ASSESSMENT OF WATER AND SANITARY SERVICES 2018

Masterton District Council

MASTERTON DISTRICT COUNCIL IS COMMITTED TO PROVIDING OUR COMMUNITY WITH SAFE, QUALITY, ECONOMIC AND ENVIRONMENTALLY SUSTAINABLE WATER AND SANITARY SERVICES.

Masterton District - 'The best of rural and urban living'

ASSESSMENT OF WATER AND SANITARY SERVICES.

Version control.	Revision.	Reviewer.
-Original -2 - New Review. Update and reformat.	-June 2012 -July 2018	-Opus and MDC -David Mawson: MDC Asset Management
-Next review	-June 2024	

This Assessment of Water and sanitary Services should read in conjunction with "other" Masterton District Council Plans, Strategies' and Policy's: Including Asset Management Plans,

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EXECUTIVE SUMMARY

1 EXECUTIVE SUMMARY

1.1 STATEMENT OF COMPLIANCE WITH LOCAL GOVERNMENT ACT 2002

All local authorities are obliged to undertake an assessment of their water and sanitary services, in accordance with Part 7 of the Local Government Act 2002. These include water supply, wastewater and stormwater disposal, public toilet facilities, cemeteries and crematoria. Solid Waste is now covered in the Solid Waste Management Plan. The main focus of the assessment is to ensure that the provision of these facilities is sufficient so that public health is maintained.

Masterton District Council last completed an assessment of Water and Sanitary Services (WA SSA) in 2012. Opus were contracted to undertake this work. In that document Council specified that it would re-assess sanitary services every 6 years.

This assessment has been compiled from a number of sources and provides a snapshot of the district as of June 2018. Council needs to know whether any issues have been missed out and are asking for public assistance in making this information as accurate as possible so that water and sanitary services can be developed in the most effective way possible to meet the needs of our communities.

The next review will be June 2024.

1.2 CURRENT STATUS

1.2.1 WATER SERVICES

There are currently two potable Council supplies and several privately owned reticulated supplies operating within the district. As well as this there are hundreds of private individual tank systems in operation.

Reticulated wastewater disposal services are provided by Council to four communities and again hundreds of dwellings within the district operate their own individual systems (usually through individual septic tanks).

Reticulated stormwater disposal is provided in the form of pipe reticulation in the main urban centres.

1.2.2 SANITARY SERVICES

There are four operational public cemeteries in the district managed by Council. In addition to this, there are a number of private cemeteries known of by Council, however there could be additional cemeteries (especially small Urupa) that are not recorded.

Currently there are fifteen sites with public conveniences in the district, in addition to the privately owned toilets available for public use such as petrol stations and restaurants.

Council has also recently (August 2017) adopted the 2nd Waste Management and Minimisation Plan 2017 - 2023 (WMMP) which addresses sanitary services requirements related to solid waste.

1.2.3 CURRENT IDENTIFIED CHALLENGES AND COUNCIL'S ROLE

In general Council see their role in the Assessment of Water and Sanitary Services as one of facilitator to ensure all community groups are heard, and their issues assessed.

This process is well advanced within Council and ties in to other projects which are detailed later in this summary.

The following tables clearly set out the main issues and role for Council in meeting demands and needs of the communities in the future.

1.2.4 WATER AND SANITARY SERVICES

Common to all Services – Water, Wastewater, Stormwater and Sanitary

Challenge	Role for Council
Education of relevant issues to communities	Action on behalf of communities to resolve specific issues.
Monitoring of relevant public health issues.	Monitoring of public health issues under the Health Act (in conjunction with MoH). Meet monitoring requirements of current legislation.
Legislation	Operate facilities in accordance with current legislation.
Funding of asset management, investigations, design, physical works and maintenance.	Manage funding for capital work requirements in line with capital expenditure programme.
Levels of service	Levels of service established with the community. Greater knowledge of small supplies developed within the district.

Water and Wastewater Services

Challenge	Role for Council
Resource consents	Ensure district water take and discharge consents are in place and adhered to.
Development in the district.	Monitor/ respond to growth scenarios in line with levels of service.

Water

Challenge	Role for Council
Drinking water standards.	Ensure compliance with Drinking Water Standards.
Development in the district.	Monitor/ respond to growth scenarios in line with levels of service.
WSP (water safety plan) for Masterton	Reviewed in 2018 and implementation recommended improvements.

Stormwater

Challenge	Role for Council
Potential increased pressure on Council SW reticulation.	Monitor/ respond to potential impacts of climatic factors.

1.3 PREDICTED FUTURE DEMAND

1.3.1 WASTEWATER AND WATER SERVICES

The current wastewater and water services in Masterton District have the required capacity to cope with current demand, and the requirements of future demand are catered for under current asset management plans for all services.

The quality of the treatment processes (water and wastewater) may need upgrading in the future if new standards, other legislation or stricter resource consent conditions are introduced.

The effects of climate change may impact on our stormwater services in the future, however more information is needed to fully assess the effects of this.

1.3.2 SANITARY SERVICES

Current development of facilities will ensure that there will be adequate capacity for burials for the life of this assessment.

The existing public toilets are well distributed at sites of high usage around the district. There is no anticipated need for further services.

1.4 PROPOSED IMPROVEMENTS TO THE ASSESSMENT

This initial assessment has involved best endeavours to gather information and assess services within reason. It is proposed to review this assessment on a regular 6 yearly cycle.

1.5 LINKAGES TO OTHER STRATEGIC DOCUMENTS CURRENTLY BEING DEVELOPED

1.5.1 COMMUNITY OUTCOMES AND COUNCIL'S LONG TERM PLAN (LTP)

As part of finalising Council's strategic vision for the future, Council continues to work through the process of developing its fifth LTP by June 2018. This is a critical process for the community and the Council, whose contribution to meeting some of the community outcomes is detailed in the draft LTP. This Water and Sanitary Services Assessment is a component of the development of community outcomes and the future LTP

1.5.2 ASSET MANAGEMENT PLANS (AMPS)

Many of the issues and proposals for meeting demands are covered under relevant sections of the Council's Asset Management Plans. These plans are working documents and are regularly updated.

2 INTRODUCTION

2.1 WATER AND SANITARY SERVICES ASSESSMENTS – LEGISLATIVE REQUIREMENTS

The Local Government Act 2002 (the Act) places responsibility on Councils to perform Water and Sanitary Services Assessments throughout their districts. Public consultation on the findings of these assessments and future recommendations is also required.

The services to be assessed are:

Water

- Water supply.
- Wastewater treatment.
- Stormwater.

Sanitary

- Cemeteries.
- Crematoria.
- Public toilets.

Transfer stations and waste management issues are covered in the Waste Management and Minimisation Plan 2017-23.

The key issue with these assessments is that they are not exclusively centred on Council provided services. The focus is on communities where the risk is highest and includes:

- Private reticulated water supplies.
- Schools etc. serviced by a bore (water), septic tank (wastewater) and soakage system (stormwater).
- Marae where health risks may arise during events.

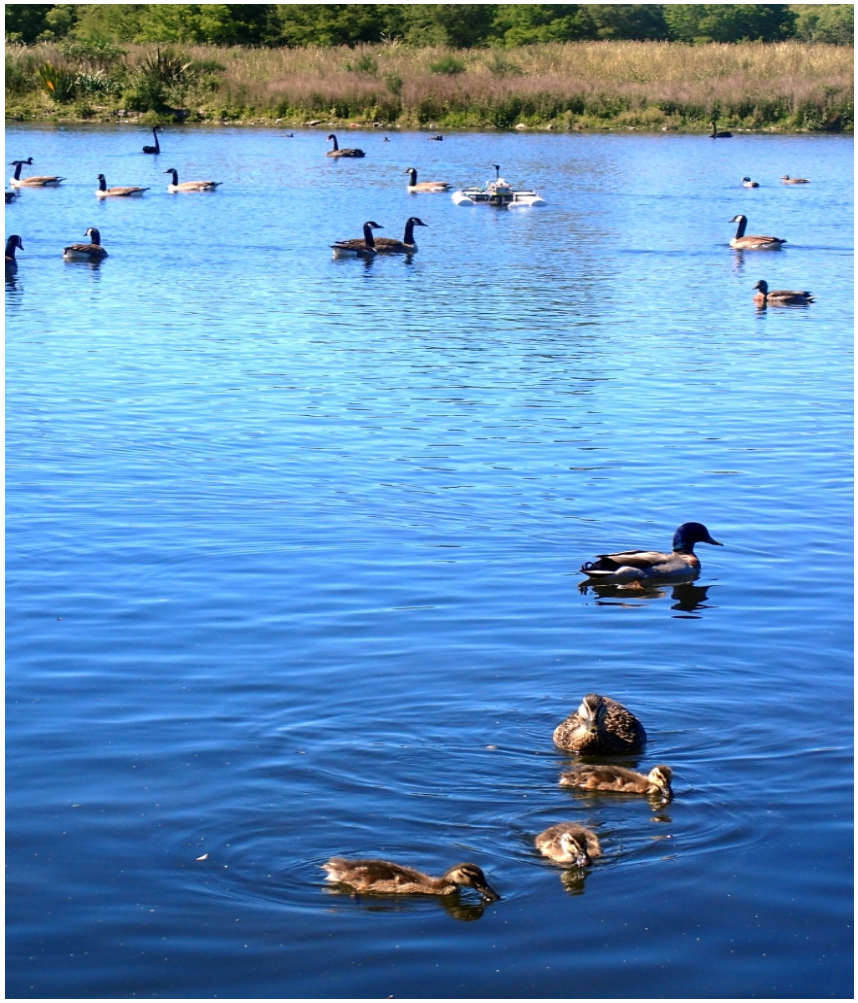
The Act does not specify the size of a community and following the Local Government Amendment Act 2010, no longer specifies the frequency or extent of assessments to be undertaken either.

