Approvals

There are two stages of approval for an onsite wastewater system, the first being a Permit to Install a system that assesses the suitability of the system against the land capability assessment for the land. The second stage is a Certificate to Use the system, which is issued once the Environmental Health Officer has inspected that the system has been installed as per the permit.

Data on the issue of Certificates to Use an onsite system provides an insight, dating from 2010, into the growth of these systems, their type and location. Such data provides information to inform the quantum of the task of monitoring onsite systems into the future, which is a key component of any DWMP.

Table 25 Certificates to Use a Domestic Onsite Wastewater System 2008 – 2015

Year Issued	Number	%
2008	16	10
2009	29	18
2010	30	19
2011	34	21
2012	7	4
2013	10	6
2014	31	19
2015	2	1
Total	**159**	**100**

Source: Certificates to Use issued by Strathbogie Shire 2008 - 2015

Table 26 Type of Onsite Wastewater System Approved for Use

Type of System	Number	%
Standard septic tank with reln drains	110	69
Aerated wastewater treatment system (AWTS)	36	23
Upgrade of reln drains only	5	3
Decommissioning of old system and replacement with new septic system	3	2
Worm farm system	4	3
Composting toilet	1	1
Total	**159**	**100**

Source: Certificates to Use issued by Strathbogie Shire 2008 – 15 extracted from Health Manager

An average of 20 Certificates to Use an onsite system were issued per annum between 2008 – 15. The peak of 31 approvals in 2014 is likely to be the result of a concerted effort from the Environmental Health Unit to follow up sites where a Permit to Install had been issued (ie the first stage of the approval process) but no Certificate to Use the system.

The overwhelming majority of onsite wastewater management systems (69%) are traditional septic systems with capacities of 3000 – 3300 litres. More sophisticated secondary treatment aerated systems, usually installed on higher risk sites or those where a traditional septic system cannot adequately treat or maintain wastewater within site boundaries, represented around a quarter of all new systems.

Interestingly, 5% of all Certificates to Use represented upgrades to existing septic systems or the replacement of reln drains. This is a positive sign as it indicates ageing septic systems are

being improved to meet current day standards; this should have an incremental positive effect on reducing the overall quantity of pathogens and nutrients within a catchment.

Table 27 Approvals by Township

Township	Number	%	Type of system
Avenel	2	1	2 standard septics
Euroa	14	9	5 AWTSs and 9 standard septics
Longwood	5	3	2 AWTSs and 3 standard septics
Nagambie	1	1	1 standard septic
Strathbogie	7	4	4 standard septics, 1 AWTS, 1 worm farm and 1 reln drain upgrade
Violet Town	5	3	3 AWTSs and 2 standard septics
Total within townships	34	21	21 standard septics, 11 AWTSs, 1 worm farm and 1 reln drain upgrade
Other (outside townships)	125	79	89 standard septics, 25 AWTSs, 3 worm farms, 4 reln drain upgrades, 3 decommissioned septics and replacement with new, 1 composting toilet
Total	**159**	**100**	

Source: Certificates to Use issued by Strathbogie Shire 2008 – 2015 extracted from Health Manager

Only around a fifth of Certificates to Use an onsite system were issued for properties within township boundaries. Standard septic systems are the most common form of onsite treatment, with only one third of properties installing a more sophisticated aerated treatment system. There was only one upgrade of an existing system within a township.

The relatively high number of aerated wastewater treatment systems in Euroa is likely to reflect the relatively small lot size and the prevalence of flooding/inundation issues within town boundaries. The proximity of waterways and the potential environmental hazards from inundated onsite wastewater treatment systems would require a higher standard of treatment.

Overall, the above data indicates that there is a spread of new systems being installed across the Shire, rather than concentrations of systems within a township.

11.6 Existing Whole of Water Cycle Initiatives Within Strathbogie Shire

Whole of water cycle initiatives represent an approach to managing water resources that focuses on the interconnectivity of all water sources and all water users. Instead of using traditional approaches to infrastructure planning and management of stormwater, drinking water, wastewater systems separately, whole of water cycle looks at how they are all interconnected.

They key aim is to minimise overall water usage by households, industry and commerce and to avoid adverse environmental impacts from stressed waterways/catchments through over extraction and pollution. Initiatives such as the reuse of treated water from municipal wastewater treatment plants, harvesting of rainwater, use of water wise appliances and water sensitive urban design are the means through which this objective can be achieved.

11.6.1 Water Sensitive Urban and Infrastructure Design

There is a relatively strong legislative framework to support Strathbogie Shire in adopting whole of water sensitive urban design initiatives to manage the impact of development and land use on water quality and in managing erosion and floodwaters.

The *Strathbogie Shire Stormwater Management Plan (Volume 1)*, prepared by EarthTech in 2005 identifies ageing infrastructure, lack of accurate information on infrastructure, human and financial resource constraints and the flood prone nature of many townships as challenges faced by the Shire.

It makes clear recommendations in relation to:

- the development of stormwater management guidelines;
- adoption of water sensitive urban design principles (WSUD) for new development (particularly subdivisions);
- the use/enforcement of rigorous planning permit conditions around WSUD initiatives;
- inclusion of a policy framework in the Strathbogie Planning Scheme around stormwater management and the adoption of WSUD principles for new development/subdivisions; and
- adopting water quality sensitive stormwater infrastructure design when installing/upgrading existing stormwater infrastructure.

Strathbogie's *Municipal Strategic Statement* (MSS) was reviewed in 2013 and has ensured recommendations around a stronger policy direction in relation to WSUD principles and improved stormwater management by:

- the inclusion of Clause 21.02 – *Sustainable Settlement* highlighting the need to manage development/land use in flood prone areas and the adoption of WSUD principles when designing new development (such as the installation of water tanks);
- the inclusion of Clause 21.04 *Sustainable Environment*, which recognises the need to plan for climate change impacts by improving drainage infrastructure and management of land subject to flooding/inundation;
- the requirement for the adoption of best practice water usage including recycling of water and use of treated grey water under Clause 21.04-3; and
- Section 21.07 *Sustainable Infrastructure* highlighting the need to manage stormwater as per the *2005 Stormwater Management Plan* and through the implementation of best practice stormwater management/WSUD measures (e.g. porous pavements, onsite water collection, water conservation and reuse).