This assessment has adopted the approach of undertaking a generic assessment for communities grouped by service level, as defined in the 2005 Assessment.

2.2 PROCESS FOR ASSESSMENT

The process of undertaking the assessment within Masterton District followed these steps:

- Review of all relevant data and documentation.
- Risk assessment workshop with Council Asset Managers as part of the AMP/ LTP development process.
- Survey of private water supplies/ suppliers by Council Officers.
- Draft assessment report.
- Stakeholder consultation as part of the 2018 LTP consultation process.
- Final assessment report – to be completed and adopted by June 2018



3 BACKGROUND ON MASTERTON DISTRICT

3.1 INTRODUCTION

The Masterton District covers an area of 229,859 hectares. As at the 2013 census there was a population of 23,352 people with 18,129 residing in Masterton town and 5,223 in rural areas. Masterton town is the main urban centre for the region. (2017 estimates are 19,700 Urban and 5,500 rural - StatsID NZ) Council is still awaiting 2018 census results at time of writing this report. Other small centres include Castlepoint, Riversdale, Mauriceville, Taueru (Tauweru) and Tinui. The Wairarapa as a whole varies considerably in its climate extremes with wind flow, sunshine hours and rainfall all depending on the proximity to the Remutaka Ranges to the south and the Tararua Ranges to the west.

Climate

SUNSHINE HOURS	RAINFALL	MAX DAILY TEMPS	FROST DAYS
			
❖ Masterton District enjoys bright sunshine thought the year and has an average of 2013 bright sunshine hours annually. ❖ 233 ave hours in January ❖ 104 ave hours in June	❖ Average rain days: 0.2mm or more, 171 days per annum. ❖ Average wet days: 2.5mm or more, 90 days per annum. ❖ Mean annual rainfall: 969mm (Masterton) - (Tararua to East coast ranges from 1,520mm to 890mm, from West to East)	❖ Mean daily maximum: January 23.8°C - July 11.8°C. ❖ Mean temperature: 12.8°C. ❖ Mean daily minimum: January 10.9°C - July 2.5°C	❖ Average days of frost: 28 per annum. ❖ Frosts of up to 6°C occur in months of April through to October

Masterton town sunshine average are for years 1930 – 2007 from Waingawa substation (1930 – 1991), Te Ore Ore weather station (1992 – 2007) and Masterton Aero (2015 – present)

Population

Masterton District population increased slightly during the 1980s, rising from about 22,000 in 1981 to about 22,600 in 1991. The population has been relatively stable since, however the most recent 2013 Census data does show an increase to 23,352 and a June 2017 estimate of 25,200 (Id community profiles & StatsNZ).

The average household size is 2.39 people, compared with 2.66 people for New Zealand as a whole. There are 11,665 rateable properties.

The Masterton District includes the following Census area units:

- Rural: Homebush-Te Ore Ore; Opaki-Fernridge; Kopuaranga; Whareama;

- Urban: Masterton Central; Masterton West; Masterton East; Solway North; Solway South; Ngaumutawa; Masterton Railway; and Lansdowne.

	1996 Census	2001 Census	2006 Census	2013 Census	2017 Estimate*
Urban	18,072	17,793	17,667	18,129	19,700*
Rural	4,686	4,824	4,956	5,223	5,500*
Total	**22,758**	**22,617**	**22,623**	**23,352**	**25,200***

**Population and Demographic trends StatsID NZ 2017*

3.2 CONSENTS AND STANDARDS

The relevant standard for water supplies is the New Zealand Drinking Water Standards and grading's. Under the Health (Drinking Water) Amendment Act 2007, water suppliers must take all practicable steps to comply with the drinking-water standards. They must also register and monitor the supply, implement a Public Health Risk Management Plan and take reasonable steps to protect the source. Water suppliers have been given dates for compliance, which vary depending on the size of the community served.

The levels of service for wastewater and stormwater are controlled by the requirements of resource consents issued by the Wellington Regional Council. As a minimum these consents should be in place and conditions met. Any future stormwater outlet works are also likely to result in consent requirements being placed on these systems.

Waste management is governed under the LGA with Wairarapa councils combining to develop the Waste Management and Minimisation Plan 2017-23 to manage solid waste issues for the region.

3.3 COMMUNITY OUTCOMES FOR WATER SERVICES

The Masterton District Council undertakes to treat and distribute an adequate supply of potable water within the various urban and rural supply areas suitable for the intended usage thereby contributing to:

- The health of the community.
- Community safety through the fire-fighting capability of the water supply system.
- Industrial and residential development.

The Council attaches a high priority to the role that it plays in the provision of water supply services for which the following strategic outcomes are desired to be achieved:

- A continuous supply of essential utility services for existing consumers and for property protection at unit costs comparable with those obtained from similar organisations or alternative suppliers.
- Ready availability of extended utility services at competitive supply costs to meet the reasonable service demands from new or expanding users.

The community outcomes identified for our community are the drivers for Council's activities. The links between Council activities, community outcomes and high level goals are summarised in the Masterton District Council Long Term Plan 2018-28. Community outcomes that water services contribute to include:

Community Outcome	How Water Assets Contribute
A thriving and resilient economy	Ensure a continuous potable water supply for industrial and/or commercial purposes
A sustainable and healthy environment	Extract, treat and distribute an optimum quantity of potable water to meet the demand of current and future customers, whilst complying with relevant resource consents
An engaged and empowered community	Ensure a continuous potable water supply that meets the DWSNZ (2005: Rev 2008) and contributes to the health of the community; Ensure a fair distribution of potable water supply to all parts of the community, delivered in a culturally sensitive manner

3.4 FUTURE GROWTH PREDICTIONS

With a 1% yearly forecast growth population, Council does not expect the demand on water supply quantities to change significantly. The household distribution and urban/rural split should continue to be monitored. If the rural population does continue to increase on the outskirts of the urban area, this growth could be accommodated by expanding existing urban facilities.

Some rural areas that have experienced population growth, such as Opaki, have their own water supply service and therefore growth in this area is currently beyond the scope of this Plan. However, this may be something Council will need to consider in the future if development in the Opaki area continues. At some stage the Opaki scheme may not be able to support its community and some Council assistance may be required.

Key growth assumptions:

- That the Masterton population was likely to grow and then level off in the near future.
- The number of households was predicted to increase due to smaller household sizes; and areas like Opaki, Ngaumutawa and Solway areas have the potential to become more intensively developed
- The demographic profile of the population is changing (ageing, a higher proportion of Maori and more diversity),

This growth and changing demographic profile is not anticipated to affect the infrastructure and facilities assessed within this study.

4 COMMUNITY DEFINITIONS

4.1 PROCESS

The 'communities' definition identified as part of the 2005 Water and Sanitary Services Assessment has been adopted for the current Water and Sanitary Services Assessment.

4.2 COMMUNITIES

4.2.1 COMMUNITY LISTINGS

A comprehensive community listing was developed for the entire district, this is given in Appendix 4.

4.2.2 DEFINITION OF COMMUNITY TYPES

Similar population centres were linked together. Figure 4.1 below sets out the aggregation principles developed from 2005.

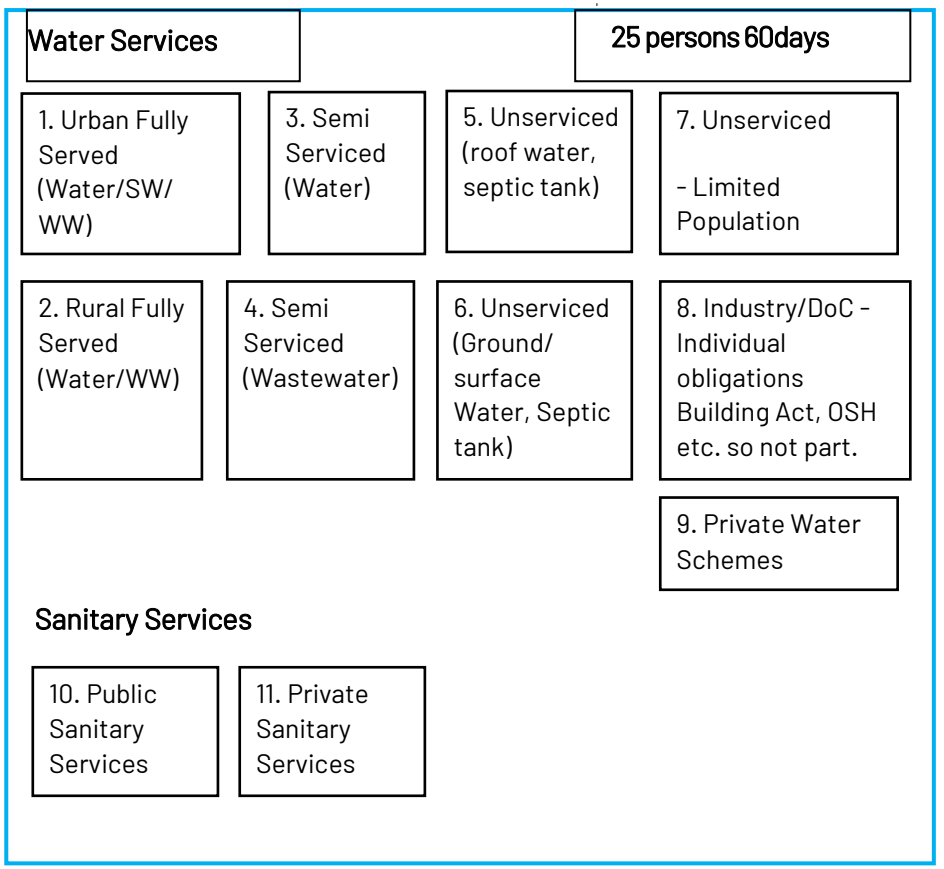


Figure 4.1 Aggregation Principle

4.2.2.1 WATER SERVICES

Each individual centre of population was identified by its combination of water supply and sewerage services (being either: fully served, partially served or unserviced) with a view to undertaking risk assessments later in the assessment process. MDC has defined the cut off size for a community worth consideration as meeting the criteria defined in the "Register of Community Drinking Water Supplies in NZ" of 25 person's resident for more than 60 days. Communities below this threshold have been labelled Unserviced Limited Population and will not be assessed individually other than listed in the total community listings provided in Appendix 4.

In some cases, areas that would normally be considered as a single community have had to be split to represent the levels of service accorded to them. An example of this occurs in small townships where the bulk of the population is fully served and the perimeter properties are semi served.

For the purposes of the assessment, each population centre has been grouped into one of eight water aggregated communities (as shown in figure 4.1) for analysis and risk assessment:

Urban Fully Served – This community deals with the main centre within the district, being Masterton.

Rural Fully Served - This community consists of the rural area of Tinui, being the only rural community that is fully served with both water and wastewater services

Semi Serviced (water only) – Many of these communities are small townships, or clusters of houses, with only one service provided, such as Fernridge.

Semi Serviced (wastewater only) – This community type covers the stand-alone rural wastewater services at Riversdale and Castlepoint.

Unserviced (roof water, septic tank) – This type of community is not provided with Council services but provide their own individual service via roof water and septic tank, Mauriceville, Taueru, Wainuioru, Whakataki, Mataikona, and many of the rural schools and Marae are included in this community.

Unserviced (ground/surface water, septic tank) – Bores are often utilised in conjunction with roof water for rural facilities such as Campgrounds, Hotels, and some Marae.

Unserviced Limited Population - This community is made up of low population density centres (and therefore low risk priority) such as adjoining farms and small centres of population. Homestays of small population may be included in this community. Although with the assumption that this community will be served by roof water the risk assessments and some outcomes will be catered for in the unserviced community above.

Industrial Communities with Building Act requirements for Water and Wastewater - This community includes industries such as the "Limeworks", "JNL" and wineries which, for the purposes of this assessment, we have deemed to be commercial premises and governed by the Building Act (Warrant of Fitness required), one

element of which covers water and wastewater), and Resource Management Act for discharge and therefore not included in the assessment.

Private water supplies - Private water supplies such as the Fernridge, Opaki, Wainuioru, Mauriceville supplies and others which link local farms or facilities (as is the case in Castlepoint), although not strictly a population centre, have been included in this category to ensure all water supplies are captured for the assessment.

For the purposes of this assessment, only water supplies that have the potential to affect public health have been considered, although it is our intention to confirm the usage of supplies used solely for irrigation and/or industrial processes.

4.2.2.2 SANITARY SERVICES

Sanitary service communities, for the assessment, have been defined differently to water services due to the nature of the service and the number of elements in the district. Figure 4.1 shows two communities for sanitary services, public and private.

Public Sanitary Services – This community covers public toilets and cemeteries.

Private Sanitary Services- This community includes private burial grounds.

Waste facilities are covered in the Solid Waste Management and Minimisation Plan 2017-23.

Full community listings given in Appendix 4 show which aggregate category the community comes under. Risk tables are developed in later chapters and applied to the aggregated communities in a generic fashion to form the broad makeup of the assessment.

5 DESCRIPTION AND ASSESSMENT OF ASSETS

The information in this chapter has been compiled from a number of sources using "best endeavours" as a snapshot of the district as at March 2018. Where tabulated information is not available blanks in the table exist. As further consultation is undertaken, there will be an opportunity to close information gaps based on feedback received from the owners and operators of the systems, and to improve the assessment over its life.

5.1 WATER SUPPLY

5.1.1 WATER SUPPLY GRADINGS

The Register of Community Drinking Water Supplies in New Zealand is maintained by the Ministry of Health and provides a grading for all community water supplies.

The first letter of the grading relates to the source water and treatment plant, the second letter relates to the distribution zone. The grading's indicate the level of risk of contamination in the system, not the quality of the water. A grading of 'A' is considered to have a very low level of risk, while a grading of 'E' is considered completely unsatisfactory. 'U' represents an ungraded risk.

Each grading is developed through a questionnaire completed by Health Protection Officers. Supplies are assessed on the basis of compliance with monitoring standards including management practices, maintenance, treatment, monitoring, supervision, storage etc. Most of the communities that have been identified in this assessment are included in the Register which is updated annually

Ministry of Health grading's for source and treatment are as follows:-

A1 Completely satisfactory, negligible level risk, demonstrably high quality.

A Completely satisfactory, extremely low level of risk.

B Satisfactory, very low level of risk when water leaves the treatment plant.

C Marginally satisfactory, low level of microbiological risk when water leaves treatment plant, but may not be satisfactory chemically.

D Unsatisfactory level of risk.

E Unacceptable level of risk.

U Ungraded

Ministry of Health grading's for distribution zones are as follows and based on reticulation condition, management, and water quality

a1 completely satisfactory, negligible level of risk, demonstrably high quality.

a Completely satisfactory, extremely low level of risk.

b Satisfactory, very low level of risk.

c Marginally satisfactory, moderate level of risk.

d Unsatisfactory level of risk.

e Unacceptable level of risk.

u Ungraded

5.1.2 URBAN FULLY SERVED COMMUNITIES

5.1.2.1 MASTERTON

The water supply for the town of Masterton is owned and managed by Masterton District Council.

Key features of the water supply are summarised in the table below:

Table 5.1. Masterton Water Supply Details

Properties Connected	Residential	8554
Estimated Population (2017)		19,700 (urban population)
Catchment	150km2. Approx. 20-30km2 of which is farmed, the remaining is Tararua Forest Park.	
Intakes		Waingawa River Intake
Storage	5 storage tanks with approximate total capacity of 13,000m^3 (1 clear water tank; 2 concrete reservoirs 9000 m3 & 2250 m3 and 2 @250 m3 timber storage tanks) 1 day's average demand in Winter 0.5 days in Summer	
Treatment	Pre-sedimentation, coagulation, sedimentation, filtration, chlorination, pH correction and fluoridation	
Pressure Zones		single (10m -120m head)

Gravity	Gravity fed from reservoirs – with booster pump at Manuka St	
Average daily demand	m3/ day	11,800 min (winter) - 14,400 max (summer) Average of 664 l/p/d per capita
Maximum Take	m3/ day	35,000 reduced to 28,000 when river flow drops to 1900 l/ s
Consent Expiry		20 May 2020 (Consent No. WAR940080)
Water Grading (source and treatment/ distribution)		Aa.

Existing Quality and Adequacy of Supply

Source and Abstraction

Water enters the system from a single catchment of (150km2) for the Waingawa River.

The catchment is primarily unprotected bush on land principally owned by the Department of Conservation, with some low intensity farming (cattle and sheep) immediately upstream of the intake.

The abstraction of water at the intake is controlled by Resource Consent No WAR170176 expiring in April 2023 to take 40,000m3/ day, (30,000 M3 consumptive max take. IE: River water taken into the treatment plant) but reducing to 28,000m3/ day when river flows drop to 1900 l/ s. The consent was issued by Greater Wellington Regional Council.

Treatment, Delivery and Storage

Kaituna Water Treatment Plant

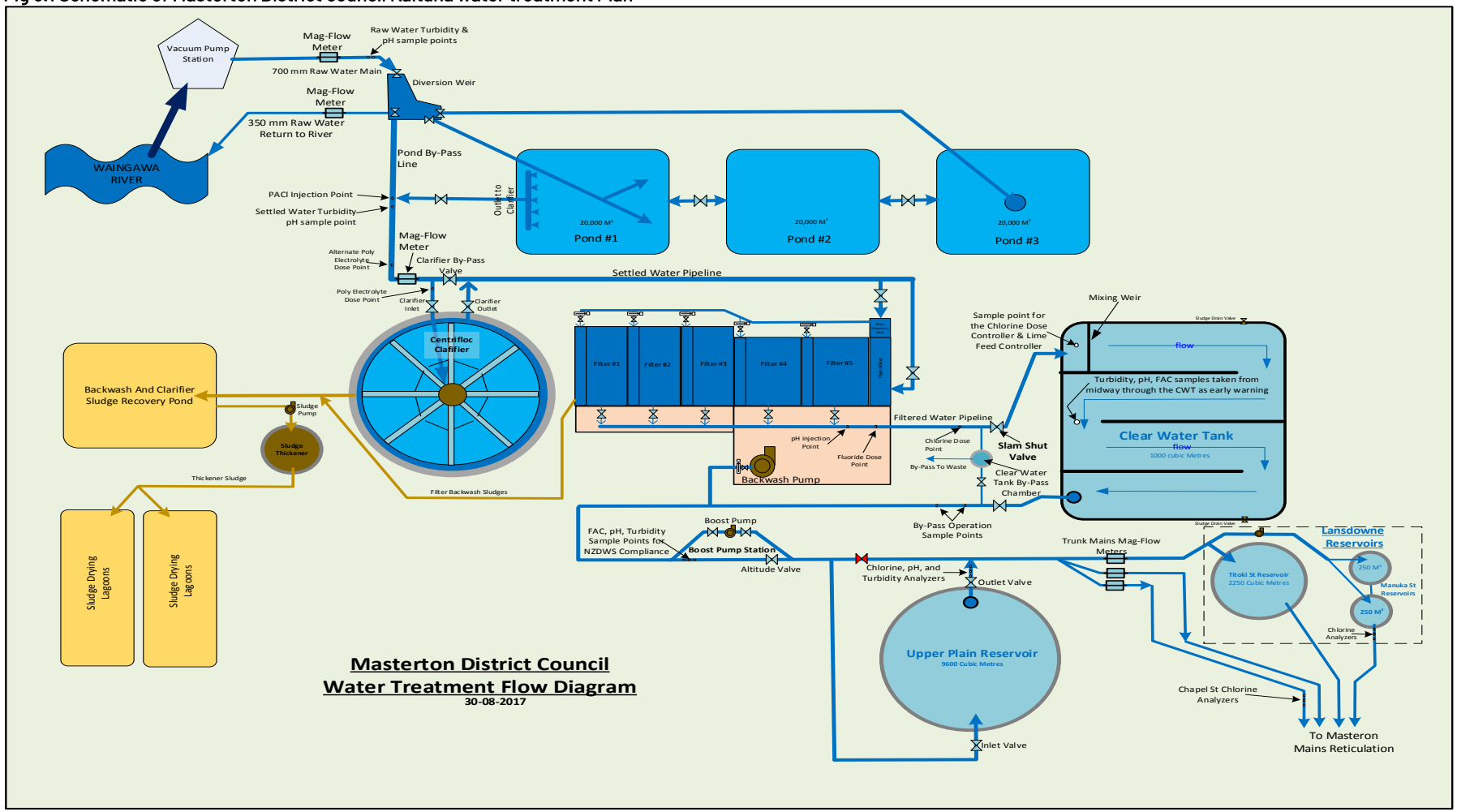
After collection at the intake, water is siphoned via a 600mm diameter raw water main to raw water settlement ponds (60,000 m3 capacity). Automatic turbidity monitoring of the raw water aims to maximise the utilisation of the ponds and excess abstraction is returned to the river to achieve resource consent compliance.