Clause 56.07 of the Strathbogie Planning Scheme is entitled *Integrated Water Management* (for Subdivisions) and requires the application of various standards and performance measures to the design and assessment of proposals to subdivide land. Standards relate to:

- Drinking water supply;

- Reuse and recycling of water (where required by the relevant local water corporation);
- Wastewater management (connection to reticulated sewerage or compliance with any relevant DWMP); and
- Urban run off management (based on the application of best practice standards).

On a more localised scale, the Comprehensive Development Zone that applies to land on the bank of Lake Nagambie recognises the need for the careful design and management of development. Schedule 1 to the Zone requires a number of plans to be submitted to council and relevant authorities for comment and approval prior to each stage of development.

There is a focus on WSUD principles and stormwater management through the need for an environmental plan and infrastructure management plan prior to the approval of each stage of subdivision. Authorities such as the EPA, GMW, GVW, the GBCMA and DELWP are required to be provided with copies of draft plans for their comment.

In 2008 Planisphere prepared the *Nagambie Growth Management Strategy*. This document reinforces the need to develop WSUD design guidelines and standards for areas around the Lake. It also highlighted that if land earmarked for residential development is fully developed the population of Nagambie could be over 9500.

11.6.2 Recent Whole of Water Cycle Initiatives by GVW

GVW currently has a number of initiatives in place across Strathbogie Shire that are in keeping with whole of water cycle objectives, including:

- Recycled water from the Euroa treatment plant is used by the Golf Course and GVW irrigate their own land around the treatment plant with recycled water;
- Recycled water from the Violet Town treatment plant is used to irrigate GVW land used for pasture;
- Council uses recycled water from Violet Town for dust suppressant and road construction purposes;
- A 'third party' arrangement is in place for the use of recycled water by a farmer in Avenel and another farmer in Nagambie; and
- There is also potential for recycled water to be used by the golf course at Avenel, which is currently being explored by GVW.

Such initiatives could be built upon further as part of the DWMP's Action Plan recommendations to reduce the stress on water supplies across the Shire and to encourage the reuse of treated wastewater.

12. A Risk Analysis of Strathbogie Shire

The information contained in this Background Report is critical to informing the analysis of the levels of risk experienced within the Shire from unmanaged wastewater. The *Environment Protection Act 1970* and *SEPP Waters of Victoria* both require a DWMP to be based on a risk analysis methodology. The purpose of this section is to outline the stages of risk analysis undertaken by Strathbogie Shire to inform this Plan.

12.1 Minor Catchments

The shire is a vast geographical area. In order to undertake a meaningful risk analysis the municipality has been broken up into smaller geographical areas, called 'minor catchments'. It is also important to break the shire up into manageable 'land units' so that stakeholders can focus their scarce resources on areas at the highest risk from the adverse affects of domestic wastewater.

Information on the eighteen watersheds, or small catchments, supplying waterways across the shire was kindly provided by the GBCMA. This data was integrated with Council's GIS system and then amended to ensure that townships were located within a single catchment area. This process has produced twenty-five (25) minor catchments, that have also been divided into Hills (south of the Hume Freeway) and Plains (north of the Hume Freeway) Catchments to better reflect their geographic nature and location. A map of the minor catchment boundaries can be found at Attachment 1B.

Table 28 Minor Catchment Information

Name	Area (km²)	Key Townships within the Minor Catchment
Hills Minor Catchments		
1. Brankeet Creek	51	
2. Burnt Creek	35	
3. Creightons Creek	87	
4. Deep Creek	1	
5. Faithfulls Creek	88	
6. Five Mile Creek	10	
7. Godfrey Creek	0.1	
8. Honeysuckle Creek	191	
9. Hughes Creek	234	Ruffy
10. Merton Creek	1.4	
11. Pranjip Creek	82	Old Longwood
12. Seven Creeks & Castle Creek	423	Strathbogie
13. Wormangal Creek	43	

Name	Area (km²)	Key Townships within the Minor Catchment
Plains Minor Catchments		
14. Broken River	65	
15. Burnt Creek	89	Locksley
16. Creightons Creek	185	
17. Faithfulls Creek	95	
18. Goulburn River	422	Nagambie, Mitchellstown, Mangalore
19. Honeysuckle Creek	320	Violet Town
20. Hughes Creek	47	Avenel
21. Major Creek	205	Graytown
22. Pranjip Creek	104	Longwood
23. Seven Creeks & Castle Creek	262	Euroa
24. Sheep Pen Creek	72	
25. Wormangal Creek	163	

Source: Strathbogie Shire GIS

12.2 Analysis of Individual Risk Factors

The Mansfield Shire DWMP Pilot Project identified key risk factors that affect the risk of adverse impacts from domestic wastewater on public health, water quality and the environment:

- ***Distance of an onsite system from a lake, reservoir or potable water offtake point*** (the greater the setback the greater the possibility of nutrients and pathogens being absorbed/destroyed before reaching the waterbody);
- The ***slope*** of land (the flatter the land the greater the ability for wastewater to be absorbed by soils due to slower flow rates);
- The ***type of soil*** (certain soils are better able to absorb wastewater to prevent leaching into groundwater or travelling over the soil surface into waterways/drains);
- ***Future infill development capacity*** (ie the percentage of the minor catchment represented by vacant land zoned for future residential development); and
- The ***existing density of unsewered dwellings*** (which has an impact on potential cumulative effects of wastewater within a minor catchment).

Council's Geographical Information System has been used to create a number of mapping layers to analyse each risk factor. Shire wide risk maps have been produced to summarise the overall risk for each of the minor catchments for the first three risk factors (Attachments 8A to C). Detailed calculations were undertaken to produce the results for the final two risk factors, being infill development capacity and density of unsewered dwellings.