Water from the settlement ponds is treated using the following processes:

- Coagulation, flocculation, and separation in a centrifloc clarifier
- rapid sand filtration
- pH correction using hydrated lime
- disinfection using chlorine
- fluoridation

Contact time for chlorination is achieved by passing water through the new 1000m3 reservoir and by utilising the time taken to travel through the trunk main from the plant to the Upper Plain Reservoir

Fig 5.1 Schematic of Masterton District council Kaituna water treatment Plan



The performance of the treatment plant was subject to a major review in 2003/ 2004 after discovery of cryptosporidium in the treated water. The treatment plant operation achieves compliance with the Health (Drinking Water) Amendment Act 2007 and the

Drinking Water Standards 2005. A comprehensive monitoring regime for water leaving the treatment plant, and for water in the distribution zone, provides evidence of compliance

A comprehensive Public Health Risk Management Plan was prepared in 2003, and revised following the Health (Drinking Water) Amendment Act 2007. The revised document was approved by Regional Public Health in August 2009. The PHRMP has been completely rewritten as what is now called for approval. It outlines prevention measures and monitoring for the entire water supply system. It also identifies new measures for future programmes that should be implemented in priority of evaluated risk

Chlorine is added as a disinfectant to water to ensure a free chlorine residual of 0.2mg/ l is maintained throughout the reticulation system.

The water leaving the treatment is graded "A" – completely satisfactory, extremely low level of risk.

To achieve compliance, the following water quality targets must be met for water leaving the plant:

- Filtered water turbidity <0.1 NTU (continuously)
- Treated water pH 7.85
- Chlorine residual 1.1g/ m3
- Fluoride 0.75 - 0.9g/ m3
- E Coli 0/ 100ml (daily testing)

Reticulation

The reticulation system is predominantly a single pressure zone – with a small high level zone feeding parts of Lansdowne.

The main town storage reservoir of 9000m3 is situated on an elevated terrace 5km west of Masterton. This reservoir is supplied by a single trunk main (600mm diameter concrete and 450mm diameter concrete lined steel) from the treatment plant. Two mains (450mm diameter concrete lined steel) take water from the reservoir until they split into smaller feeder mains of 250mm cast iron, 300mm diameter steel riveted, and 450mm diameter concrete lined steel to supply the town. A 2250m3 concrete reservoir is located on Titoki St, Lansdowne and two 250 m3 timber stave reservoirs are used to provide storage in a small high level area of Lansdowne.

A full description of pipeline assets is provided in the Water Supply Asset Management Plan.

They can be summarised as table 5.2 below;

Table 5.2 Masterton Urban Water Supply Pipeline Lengths & Materials

Diameter	AC	Steel	Unknown	Copper	Cast Iron	PVC	PE	Concrete	E/W
mm	m	m	m	m	m	m	m	m	m
0-40	0	585	2,438	4,243	0	9,899	2,413	0	0
50-63	2,890	647	1,701	90	107	3,086	1,991	0	0
75	437	743	258	0	1,094	704	6,096	0	0
100	14,326	23,096	1,147	0	10,111	21,564	964	0	0
150	2,260	10,208	136	0	5,264	5,814	173	0	0
200	0	1,790	15	0	0	5,671	130	0	0
250	113	3,535	3,080	0	8,092	1,875	0	0	0
300	0	11,644	554	0	0	84	0	0	2,691
450	0	12,588		0	0	0	0	762	0
600	0	60		0	0	0	0	5,038	0
Total	**20,028**	**64,900**	**9,335**	**4,336**	**24,671**	**48,703**	**11,771**	**5,800**	**2,691**

The policy for reticulation network design endeavours to provide a grid network – and where "dead-end" streets are unavoidable, rider mains are installed to minimise circulation problems (approximately 49% of installed water main lengths are rider mains).

The condition of underground assets has been assessed on a grading scale of 1-5.Pipe replacement or refurbishment is programmed according to pipe failure history, assessed against the cost effectiveness of repair vs replacement – or when the required level of service can no longer be maintained.

The current policy for backflow prevention is to install appropriate backflow devices on commercial premises according to the assessed level of risk. Documentation of the backflow prevention policy is a recommended implementation measure in the Public Health Risk Management Plan.

The target level of service for Masterton is to provide fire flows from all hydrants to meet NZ Fire Service requirements.

The Council maintenance contractor (City Care Ltd) undertakes a flushing programme to ensure circulation of dead end mains, and to minimise the build-up of corrosion products within the water main system.

The reticulation system for Masterton is graded "a" Public health risk mitigation measures for reticulation management are comprehensively addressed in the Public Health Risk Management Plan.

For more detail re the Masterton Water Supply, please refer to the Water Supply Asset Management Plan.

Consumer Issues

Incidence of Waterborne Disease

The 'Aa'grading for Masterton's water supply reflects the low risk of contamination.

Public perception

The number of complaints received by Council relating to water is small, with each one followed up on an individual basis.

Current Demand and Demand Management

The Masterton water supply has been developed to address low-medium population growth in the District. Projections suggest that the population is likely to remain relatively static. The impact of population change on the water supply service provision is expected to be minimal unless initiatives to encourage economic growth are successful.

Daily demand ranges from11, 500 m3/ day in winter to 14,400 m3/ day in summer. On the basis of total water supplied in a year, the composition of water demand is as follows:

Charging regime

Water supplies are currently funded by a uniform charge targeted at each connected or 'serviceable' property plus a targeted capital value rate. 'Serviceable' is defined as serviced or with premises which are "not connected to the Masterton urban water supply, but is within 100 metres of such water supply and within the urban rating area". These uniform rates provide the majority of the costs, with rural users supplying the remaining through metered rates. A minimum charge applies to the targeted metered rate. Metering of commercial and residential connections is not standard practice.

Demand management

Current demand management practices include public education, garden sprinkler restrictions during the summer months – with enforcement by Council staff and contracted security services, and water loss reduction via leak detection, network condition assessments and zone monitoring.

Water use per capita for Masterton is significant at 411 L/ p/ d, indicating the potential for some leakage from the reticulation. A leak detection study commenced in 2008 and a network condition assessment commenced in 2009. This work is ongoing.

For more information re demand management

Assessment to Meet Future Demand

Quantity

The population of Masterton is expected to remain static over the next 20-30 years. The Council believes that it has spare capacity within its water supply infrastructure to absorb the impact of any expansion in its industrial base that may occur.

The planning of council water supply assumes that the impact of population growth on the water supply infrastructure over the next twenty years will be minimal.

An alternative water source from the Waipoua River has been identified as a short term option to be used in a civil emergency should the existing source become unavailable

For more information re future demand and projections, please refer to the Water Supply Asset Management Plan.

Quality

The water supplied to Masterton Township is compliant with the Drinking Water Standards and requirements of the Health (Drinking Water) Amendment Act 2007. The reported number of complaints from customers about aesthetic water quality issues is small. Masterton will continue to deliver high quality water to its consumers.

Replacement Infrastructure

Council has a programme for replacing deteriorating or failing reticulation pipe work and fittings. The programme is based on failure to achieve service levels, or historic evidence that justifies

replacement is more effective than on-going repair. See the Water Supply Asset Management Plan for more information.

Development Infrastructure

All water supply infrastructure installed in areas of new development must meet the requirements outlined in the "Code of Practice for Development". Development of the urban water scheme is largely through the private subdivision process.

5.1.3 RURAL FULLY SERVED COMMUNITIES

5.1.3.1 TINUI

Table 5.3. Tinui Water Supply Details

Status		Potable
Properties Connected		19 + School
Estimated Population		120
Catchment		Groundwater – Whareama catchment
Intake		Concrete box collection from two springs
Storage	m3	25 m3 Raw Water Storage 50 m3 Treated Water Storage (2-3 Days)
Treatment		Chlorination (sodium hypochlorite)
Pressure Zones		Single
Pumped/ Gravity		Gravity
Estimated Daily	m3/ day	25 (approx.)
Maximum take	m3/ day	90
Consent Expiry		21 / 09/ 2036 (WAR 010244)
Water Grading (source and treatment/ distribution)		u
Compliance		One E.coli transgression

The Tinui water supply is owned and maintained by Council, servicing a steady residential population estimated at 60 people. There are approximately 19 residential properties, a hotel, a store and school connected to the system.

Existing Quality and Adequacy of Supply

Source and Abstraction

The water supply for the Tinui Township is sourced from two springs, covered by

0.3 m2 concrete collection boxes. These are located in the "Tinui Taipos" area of the Masterton District, north of the community.

A consent for a maximum take of 90 m3/ day is currently in place, expiring in 2036. It has been estimated from studies of a similar community, that the average take is likely to be closer to 60 m3/ day. Current metering is taken from spring water into the treatment plant and also what is sent to the reticulation network.

Treatment, Delivery and Storage

The flow from the springs is collected by a 2.7 m3 holding tank, 20m from the intake.

The water is then gravity fed to one 30,000 litre Storage Tank. this raw water then passes through the Treatment Plant where the water is passed through a sand filter, which removes course contaminants, then a 1 Micron Filter, to meet DWS, then through a Water Softening system (as the raw water is very 'Hard' water) then Chlorinated with Sodium Hypo, then stored in two 30,000 Litre Treated Water Reservoirs (Plastic)

Tinui is a relatively small gravity fed pressure zone (pressure ranging from 27m to 34m), containing approximately 1.7km of pressurised pipe. Pipe sizes range from approximately 20mm to 100mm in diameter. Pipe materials include PVC for the reticulation system in the township and polyethylene from the springs to the collection and storage points. The reticulation system for Tinui is currently ungraded (u).

The water leaving the treatment is currently ungraded (u). NB: At the time of this report Regional Public Health are due soon to do a Revision on the Tinui Treatment to give it a Grading

There is a monthly testing of water with the sample point being the Tinui School. E.coli & FAC tests are carried out and a continuous online monitoring for turbidity, PH and Chlorine monitoring is enabled, and stored on SCADA (Telemetry)

The water is abstracted for domestic use and fire-fighting purposes.

Consumer Issues

Incidence of Waterborne Disease

In the last three years, only one bacterial transgression was recorded in the Tinui water supply and this was cleared by subsequent testing.

Public perception

There are low numbers of water complaints, and each one is dealt with on an individual basis.

Current Demand and Demand Management

Water is taken from springs and fed to a collection tank. Any excess water overflows are returned to the ground water to recharge the springs.

The level of unaccounted for water (and potentially leakage) in Tinui is currently unknown. Council undertakes Annual Leak Detection on the Reticulation, any issues are repaired as they are detected.

Consent conditions require that the water supply system is operated and maintained so that water does not run to waste.

The scheme while owned and operated by Council but local users are supported through Council's media promotion of water conservation in the summer months does reach this area.

Assessment to Meet Future Demand

Quantity

Population growth is not expected to provide constraints to the Tinui water supply in the context of current projections and the existing abstraction consent.

The current covered storage capacity for treated water is adequate to meet future demands.

Quality

Compliance with drinking water standards is now a legal requirement under the Health (Drinking Water) Amendment Act 2007. Council will need to implement some operational changes and/ or capital projects to ensure compliance at Tinui by 2015. Refer to the Water Supply Asset Management Plan.

Bacteriological compliance is achievable through appropriate chlorine dosing, and implementation of an approved monitoring programme. The principle barrier to NZDWS compliance will be provision of treatment processes to remove or inactivate protozoa (giardia/ cryptosporidium).

Replacement Infrastructure

Council has a programme for replacing deteriorating or failing reticulation pipework and fittings. The programme is based on failure to achieve service levels or historic evidence that justifies replacement being more effective than on-going repair.

See the Water Supply Asset Management Plan for more information.

5.1.4 RURAL WATER SUPPLY

5.1.4.1 WAINUIORU

Table 5.12 Wainuioru Rural Water Supply Details

Status		Non-potable
Properties Connected		93 named users
Estimated Population	Population uncertain but 184 known stakeholders including the Wainuioru School and Hall	
Catchment		Groundwater
Intake		54 metre deep well
Storage	m3	240m^3 total system 100m^3 main
Treatment		No Treatment
Pressure Zones		Single
Pumped/ Gravity	Pumped from source, three booster pumps in reticulation	
Estimated Daily	m3/ day	27.5 9range 13.8 to 55.2)
Maximum Take	m3/ hour	30 or 720m^3 per day
Consent Expiry		30/ 09/ 2020
Water Grading (source and treatment/ distribution)		u
Compliance		E Coli transgression

Existing Quality and Adequacy of Supply

The Wainuioru Rural Water Supply Scheme (WRWSS) is a delegated body of Council. Assets are owned by Council and operated through a management committee representing the connected properties.

The supply serves 184 stakeholders, including the Wainuioru Primary School and Hall and is untreated. There has been some concern from both the WRWSS and the DHB that the Wainuioru Primary School reservoir may not be cleaned out regularly. No assessment of the condition of the pipeworks or associated pump and storage facilities has been undertaken.

Source and Abstraction

Two 15kW pumps draw water from a 54 metre deep well.

Treatment, Delivery and Storage

Chlorination of the supply took place adjacent to the well in Watsons Road up until late 2003/ early 2004. At the request of users, the

supply ceased being chlorinated apparently due to a build-up in chlorine in the reservoirs. Discussions with the DHB have not altered the supplier's stance on this.

The water is pumped from the bore into one main reservoir of 100 m3 and six minor reservoirs. The systems total storage capacity is 240m3. The supply is then transferred to 140 client reservoirs.

The total scheme area is approximately 7526 ha and is covered by approximately 85km of PVC piping ranging in size from 125mm to 20mm. Three booster pump stations and two staging sites are utilised in the scheme.

Abstraction is for the purposes of stock and human consumption.

Monitoring

Monitoring is performed at the staging site, monthly. MDC test Nitrates quarterly

Assessment to meet Future Demands

A programme of point of use treatment is being developed for the users of this scheme.

A Water Safety Plan (WSP) is currently being developed by the scheme operators and this will enhance knowledge and understanding of the scheme's management processes.

5.1.5 UNSERVICED COMMUNITIES (ROOF WATER, BORE OR SURFACE WATER SUPPLY)

5.1.5.1 GENERAL

The assessments have identified options that are available to address potential public health risks and potential water shortage. It is acknowledged that individual owners of the facilities may have adopted some of these options already – by way of:

- Purchase and installation of more sophisticated equipment
- Greater level of planned maintenance
- More frequent or wider range of water quality monitoring

Rural Settlements

Within the boundaries of Masterton District Council, there are a number of settlements that are "self-serviced" for water supply.

These communities include:

- Whakataki
- Mataikona
- Riversdale
- 'Fringe' areas of other settlements

Generally it could be assumed that these residential rural areas are served by:

- Roof water (used by approximately 80% of houses, often in conjunction with other sources)
- Bores (often used in the plains for both irrigation and potable water)
- Wells (as above, often used in the plains for both irrigation and potable water)
- Springs (common in the eastern hills)

Rural Schools

Within the boundaries of Masterton District Council, there are a number of rural schools that are "self-serviced" for water supply. For purposes of the Water and Sanitary Services Assessments, they have been regarded as separate communities.

A survey was posted to all schools believed to be self-serviced for water supply or wastewater. The responses are summarised in ***Table 5.4.***

The Board of Trustees of each school has responsibility for the management of their water supply, receiving funding from the Ministry of Education's Operational Grant.

Capital expenditure to replace depreciating water supply services assets is also the responsibility of the Board of Trustees. However any unplanned capital expenditure on wastewater services can be funded by the Ministry of Education on receipt of evidence of the need for the expenditure.

Wainuioru and Opaki schools are supplied by their respective reticulated private water schemes (and therefore not included in the table above). In addition to the scheme treatment, Opaki School has UV filters in place.

Table 5.4 School Water Supplies

School	School Roll	Source	First Flush Diversion?	Treatment Processes	Storage		Pump Process	Shortages
					m3	No		
Mauriceville School	28	Spring	No	Chlorine (POU Filters)	3000l	1		None
Whareama School	39	Roof Water	No	UV	30	2		None
Rathkeale College	327	Now on Opaki Water scheme	N/A	UV Treatment+ Streaming Current pH adjustment	30,000	2	gravity	None

Rural Halls

The following rural halls are known to exist in Masterton District:

- Bideford
- Castlepoint*
- Rangitumau – 2-3 times/ year
- Taueru
- Tinui – Large hall, frequent use – connected to Tinui water supply
- Wainuioru – Frequent use
- Whangaehu
- Whareama – Frequent use Feb-Oct

*Not operated by MDC

The Tinui hall is supplied by the Tinui water scheme whilst Taueru and Wainuioru halls are both served by their respective rural water supply schemes. At Taueru however, this scheme is for non-potable use only.

The water supplies for all the halls (except Tinui) are operated as non-potable supplies and therefore "boil-water" notices are posted in each of the halls to educate user

Other Private Rural Facilities

While the majority of these facilities do not meet the community criteria of '25 people for 60 days', these are situations that are considered to be of high risk as they often expose people who routinely drink treated water, to water of potentially lower standard.

Due to the large number of facilities, it was not practical to investigate these communities individually. As the risks are unlikely to differ between facilities, a single generic assessment has been completed that can be applied to each of these sites. During consultation, or in future studies, more information may be gained which might point towards some facilities presenting a higher risk to the public than others.