Other Risk Related Mapping

It must be noted that a Watercourse Risk layer using data from DELWP (formerly DEPI) to calculate distances from rivers, named streams and channels has been produced based on

the following parameters: **Low Risk** Land > 300m from a watercourse, **Medium Risk** Land between 100 – 300m from a watercourse and **High Risk** Land < 100m from a watercourse.

After discussions with GMW and GVW it was felt that this detailed layer of information was best applied at a local level, that is when an application is being made or when a proponent is looking at development a certain piece of land.

The setback from waterways is a key parameter under the EPA's Code of Practice and therefore will be critical when identifying individual lots that are close to waterways and where development is more constrained.

12.2.1 Layer 1, Attachment 8A: Waterbody and Potable Water Asset risk layer depicting all water bodies, storages and potable water assets (using data supplied by VicMaps and GVW) using these parameters:

Low Risk Land > 15km from water body/potable water reservoir or offtake point

Medium Risk Land 2 – 15km from water body/potable water reservoir or offtake point

High Risk Land < 2km from water body/potable water reservoir or offtake point

This risk rating is calculated by identifying what area of land is within the distances identified by the three risk categories. A very conservative approach was then taken when attributing the final risk rating; for example where a minor catchment had a relatively equal distribution of land across two risk categories, the higher risk category was awarded to that catchment.

Table 29 Waterbody and Potable Water Asset Risk Ratings for Minor Catchments

Name	Risk Rating	Name	Risk Rating
Hills Minor Catchments		***Plains Minor Catchments***	
1. Brankeet Creek	Medium	14. Broken River	Low
2. Burnt Creek	Medium	15. Burnt Creek	Medium
3. Creightons Creek	Medium	16. Creightons Creek	Medium
4. Deep Creek	Low	17. Faithfulls Creek	Medium
5. Faithfulls Creek	Medium	18. Goulburn River	Medium
6. Five Mile Creek	Medium	19. Honeysuckle Creek	Medium
7. Godfrey Creek	Medium	20. Hughes Creek	Medium
8. Honeysuckle Creek	Medium	21. Major Creek	Low
9. Hughes Creek	Medium	22. Pranjip Creek	Medium
10. Merton Creek	Medium	23. Seven Creeks & Castle Creek	Low
11. Pranjip Creek	Medium	24. Sheep Pen Creek	Low
12. Seven Creeks & Castle Creek	Medium	25. Wormangal Creek	Medium
13. Wormangal Creek	Medium		

Source: Strathbogie Shire GIS

Analysis:
Although there are several lakes and potable water reservoirs across the Shire, when viewed from a broader minor catchment perspective none are deemed to be high risk. This is because of the relatively large geographical areas of each catchment.

Having said that, the majority of minor catchments are considered to be medium risk; that is a significant portion of land is within 15 kilometres of a potable water asset. The five low risk catchments are located in the far corners of the shire, far from potable water assets.

12.2.2 Layer 2, Attachment 8B: **Slope** risk layer using 10 metre contours supplied by VicMap to calculate the median slope of land units measuring 25 metres by 25 metres using the following parameters:

Low Risk Land with slope < 10%
Medium Risk Land with slope of 10 – 20%
High Risk Land with slope > 20%

The risk rating of a minor catchment has been derived by looking at the predominant risk rating from the base map and producing an average of risk across the entire catchment based on the area covered by each risk rating. A very conservative approach was taken when attributing the final risk rating; for example where a minor catchment had a relatively equal distribution of land across two risk categories, the higher risk category was awarded to that catchment.

Table 30 Slope Risk Ratings for Minor Catchments

Name	Risk Rating	Name	Risk Rating
Hills Minor Catchments		***Plains Minor Catchments***	
1. Brankeet Creek	Low	14. Broken River	Low
2. Burnt Creek	Low	15. Burnt Creek	Low
3. Creightons Creek	Low	16. Creightons Creek	Low
4. Deep Creek	Medium	17. Faithfulls Creek	Low
5. Faithfulls Creek	Low	18. Goulburn River	Low
6. Five Mile Creek	Low	19. Honeysuckle Creek	Low
7. Godfrey Creek	Low	20. Hughes Creek	Low
8. Honeysuckle Creek	Medium	21. Major Creek	Low
9. Hughes Creek	Medium	22. Pranjip Creek	Low
10. Merton Creek	Medium	23. Seven Creeks & Castle Creek	Low
11. Pranjip Creek	Low	24. Sheep Pen Creek	Low
12. Seven Creeks & Castle Creek	Low	25. Wormangal Creek	Low
13. Wormangal Creek	Low		

Source: Strathbogie Shire GIS

Analysis:
There are no high risk minor catchments when it comes to slope. While land in and around the Strathbogie Ranges is of high risk, it is predominantly Crown land and therefore not developable. A number of the hills minor catchments contain areas of high, medium and low risk on a more localised scale, including small areas of low risk to the south of the Hume Highway.

In contrast, all minor catchments to the north of the Highway are considered to be low risk given the relatively flat topography. Land in the western part of the shire is more undulating, however there are only relatively small, scattered pockets of medium risk, much of which is Crown land.

12.2.3 Layer 3, Attachment 8C: Soil Risk layer using information from the Australian Soil Resource Information System based on the risk parameter attributed to various types of soils in Table 3 from Dr Robert Edis' Discussion Paper prepared for Mansfield Shire:

Low Risk Chromosols, Ferrosols, Dermosols
Medium Risk Vertosols, Kandolsols
High Risk Sodosols, Tenosols.

Again, the overall risk rating applies a precautionary approach; where around half of the minor catchment is high risk, this has been the risk level applied to the entire catchment. A very conservative approach was taken when attributing the final risk rating; for example where a minor catchment had a relatively equal distribution of land across two risk categories, the higher risk category was awarded to that catchment.