Known facilities include golf clubs, Hood Aerodrome, marae, hotels and camps.

A summary of several of these supplies is presented below **Table 5.5.** In general, less information is known of the other supplies.

Table 5.5 Summary of some private rural facilities

Supply	Population	Source	Treatment Processes	Storage		Pump Processes
				m3	No	
Camp Anderson - Waimanaaki	78 (intermittent use by church groups, school & holiday camps	Dam water for toilets and rainwater for drinking	UV light filter. Ozone + sand filter prior to storage, filter + chlorinated prior to POU	22	8 untreated, 4 treated	To/ from treatment + from treated storage
Riversdale Beach Holiday Park	200 - 280 max (intermittent use)	Bore + raw rainwater mixed	Filtered + chlorinated. Bicarb pH correction UV light filter	100 total	5 Large 1 Small	From source and storage
Ararangi Camp	54 (intermittent use by church groups)	Bore to 25.5m	Chlorinated	22	1	From source and storage

5.1.5.2 ROOF WATER

Existing Quality and Adequacy of Supply

Source

Water enters the covered storage tanks directly from the roof. It is more common for there to be no first flush diverter. Typically, excessive water overflow s the tanks, either to direct soakage or into stormwater. It is assumed that, if more than one tank exists, they are directly connected.

In theory, it would be possible to determine whether the roof catchment area and storage tank volume provides reasonable protection against water shortage given the rainfall for the district. In practice, without actual consumption records, this would be an unreliable estimate. Information suggests that a common solution is to:

- Purchase tankered water to augment their storage during the summer months
- Use an alternative supply (e.g. bore, spring or stream) for irrigation, swimming pool and toilet use.

Treatment, Delivery and Storage

Typically storage tanks for rainwater systems are in multiples of 22.7 m3 (5000gal). The most common material is concrete, located at ground level close to the building. Rainwater is usually corrosive to metallic pipes and hot water systems. Concrete tanks are known to provide some corrosion mitigation due to slow dissolution of cement, otherwise not available if plastic tanks are used.

Water is drawn from close to the bottom of the tanks and pumped directly into the plumbing system.

Often, no provision is made for any water treatment. In some circumstances cartridge filtration and UV disinfection has been installed to treat water destined for consumption (refer to section 5.1.4.5). Chlorination is usually reserved for treatment of school swimming pool water.

The water supplies are usually ungraded.

Faecal coliform testing of the water is most commonly undertaken on a yearly basis for schools and only in response to sickness in the case of residences.

Consumer Issues

Incidence of Waterborne Disease

"The lack of reports linking communicable disease to roof-collected rain water, may in part be due to the fact while rainwater use is extensive, most systems serve individual households of only a few persons. Residents experiencing sporadic gastrointestinal illnesses are less likely to seek medical attention unless the illnesses are severe and/ or life threatening. Furthermore contaminated rainwater is more likely to be a source of sporadic disease episodes because of

possible immunity in a proportion of those exposed, together with asymptomatic infection in others."

(Ref NZWWA, May 2004, p26, S. Abbott)

It is unlikely, therefore that any sickness that is attributable to the rain water supply system could be directly linked to the particular supply in question.

Public perception

A common perception of consumers of rainwater is that the supply is inherently cleaner than alternatives. The potential contamination routes are not w ell– understood and not considered important enough to critically review.

Current Demand and Water Supply Management

The water supply is used for normal consumption and in some circumstances for the swimming pool and limited external use.

Supply availability, using the on-site storage, exceeds demand for most of the year. It is likely that there have been limited occasions when tankered water is required to augment the supply. This would usually occur during summer months or as a result of system failures.

In most areas where consumers are dependent on roof water collection systems, there is an inherent awareness of the need to avoid water wastage. However, there may well be additional ways to improve water conservation – and to minimise risks of water contamination.

5.1.5.3 GROUND WATER

Existing Quality and Adequacy of Supply

Source

Water is sourced from either springs or drilled bores and either gravity fed or pumped to the property. Usually this kind of system operates on an 'on-demand' basis.

While some bores source decades old water from aquifers, several simply enter the water table in the vicinity of streams and rivers, sourcing relatively young water. In some cases, where a property has changed hands, the information on the bore has been lost, making this an unknown factor.

Without knowledge of individual situations, it is not possible to determine whether these systems provide reasonable protection against water shortage. While Greater Wellington monitors ground water allocations to try to ensure that aquifers are not overused, it is not possible to determine whether shallower systems, more vulnerable to weather provide adequate protection. Information suggests that a common solution is to:

- Purchase tankered water to augment their storage during the summer months
- Use an alternative supply (e.g. roof water or stream) for irrigation, swimming pool and toilet use)

- In the case of springs or artesian bores, place backup pump systems for use in the summer months

Treatment, Delivery and Storage

Often no provision is made for any water treatment or storage. In some circumstances cartridge filtration and UV disinfection has been installed to treat water destined for consumption (refer to section 5.1.4.5).

The water supplies are usually ungraded.

Faecal coliform testing of the water is most commonly undertaken on a yearly basis for schools, and only in response to sickness in the case of residences.

Consumer Issues

Incidence of Waterborne Disease

It is unlikely that any sickness that is attributable to the ground water supply system could be directly linked to the particular supply in question.

Public perception

A common perception of consumers of groundwater is that the supply is inherently cleaner than alternatives. The potential contamination routes are often not well– understood and often not considered important enough to critically review.

Current Demand and Water Supply Management

The water supply is used for normal consumption and in some circumstances for the swimming pool and external use.

Supply availability exceeds demand for most of the year. It is likely that there have been limited occasions when tankered water is required to augment the supply. This would usually occur during summer months or as a result of system failures.

In most areas where consumers are dependent on ground water collection systems, there is an inherent awareness of the need to avoid water wastage. However, there may well be additional ways to improve water conservation – and to minimise risks of water contamination.

5.1.5.4 SURFACE WATER

Existing Quality and Adequacy of Supply

Source

Surface water runs off catchment land upstream of the property, collecting contaminants from bush matter and/ or farm land. Water typically enters the feeder pipe from a direct intake structure on the side of a stream and flows to covered storage tanks. Typically, excessive water overflow s the tanks, either to direct soakage or into stormwater channels. It is assumed that, if more than one tank exists, they are directly connected.

Without knowledge of individual streams, it is not possible to determine whether the stream and storage tank volume provides reasonable protection against water shortage. Information suggests that a common solution is to:

- Purchase tankered water to augment their storage during the summer months
- Use an alternative supply (e.g. bore, roof water) for irrigation, swimming pool and toilet use.

Treatment, Delivery and Storage

Typically storage tanks for surface source systems are in multiples of 22.7 m3 (5000gal). The most common material is concrete, located at ground level close to the building. Stream water is usually corrosive to metallic pipes and hot water systems. Concrete tanks are known to provide some corrosion mitigation due to slow dissolution of cement, otherwise not available if plastic tanks are used.

Water is drawn from close to the bottom of the tanks and pumped directly into the plumbing system.

Often, no provision is made for any water treatment. In some circumstances cartridge filtration and UV disinfection has been installed to treat water destined for consumption (refer to section 5.1.4.5). Chlorination is usually reserved for treatment of swimming pool water

The water supplies are usually ungraded.

Faecal coliform testing of the surface water supplies is seldom undertaken.

Consumer Issues

Incidence of Waterborne Disease

It is unlikely, that any sickness that is attributable to the surface water supply system could be directly linked to the particular supply in question.

Public perception

A common perception of consumers of surface water is that an untreated supply is potable. The potential contamination routes are often not well–understood and often not considered important enough to critically review.

Current Demand and Water Supply Management

The water supply is used for normal consumption, and in some cases for swimming pool and limited external use.

Supply availability, using the on-site storage, exceeds demand for most of the year. It is likely that there have been limited occasions when tankered water is required to augment the supply. This would usually occur during summer months or as a result of system failures.

In most areas where consumers are dependent on surface water collection systems, there is an inherent awareness of the need to avoid water wastage. However, there may well be additional ways to

improve water conservation – and to minimise risks of water contamination.

5.1.5.5 TREATMENT OPTIONS

Filters

There are a wide range of cartridge filters available. Appropriate filters can be selected for specific purposes, whether to remove chemicals, to correct pH or to provide variable barrier levels to microbiological contamination.

Sections 5.12.1 to 5.12.3 of the NZ Drinking Water Standards specify the treatment compliance criteria for cartridge filtration.

On the basis that the details of the specification of each filter for each premise would have to be known to adequately assess treatment capability, the potential deficiencies of filter use are simply 'flagged' in this assessment. Water supply owners would be advised to seek expert advice about the appropriate filter for their purpose, noting that their current filters may not be as effective as believed.

Cartridge filters may be installed on the main pumped feed to the premises- downstream of any take-offs where potable water is not required (e.g. irrigation or swimming pool). In other circumstances point of use filters may be installed at outlets where water is taken for consumption

UV Disinfection

Historically, some unserviced properties have decided to install low pressure ultra violet (UV) disinfection systems for their water supply.

The ability of UV systems to inactivate protozoa (giardia and cryptosporidium) has been under debate for some time. The specification of UV systems to ensure adequate pre-treatment, UV dose, monitoring and maintenance is addressed in the NZ Drinking Water Standards sections 5.16.1 to 5.16.4.

5.1.5.6 TANKERED WATER

General

Tankered water is the most common auxiliary source of water for premises usually supplied with rainwater.

Since July 2008, the Health (Drinking Water) Amendment Act 2007 has required water carriers to be registered and their registration renewed annually. This includes transporters of drinking-water that use trucks, trailers, vessels, rail wagons and demountable tanks.