Table 31 Soil Risk Ratings for Minor Catchments

Name	Risk Rating	Name	Risk Rating
Hills Minor Catchments		***Plains Minor Catchments***	
1. Brankeet Creek	High	14. Broken River	Medium
2. Burnt Creek	Medium	15. Burnt Creek	High
3. Creightons Creek	High	16. Creightons Creek	High
4. Deep Creek	Medium	17. Faithfulls Creek	High
5. Faithfulls Creek	Medium	18. Goulburn River	High
6. Five Mile Creek	Medium	19. Honeysuckle Creek	High
7. Godfrey Creek	High	20. Hughes Creek	High
8. Honeysuckle Creek	Medium	21. Major Creek	Medium
9. Hughes Creek	High	22. Pranjip Creek	High
10. Merton Creek	High	23. Seven Creeks & Castle Creek	High
11. Pranjip Creek	Medium	24. Sheep Pen Creek	Medium
12. Seven Creeks & Castle Creek	Medium	25. Wormangal Creek	High
13. Wormangal Creek	Medium		

Source: Strathbogie Shire GIS

Analysis:
Strathbogie Shire is dominated by soils that are categorised as sodosols and tenosols; the former is a duplex soil where the subsoil has a higher clay content than the topsoil, making it hard for effluent to penetrate to any great depth. Sodosols are very prone to erosion, which is why the Shire has extensively applied the Erosion Management Overlay (as outlined in Section 8).

Tenosols vary in nature but have a shallow, poor structure and are generally rocky in nature with very little clay content. The shallowness of the soil is what makes effluent absorption difficult.

Accordingly, there are only small areas of low risk soils across the shire, with fourteen (14) out of the twenty five (25) minor catchments having a high rating. No minor catchment has sufficient areas with low risk soils to receive an overall low risk rating.

Minor catchment 12, Seven Creeks and Castle Creek (Hills) is a difficult one to categorise given the relatively even mixture of low, medium and high-risk soils. On balance a medium risk rating has been awarded to this catchment given that much of the settlement is in the medium risk area, the areas of Crown land in the high risk area and the swathes of low risk soils contained in the heart of the band of high risk soils.

12.2.4 Layer 4: **Infill Development Potential Per Square Kilometre** using Council's GIS to identify:

- the number of Farming Zone lots above 40 hectares in area per minor catchment as this means the lots can theoretically be developed with a dwelling without the need for a planning permit;
- properties within each minor catchment within the Farming Zone that have already been developed with a dwelling but are of sufficient size to be subdivided into 40 hectare lots to provide additional dwellings;
- the number of vacant parcels within residential zones – that is a General Residential, Township Zone, Low Density Residential Zone and Comprehensive Development Zone No 1; and
- the number of possible Rural Living lots that could be created from existing vacant parcels using 2 hectares as the minimum lot size as per the Strathbogie Planning Scheme.

Low Risk < 1 infill dwelling / square kilometre
Medium Risk 1 – 2 infill dwellings / square kilometre
High Risk > 2 infill dwellings / square kilometre

Table 32 Infill Development Potential Per Square Kilometre Risk Ratings for Minor Catchments

Name	Risk Rating	Name	Risk Rating
Hills Minor Catchments		***Plains Minor Catchments***	
1. Brankeet Creek	Medium	14. Broken River	Medium
2. Burnt Creek	Medium	15. Burnt Creek	High
3. Creightons Creek	Medium	16. Creightons Creek	High
4. Deep Creek	Medium	17. Faithfulls Creek	Medium
5. Faithfulls Creek	Medium	18. Goulburn River	High
6. Five Mile Creek	Low	19. Honeysuckle Creek	High
7. Godfrey Creek	Low	20. Hughes Creek	High
8. Honeysuckle Creek	Medium	21. Major Creek	Medium
9. Hughes Creek	Medium	22. Pranjip Creek	High
10. Merton Creek	Medium	23. Seven Creeks & Castle Creek	High
11. Pranjip Creek	Medium	24. Sheep Pen Creek	Medium
12. Seven Creeks & Castle Creek	Medium	25. Wormangal Creek	Medium
13. Wormangal Creek	Medium		

Source: Strathbogie Shire GIS

Analysis:

Infill development creates a high risk only to the north of the Hume Freeway in the Plains Minor Catchments.

Due to the terrain and limited number of townships the Hills Catchments are all low to medium risk when it comes to future unsewered residential development. There is, however, an anomaly to consider; Strathbogie Township certainly does have future development potential, however it is located in the largest minor catchment with an area of 423 kilometres^2 which means it receives an overall medium risk rating.

Minor Catchments to the north of the Freeway with high risk ratings all contain townships as well as larger farming properties capable of being further subdivided with the capability for an as of right dwelling.

12.2.5 Layer 5: Unsewered Dwelling Density Per Square Kilometre using information from Council's GIS relating to the number of unsewered dwellings per minor catchment divided by the area of the minor catchment to produce a dwelling density ratio per square kilometre of land.

The following parameters define the risk level that is, again, based on the work by Dr Robert Edis for Mansfield Shire Council:

Low Risk < 20 dwellings per square kilometre

Medium Risk 20 – 40 dwellings per square kilometre

High Risk > 40 dwellings per square kilometre

Table 33 Unsewered Dwelling Density Per Square Kilometre Risk Ratings for Minor Catchments

Name	Risk Rating	Name	Risk Rating
Hills Minor Catchments		***Plains Minor Catchments***	
1. Brankeet Creek	Low	14. Broken River	Low
2. Burnt Creek	Low	15. Burnt Creek	Low
3. Creightons Creek	Low	16. Creightons Creek	Low
4. Deep Creek	Low	17. Faithfulls Creek	Low
5. Faithfulls Creek	Low	18. Goulburn River	Low
6. Five Mile Creek	Low	19. Honeysuckle Creek	Low
7. Godfrey Creek	Low	20. Hughes Creek	Low
8. Honeysuckle Creek (Contains a DWSC)	Low	21. Major Creek	Low
9. Hughes Creek	Low	22. Pranjip Creek	High
10. Merton Creek	Low	23. Seven Creeks & Castle Creek	Medium
11. Pranjip Creek (Contains a DWSC)	Low	24. Sheep Pen Creek	Low
12. Seven Creeks & Castle Creek (Contains a DWSC)	High	25. Wormangal Creek	Low
13. Wormangal Creek	Low		

Source: Strathbogie Shire GIS

Analysis:

There are two high risk minor catchment; Seven Creels and Castle Creeks of the Hills Minor Catchments (Minor Catchment 12) and Pranjip Creek of the Plains Minor Catchments (Minor Catchment 22).

Seven Creeks is high risk due to the fact that almost the entire Seven Creeks/Mountain Hut DWSC is contained within it and Strathbogie Township has an unsewered dwelling density of 42 dwellings per square kilometre. Pranjip Creek does not contain a DWSC but the town of Lockwood has an unsewered dwelling density of 58 dwellings per square kilometre, by far the highest unsewered dwelling density within the Shire. Other minor catchments containing DWSCs have low dwelling densities.

The only Medium Risk minor catchment is Number 23, Seven Creeks and Castle Creek of the Plains minor catchments, which is the result of the township of Euroa having an unsewered dwelling density of 21 dwellings per square kilometre. This risk reflects the fact that there are

over 70 unsewered dwellings within township boundaries, which is a matter than must be addressed by the DWMP, as evidenced by this risk rating.

Other minor catchments containing townships are considered low risk due to the relatively low unsewered dwelling densities; Nagambie has an unsewered dwelling density of 11, Violet Town is at 12 and Avenel at 7.

12.3 Overall Minor Catchment Risk

The DWMP will outline actions and strategies to mitigate and manage the potential adverse impacts of wastewater based on an overall risk rating for each of the twenty five minor catchments.

This overall minor catchment risk rating combines the risk ratings of the five risk factors outlined above by adding the risk value attributed to each catchment using the following values:

Low Risk = 1 point
Medium Risk = 2 points
High Risk = 3 points.

The overall ratings for each of the five factors by Minor Catchment are outlined in the table below, with the parameters being:

Low Risk = 0 – 8 points
Medium Risk = 9 – 10 points
High Risk = > 11 points.

Please note that a further calculation was made once the initial risk rating for Unsewered Dwelling Density was identified for those minor catchments containing a substantial portion of a Declared Water Supply Catchment. The rationale being that a vast array of legislation and guidelines relating to declared catchments all state that potential adverse risks from domestic wastewater are heightened within a DWSC. GVW and GMW are also focused on ensuring there is a multi barrier risk approach to protecting water quality in these areas.

To this end, the risk rating awarded to each Minor Catchment with a significant portion, or an entire, declared catchment has been multiplied by a factor of two as a means of reflecting the importance of this one risk factor on overall domestic wastewater management.

The following minor catchments contain small portions of a DWSC, however their risk rating has not been adjusted due to the very small portion of land within a declared catchment; it is considered that such portions are too small to affect the overall risk of detriment via unsewered dwelling density:

- Number 9 Hills Hughes Creek (0.06% of total land area or 16.33ha);
- Number 4 Hills Deep Creek (8.06% of total land area or 9.6ha);
- Number 6 Hills Five Mile Creek (2.8% of total land area or 27.3ha); and
- Number 5 Hills Faithfulls Creek (0.67% of total land area or 58.88ha).

Table 34 Overall Risk Rating of Minor Catchment Areas

Minor Catchment	Waterbody / Potable Water Asset Risk Rating	Slope Risk Rating	Soil Risk Rating	Infill Development Potential Risk Rating	Unsewered Dwelling Density Risk Rating*	Overall Risk Rating
Hills Minor Catchments						
1. Brankeet Creek (Contains a DWSC)	2	1	3	2	**2 (1x2)**	**10**
2. Burnt Creek	2	1	2	2	1	**8**
3. Creightons Creek	2	1	3	2	1	**9**
4. Deep Creek	1	2	2	2	1	**8**
5. Faithfulls Creek	2	1	2	2	1	**8**
6. Five Mile Creek	2	1	2	1	1	**7**
7. Godfrey Creek	2	1	3	1	1	**8**
8. Honeysuckle Creek (Contains a DWSC)	2	2	2	2	**2 (1x2)**	**10**
9. Hughes Creek	2	2	3	2	1	**10**
10.Merton Creek	2	2	3	2	1	**10**
11.Pranjip Creek (Contains a DWSC)	2	1	2	2	**2 (1x2)**	**9**
12. Seven Creeks & Castle Creek (Contains a DWSC)	2	1	2	2	**6 (3x2)**	**13**
13. Wormangal Creek	2	1	2	2	1	**8**

* Unsewered Dwelling Density in a DWSC multiplied by a factor of 2

Source: Strathbogie Shire GIS

Minor Catchment	Waterbody / Potable Water Asset Risk Rating	Slope Risk Rating	Soil Risk Rating	Infill Development Potential Risk Rating	Unsewered Dwelling Density Risk Rating *	Overall Risk Rating
Plains Minor Catchments						
14. Broken River	1	1	2	2	1	**7**
15. Burnt Creek	2	1	3	3	1	**10**
16. Creightons Creek	2	1	3	3	1	**10**
17. Faithfulls Creek	2	1	3	2	1	**9**
18. Goulburn River	2	1	3	3	1	**10**
19. Honeysuckle Creek	2	1	3	3	1	**10**
20. Hughes Creek	2	1	3	3	1	**10**
21. Major Creek	1	1	2	2	1	**7**
22. Pranjip Creek	2	1	3	3	3	**12**
23. Seven Creeks & Castle Creek	1	1	3	3	2	**10**
24. Sheep Pen Creek	1	1	2	2	1	**7**
25. Wormangal Creek	2	1	3	2	1	**9**