To become registered, the carrier must complete a paper form, which is assessed by a Drinking Water Assessor (DWA) from their Public Health Service Provider. Details include name and address, water supplies used for extraction, water tanks (trucks, trailers, separate tanks, etc) and fittings.

Masterton District

In Masterton District, McAuley's Transport is the only registered supplier of tankered water.

Table 5.6 summarises information supplied by McAuley's Transport as an indication of the extent of demand for tankered water in the Masterton District.

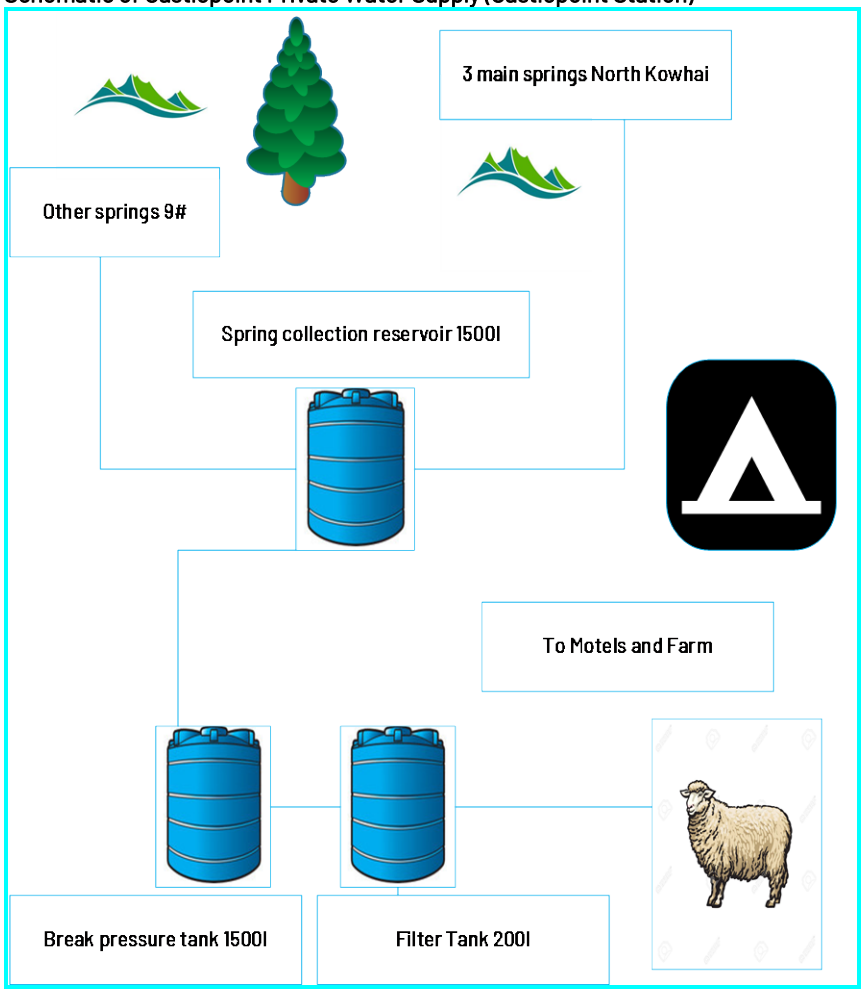
Table 5.6 District Tanker Water Requirements

Provider	McAuley's Transport (as at 2018)
Instances per year	Maximum of 363 deliveries.
Reasons	90% drought 5% leaks 5% pools
Typical locations	Rural properties and schools with one or two tanks.
Supply	There are three tankers: An Artic Unit, stainless steel. A Modular unit A Scania unit The water is only ever sourced from town supply.
Contact	Steve McMahon - GM Fiona Witinotara - HR/H&S

5.1.6 PRIVATE WATER SCHEME COMMUNITIES

5.1.6.1 CASTLEPOINT

Schematic of Castlepoint Private Water Supply (Castlepoint Station)



Schematic of Castlepoint Water Supply & Castlepoint Toilet Block Water Supply

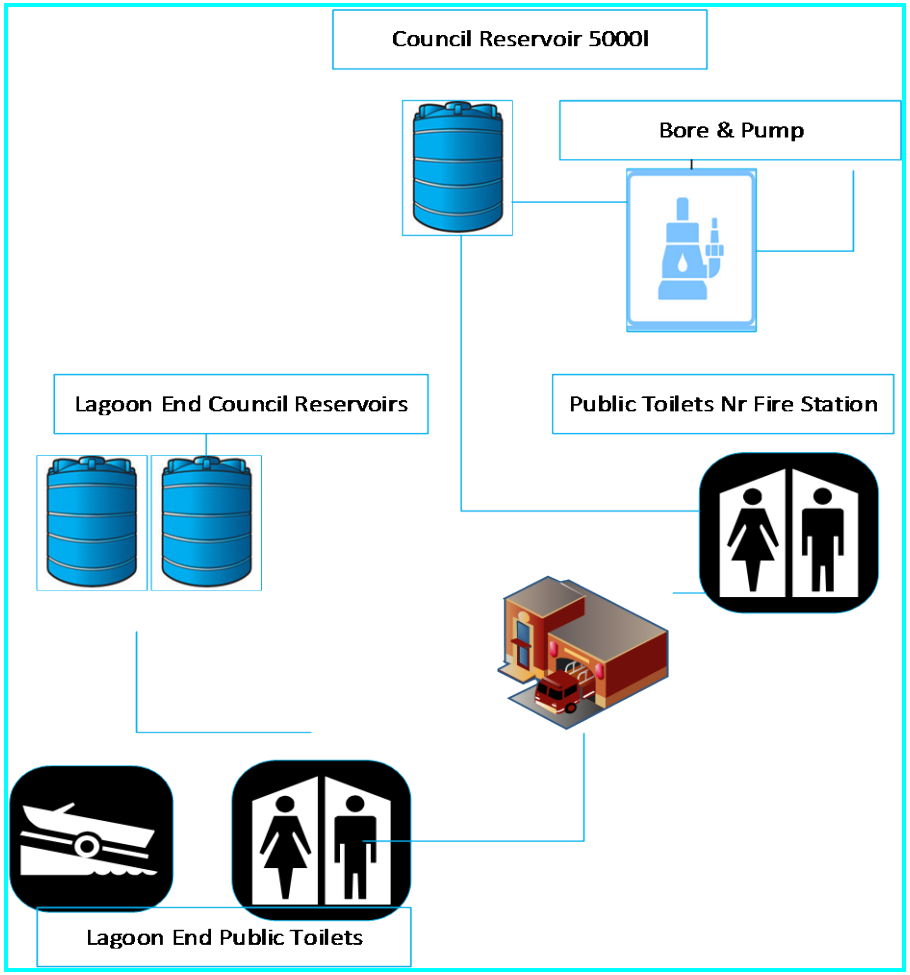


Table 5.7 Castlepoint Water Supply Details- Most below are managed by Castlepoint Station Owners

Status		Potable
Properties Connected		Station, Motels and Campground
Estimated Population		130 - 600
Catchment		Groundwater
Intake		9 wooden boxed springs
Storage	m3	54 (+ 22 at Motel)
Treatment		Chlorinated
Pressure Zones		Single
Pumped/Gravity		Gravity
Estimated daily demand	m3/ day	14 (range of 6 to 22)
Maximum Take	m3/ day	40
Consent Take		
Water Grading (source and treatment/ distribution)		u
Compliance		

Table 5.8 Castlepoint Toilet Block Water Supply Details

Status		Non potable
Properties Connected		Public toilet
Estimated Population		Toilet users only: Seasonal
Catchment		Shallow Bore
Intake		Shallow Bore
Storage	Litres	5,000l
Treatment		Nil
Pressure Zones		Single
Pumped/Gravity		Toilet blocked pumped Lagoon toilet is gravity fed

Estimated daily demand	m3/ day	4
Maximum Take	m3/ day	10
Consent Take		
Water Grading (source and treatment/ distribution)		u
Compliance		

Existing Quality and Adequacy of Supply

The Castlepoint water scheme was developed around 1955. This is a private scheme servicing the Castlepoint Station, Castlepoint Camping Ground and Motels.

The Castlepoint toilet block water scheme was developed around 2000. A shallow bore and pressure pump were installed in the road berm adjacent to the Fire Station end toilet block.

Castlepoint has a fluctuating population with a maximum of 600 people.

Source and Abstraction

Water for the Castlepoint water scheme is sourced from seven springs located inside the JN L Forest block. There are an additional two springs located inside the area known as North Kowhai that are hydraulically able to feed into the system and supply Castlepoint Station farm only, but are not used. The springs are all protected with wooden covers. Water is fed by gravity from the seven leafed spring through 50mm polyethylene piping to a 54m3 tank. The length of pipeline is approximately 11km.

Water for the Castlepoint toilet block water scheme is sourced from a shallow bore and pumped to two 15,000 litre concrete tanks that sit on the hill above the Lagoon end toilet block; and to a 10,000 litre concrete tank beside the fire station end toilet block. The Fire station end toilet block is pump fed off its own water tank.

Treatment, Delivery and Storage

The main supply line of the Castlepoint water supply is liquor injected with chlorine as the water enters the main storage tank. The supply splits to serve two 22.5m3 storage tanks at Castlepoint station and Castlepoint Motels and Campground. Water is tested by Council on a monthly basis. Chlorination rates have been adjusted from time to time in response to results. No other quality issues have been identified.

The Castlepoint toilet water supply is not treated. The bore that serves the toilet blocks is shallow and runs dry with prolonged pumping, so the pump is controlled to maintain efficiency of the water supplied to the storage tanks. Typically there is enough storage to accommodate day to day use during holiday periods, with storage recovering overnight.