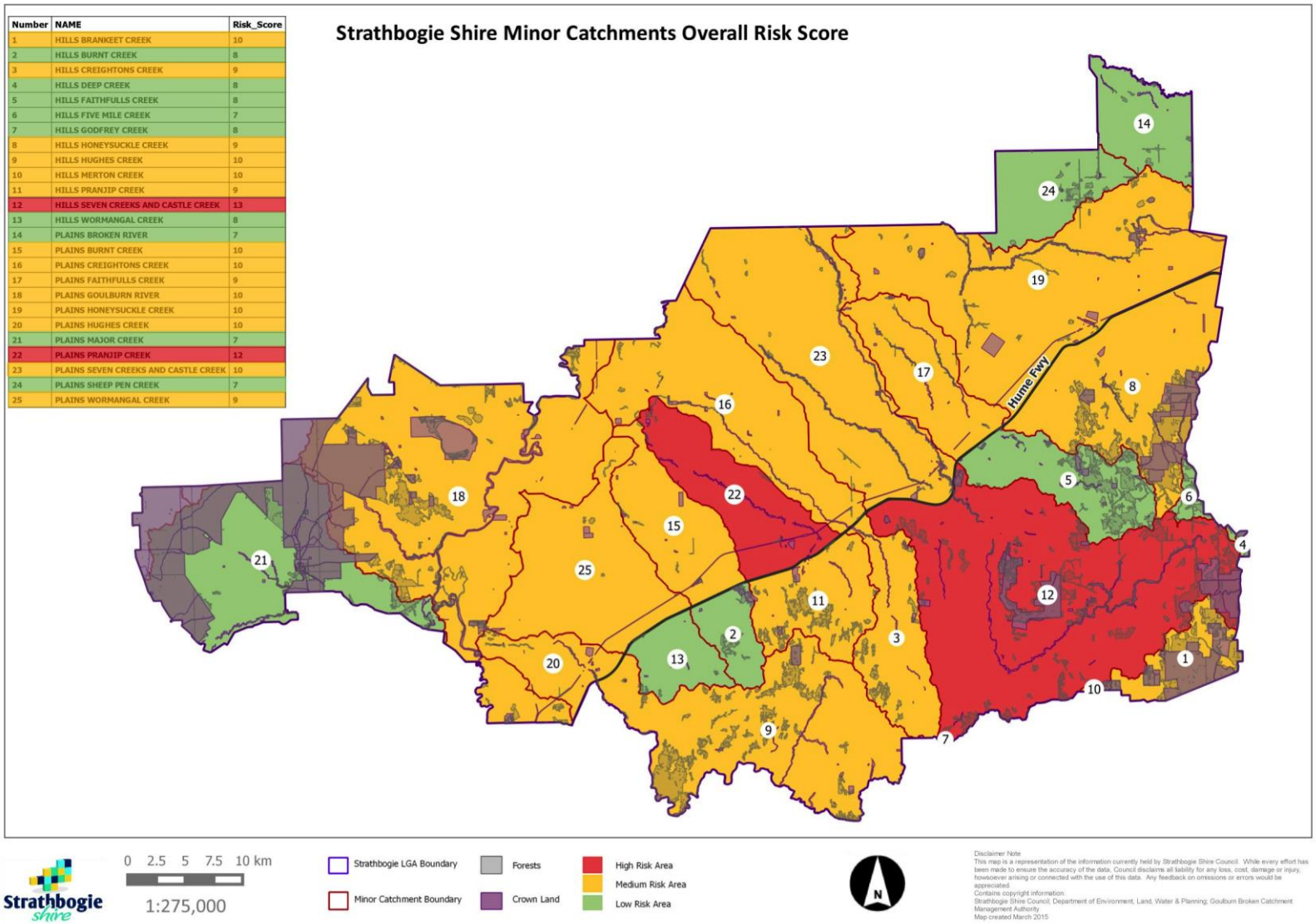
Source: Strathbogie Shire GIS

Analysis:

The analysis of the overall risk ratings for each Minor Catchment will be discussed in the Domestic Wastewater Management Plan document.

Map 14 Overall Risk Rating for Minor Catchments

Number	NAME	Risk_Score
1	HILLS BRANKEET CREEK	10
2	HILLS BURNT CREEK	8
3	HILLS CREIGHTONS CREEK	9
4	HILLS DEEP CREEK	8
5	HILLS FAITHFULLS CREEK	8
6	HILLS FIVE MILE CREEK	7
7	HILLS GODFREY CREEK	8
8	HILLS HONEYSUCKLE CREEK	9
9	HILLS HUGHES CREEK	10
10	HILLS MERTON CREEK	10
11	HILLS PRANJIP CREEK	9
12	HILLS SEVEN CREEKS AND CASTLE CREEK	13
13	HILLS WORMANGAL CREEK	8
14	PLAINS BROKEN RIVER	7
15	PLAINS BURNT CREEK	10
16	PLAINS CREIGHTONS CREEK	10
17	PLAINS FAITHFULLS CREEK	9
18	PLAINS GOULBURN RIVER	10
19	PLAINS HONEYSUCKLE CREEK	10
20	PLAINS HUGHES CREEK	10
21	PLAINS MAJOR CREEK	7
22	PLAINS PRANJIP CREEK	12
23	PLAINS SEVEN CREEKS AND CASTLE CREEK	10
24	PLAINS SHEEP PEN CREEK	7
25	PLAINS WORMANGAL CREEK	9



Source: Strathbogie Shire GIS

13. Research into Current Practices Around the Installation and Maintenance of Onsite Wastewater Management Systems

It is important to understand current practices in relation to the installation, management and maintenance of onsite systems across Strathbogie Shire. Such data can be useful when developing the DWMP Action Plan; if we have a handle on what is and isn't working with the current system then the DWMP will be all the more effective.

Three online surveys were developed (refer to Attachment 9) to help us gain an insight into current day practices; one for land capability assessors who work within the Shire, another for plumbers and service technicians of onsite systems and the last for residents and land owners.

Unfortunately the response to the surveys was poor; while the majority of LCA experts operating in the Shire responded only one local plumber participated. While five residents/land owner responses were received, only two completed all questions.

Efforts were made to promote participation including emails being sent directly to LCA consultants and plumbers requesting their involvement (and a reminder email to complete the survey), the resident/land owner survey being on the front page of Council's website and a media release provided to Council as a means of promoting participation.

Despite the low participation rates it is still felt important to include the handful of survey responses that were received, as their contribution to this project is greatly appreciated.

13.1 Land Capability Expert Survey Results

A key component of the onsite wastewater management process is the preparation of land capability statements to explore a site's capacity to contain all wastewater generated within the site's boundaries, as required by the *EPA Code of Practice 2013*.

Although a small sample size, the three LCA experts who completed the online survey provided important information into current practices, the issues they face when preparing an LCA and how the DWMP can include actions to assist them in preparing quality LCAs.

Qualifications and Experience
Our respondents drew upon expertise through years of experience in the field, a degree in Geology/Soil Science or a degree in a related field (eg Environmental Science or Engineering). Two respondents have been preparing LCAs for between 5 – 10 years and one respondent for over 10 years.

LCA Activity within Strathbogie Shire
All prepare five or less LCAs within the Shire per year. The majority of these LCAs were for single dwellings on a rural living/farming lot, with assessments for small lots within a township, commercial developments and residential subdivisions also being prepared.

Table 35 Work Undertaken to Prepare an LCA for a Single Dwelling

Nature of Task	Consultant 1	Consultant 2	Consultant 3
An onsite meeting with the landowner to discuss options	☒		☒
Collation of data / desktop analysis (eg rainfall, evapotranspiration and soil types in area)	☒	☒	☒
Onsite soil testing	☒	☒	☒
Soil testing for laboratory analysis		☒	
Meeting with Council's Environmental Health Officer			
Meeting with a Council Planning Officer			
Meeting or conversation with GMW	☒		
Calculation of dwelling densities in the area	☒	☒	
Analysis of water quality in the area			
Identification and classification of nearby waterways	☒	☒	☒
Identification of whether the waterway feeds into a potable water supply	☒	☒	☒
Discussion with other LCA experts about possible solutions			
Assessment of other wastewater management systems in the area			☒

Those consultants who also completed LCAs for a residential subdivision completed similar work to that outlined above apart from there being no onsite meetings with the land owner and an analysis of water quality in the area was undertaken.

The use of the Municipal Association of Victoria's LCA template was varied; one consultant always used it as it was accepted by all authorities, another used it only sometimes because it sometimes didn't suit a specific site and one had developed their own template instead.

Site and Soil Management Recommendations for Land Owners / Residents

The consultants included system and soil management recommendations in their LCAs for land owners/residents to implement, including:

- installation requirements;
- how the onsite system works;
- soil remediation requirements (eg the application of gypsum to improve permeability);
- information about how to effectively maintain the system;
- what signs to look for that indicate the system is not working properly; and
- explanation of what detergents/household cleaners to use.

Consultants were split on whether or not land owners/residents followed their recommendations; one said they did and another said the opposite. More specifically the respondents were asked what percentage of people followed management recommendations; one said 0 – 20% and another 50 – 80%.

How the DWMP Can Assist to Improve Maintenance Compliance and Knowledge about Onsite Systems

When asked how to improve the implementation of management plans and compliance with the conditions of Certificates to Use an Onsite System, the following solutions were offered:

- provision of a checklist by Council when a Certificate to Use the Onsite System is issued;
- provision of more information on how to use and maintain onsite systems for new residents / land owners;
- cross referencing with maintenance reports for packaged treatment plants;
- regular inspections;
- regular communication with designers;
- annual site check; and
- by council using a "big stick".

13.2 Plumber and Service Technician Survey Results

As mentioned above only one response was received to this survey, from a Licensed Plumber with over 10 year's experience whom installs between 5 – 10 new onsite wastewater management stems per year and services 10 – 20 systems per year within the Shire.

Installation of New Systems

The majority of work is installing new standard septic systems with trench irrigation on small rural lots; occasionally they have replaced an old system with a new one and/or installed an aerated system or dry composting toilet.

In this person's experience, based favourable the soil type and structure, a traditional septic tank with effluent lines is the most effective and cost efficient type of system to install.

Issues often faced when installing systems include the fact that the client doesn't understand just how much land is required for the system and finding that the approved location does not work once installation commences (eg rock has been hit when excavating).

The ways in which these problems are solved included:

- educating the land owner about the need to stick to the approved plans;
- talking to Council's Environmental Health Officer; and
- finding a solution themselves.

The ways in which Council can best assist local plumbers when installing new systems are, in terms of priority:

- holding worships for land owners wanting to build a house and residents;
- organising forums with other local experts to share information;
- providing training at local venues;

- providing more online information for landowners about system design requirements; and
- organising meetings with LCA experts (who design onsite systems) to discuss local issues and possible solutions.

Servicing and Maintenance of Existing Systems
It is this person's view that only between 0 – 20% of people follow maintenance requirements for their system.

When called into service a system they undertake the following:

- providing information to the land owner/resident about maintenance schedules;
- educating the land owner/resident about how the system works;
- checking the reln drains aren't blocked (if it is a traditional septic system);
- checking an aerated system's alarms and floats are working properly;
- flushing out of drainage lines;
- checking wastewater is being contained within site boundaries;
- checking sludge levels in the primary tank; and
- 3 yearly servicing of septic systems.

Issues commonly faced when servicing an existing system include:

- the land owner will not pay for the required maintenance;
- the aerated system needs to be adjusted as it is not working properly;
- there is a need for maintenance as the system hasn't been looked at for some time; and
- the system is not working effectively.

When asked if onsite systems servicing holiday homes were maintained to a higher or lower standard compared to a permanent resident, the respondent felt maintenance was about the same.

Common maintenance issues for holiday homes in this person's experience included:

- blocked drainage lines;
- lack of understanding about what cleaning products to use or objects that can/can't be put down the toilet;
- lack of knowledge about how to maintain the onsite system; and
- lack of overall maintenance.

How the DWMP Can Assist to Improve Maintenance Compliance and Knowledge about Onsite Systems
When it comes to ensuring land owners/residents follow maintenance agreements, the respondent felt that more could be done; specifically, that landowners should receive a notice from Council when maintenance is due.

13.3 Resident and Land Owner Survey Results

Nature and Age of Dwelling and Onsite System
The five respondents to this survey were comprised of three permanent residents and two holiday home owners who only spend a few weeks living in the Shire; two lived in a house on a small lot in a town, one on a rural 'lifestyle' property of between 2 – 15 acres on the edge of a town and two who lived on a rural 'lifestyle' lot away from town. Three respondents had lived in the Shire for less than 2 years, one had lived in Strathbogie for between 2 – 5 years and another more than 10 years.

In terms of the age of the house, which often a good indicator of the age of the onsite system, one person lived in a dwelling less than a year old, one in a house 5 – 10 years old, two people lived in a house built 10 – 20 years ago and one in a house older than 20 years.

Consequently only one respondent stated their system was less than 2 years old, two had systems of between 5 – 10 years and one had a system of between 10 – 20 years old (one respondent did not answer this question).

Three respondents knew what type of onsite wastewater system they had; two did not. All respondents had a traditional septic system bar one who had a composting toilet/septic tank for greywater combination.

Three people know where their system was located, one said they roughly knew.

Onsite System Related Paperwork and Information
None of the respondents had installed a new system since purchasing their property.

Surprisingly none of the respondents possessed any form of paperwork relating to their onsite system such as the land capability assessment submitted to Council, copies of the Permit to Install and/or Certificate to Use the system, a service agreement to maintain their system or information about how to ensure their system operates effectively.

One respondent knew that approvals to install and use and onsite system included requirements for ongoing maintenance (this was the respondent with the recently installed system for a new dwelling) and one did not. Other respondents did not answer the question.

Maintaining Onsite Systems
One resident had a local plumber inspect their onsite system within the past twelve months. The only other respondent to this question had their system inspected more than 5 years ago.

The respondent who had their system recently inspected was due to their toilet being blocked and horrible smells were emanating from the toilet and plug holes throughout the house. The other respondent had not experienced any problems with their system.

As for how the resident believes they could avoid problems with their system in the future, the responses were:

- to listen to the advice of the plumber;
- having access to more information about how to look after my system on the Shire's website; and
- having a service contract with a company to regularly inspect the system.

Knowledge of Onsite Systems

Unfortunately only two respondents answered the question asking about their level of knowledge around both their, and Council's, responsibilities around maintaining onsite systems and complying with approval requirements.

One respondent was aware that the septic tank had to be emptied at least every 3 years, while both respondents understood the need to use 'septic friendly' household cleaners and to be careful about what types of things were disposed into their sinks and toilets.

Increased Monitoring by Council

Again only two respondents answered a question about what they would think if Council inspected more properties to ensure onsite systems were working properly and that permit conditions were being met.

One believed increased Council activity would be a good thing if it helped them understand how to look after their system, while the other believed it would be a positive initiative if it helped protect their health and that of local waterways.

How the DWMP Can Best Help Improve System Management

Two respondents felt Council could best support them by having more information on the Shire's website to help them understand what their obligations around system maintenance are.

The following was also identified as being helpful for residents/landowners:

- provision of a map of where the system is located and what type of system it is;
- making information about how to maintain their system readily available;
- providing a copy of permits/approvals;
- reminding residents/landowners when a system service/desludging is due.

14. Summary of Key Issues

Following discussion with GMW and GVW it is considered that the following are the key issues that must be addressed by the DWMP:

- There must be a multi agency approach to the active management of domestic wastewater, with Council forging stronger partnerships with local water corporations;
- Land managers, owners and residents play a critical role in managing potentially adverse impacts from domestic wastewater by ensuring onsite systems are installed, used and maintained properly;
- Management of risks from domestic wastewater is of paramount importance within the Seven Creeks/Mountain Hut DWSC and the Nine Mile Creek DWSC given they supply potable water to Euroa, Violet Town and Longwood;
- Domestic wastewater challenges arise more from ageing systems rather than significant development pressures in light of the Shire's historical, and predicted, moderate rate of growth;
    - GVW's proposed investment plan for extensions to existing reticulated sewerage systems needs to form the basis of the DWMP given 54% of all onsite systems within township boundaries are located in sewered towns. Recommendations are required as to when such extensions are triggered given some areas are already substantially developed and more onsite systems are being approved year on year;
    - Onsite wastewater system approval trends show that only one fifth of all new systems are located within township boundaries. The dominance of rural residential development and development in small settlements, as per the recommendations of the *2004 Rural Residential Strategy*, is apparent in these approval figures.
    - The proportionately high number of aerated wastewater treatment systems in Euroa and Strathbogie indicates underlying issues with lot size and environmental constraints. As such the need for connection to reticulated sewer is heightened.
    - The were relatively few upgrades of ageing systems in the approvals issued by Council between 2008 - January 2015, representing only 5% of all approvals. This is of particular concern in environmentally sensitive areas such as Euroa and Strathbogie as the potential for adverse offsite impacts from ineffective wastewater treatment systems is heightened by flooding/inundation issues in the case of the former, and the location of the town in a declared water supply catchment in the case of the latter.
    - Ensuring all properties within the township boundaries of Avenel, Euroa, Nagambie and Violet Town are connected to reticulated sewer must be a priority for Council and GVW given the environmental challenges faced in these areas (ie land being subject to inundation and development on the shores of Lake Nagambie);
    - Adopting a 'whole of water cycle' management approach which includes wastewater management, stormwater management and the use of recycled water, will place Strathbogie Shire in a strong position to effectively manage development and water quality issues;
    - The level of consistency and detail in the land capability process could be improved through local training opportunities, workshops and information sessions. Templates for LCAs would also be beneficial to standardise the nature of assessments being undertaken and ensure the requirements of the EPA's Code of Practice are met;
    - Similarly local plumbers/service technicians may benefit from improved local training and information forums to discuss common issues and possible solutions;

- The handful of resident/land owners surveys completed showed there was relatively limited knowledge about their wastewater management obligations and how to maintain their system. Again information sessions, more information about how to maintain a system on the Shire's website and information packs were initiatives land owners felt would help them become better informed about their responsibilities;
- Local experts felt that there was a low level of compliance with maintenance/servicing requirements that needed to be tackled by the DWMP;
- There was support for improved monitoring by Council including increased inspections and sending reminders about when maintenance is due;
- According to the risk analysis there are two high risk Minor Catchments; Hills Catchment No 12 Seven Creeks and Castle Creek and Plains Catchment No 22 Pranjip Creek. The former contains the unsewered township of Strathbogie while the latter contains Longwood Township; and
- Minor Catchments containing the townships of Nagambie, Violet Town, Avenel and Euroa are all rated as being Medium Risk.