Assessment to meet Future Demands

The Castlepoint water scheme is managed by Castlepoint Station. It is adequate to meet future anticipated demand from Castlepoint Station and the Holiday Park and Motels. However, it is still a limited resource and does not have the capacity to supply properties beyond this. A number of conservation measures have been implemented in the Holiday Park to conserve water and provide a more comfortable buffer. Due to the poor quality of the water supplied from the bore, the Castlepoint Toilet water supply is not a potable water supply and is not intended for consumption.

5.1.6.2 FERNRIDGE

Table 5.8 Fernridge Water Supply Details

Status		Potable
Properties Connected		Approximately 100 (2018)
Estimated Population		450
Catchment	Upper Plain –Groundwater Waingawa River flood plain	
Intake		Well
Storage	m3	210
Treatment		Filtration UV Treatment
		Caustic Soda
Pressure Zones		Single
Pumped/Gravity		Pumped from source Gravity reticulation
Estimated daily demand	m3 / day	71.8 average 194 theoretical maximum
Maximum Take	m3 / day	9.27 with current plan
Consent expiry		30/09/2037
Water Grading (source and treatment/distribution		u
Compliance		Bacteriological transgression

Existing Quality and Adequacy of Supply

Commissioned in November 1987, the Fernridge water supply is located on Upper Plain Road adjacent to the Waingawa River. The supply is administered by the Fernridge Water Supply Association Incorporated (FWSA). The supply services approximately 100 residences with potable water.

Source and Abstraction

The source draws from the flood plain of the Waingawa River. The well is 5.0m below the ground level consisting of 1m diameter concrete w ell liners with a polythene ground seal at approximately 500mm below the surface. Abstraction is for domestic use and fire-fighting purposes

Treatment, Delivery and Storage

Treatment is by a two-stage filtration system (Filterite 28 TKO A 4 housings). The pre-filters are 10 µm EPX05-40, and 1 µm absolute EA BS.ZA 01-40YYP filters from Davey Water Products Limited. Two Filtec supplied Trojan UV Max Pro30 UV units are used for sterilisation at 150 litre/ min. Caustic soda is injected via a metering pump for pH adjustment after the UV treatment. Pressures across the filter stages are recorded weekly and filters are changed in line with manufacturer's recommendations incorporated in a Standard Operating Procedures document.

The water is stored in a 90 m3 timber tank and 4 30m3 plastic tanks reservoirs then the treated water passes into the distribution reticulation and is gravity fed to the individual storage. Distribution to the member's storage tanks is by PVC pipe with flow metering restrictors and backflow preventers at each toby.

Monitoring

The test schedule for the year ended the 31st of December 2017 saw samples taken by the FWSA once a month from one of the sample points, Pump house, Reservoir, Evans Rd, Tararua Drive and Upper Plain Rd post UV treatment by Council and FWSA every three months. This equates to testing approximately every three weeks.

Current Demand

Demand is well within the current plant and consent capacity.

Assessment to meet Future Demands

Prospects for increased demand are assessed as minimal in the present environment.

5.1.6.3 MAURICEVILLE

Schematic of Mauriceville Water Supply Scheme

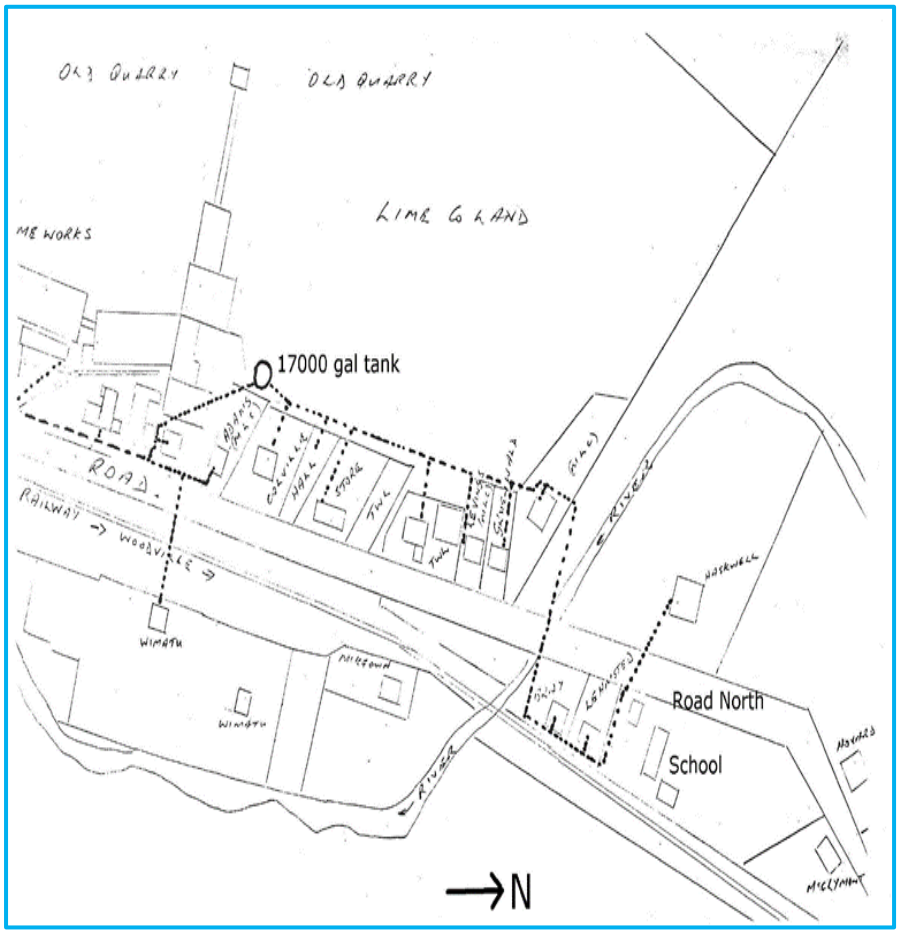


Table 5.9 Mauriceville Water Supply Details

Status		Permanent boil notice.
Properties Connected		?
Estimated Population		80
Catchment		Groundwater
Intake		Fenced spring
Storage	m3	855
Treatment		none
Pressure Zones		Single
Pumped/ Gravity		Gravity
Estimated daily demand	m3	
Maximum Take	m3/ hour	
Consent Expiry		
Water Grading (source and treatment/ distribution)		U
Compliance		E coli transgressions

Existing Quality and Adequacy of Supply

Ownership of the Mauriceville water supply is not clear. Hatuma Lime Company own and maintain the infrastructure to the Limeworks and to the one house in the Mauriceville village that they own. The supply, however, serves a steady residential and lime works population of approximately 80 people.

Source and Abstraction

The supply is sourced from a fenced spring.

Treatment, Delivery and Storage

Mauriceville reservoir is gravity fed by a PVC pipe from the spring. The supply from the reservoir is by gravity to the township and Limeworks through steel, galvanised copper and plastic pipes.

Storage of 90 m3 is located adjacent to spring. In addition there is 765 m3 of storage in the town. The supply is ungraded.

The water is abstracted for domestic use, fire-fighting purposes and stock use.

Monitoring

Monthly monitoring is carried out from a sample point at the Mauriceville Limeworks kitchen.

Assessment to meet Future Demands

Little is known about the management of this scheme and this should be the subject of future consultation/ investigations to ensure compliance with current NZDWS.

5.1.6.4 OPAKI

Table 5.10 Opaki Water Supply Details

Status		Potable
Properties Connected		350
Estimated Population		1500
Catchment		Rathkeale Groundwater Take surrounded by agricultural land
Intake		Deep well (Springlea) Shallow well (Willow Park)
Storage	m3	2 x 30,000 storage tanks
Treatment		UV Treatment+ Streaming Current pH adjustment
Pressure Zones		Single

Pumped/ Gravity		Gravity
Estimated daily demand	L/P/D	276
Maximum Take	m3/ hour	605 & 900
Consent Expiry		WAR 150209 & WAR 130324
Water Grading (source and treatment/ distribution)		u
Compliance		No transgressions

Existing Quality and Adequacy of Supply

Commissioned on the 9th of December 1991, the Opaki Water Scheme supplies approximately 800 people through 350 connections. The supply is owned and administered by the Opaki Water Supply Association Inc. (OWSA), which is elected by the members of the scheme.

Source and Abstraction

The Opaki water supply is sourced from a deep well 11-14 meters (Springlea) at the top of Paierau Road and a 6 metre shallow well (concrete lined) on Willow Park Drive, Opaki, in the Rathkeale ground water zone. The water is taken at a maximum rate of 10.5 (combined) litres a second.

The consent renewal (WAR 150209 & WAR 130324) saw an increase in water take mainly due to the Springlea bore becoming operational. A second consent from Greater Wellington has been issued for this Springlea bore.

An extensive 7-day pump test performed in 2002 confirmed that the bore should provide the required yield on a sustainable basis. (Willow park well)

The water is abstracted for domestic use, fire-fighting purposes and stock use.

Treatment, Delivery and Storage

In October 2004 the OWSA installed filtration and UV treatment in their pump shed to disinfect all water entering the supply. Results since the treatment demonstrate that the water leaving the pump shed is properly disinfected with no failures since the installation.

Streaming current pH adjustment has also been installed. Masterton District Council tests the pH of the water monthly.

The water is noted to be aggressive.

The distribution supply is enclosed by Paierau Road, Loop Line, Mahunga Golf Course and Upper Gordon Street and is a single pressure gravity feed system.

Storage is by two 30,000 litre concrete tanks, one at Tarpot Hill and one at the Masterton District Council Lansdowne compound.

Monitoring

Upgrading of treatment (October 2004) was concurrent with a change in the monitoring programme. The water supply system is remotely monitored by Harvest Electronics and information is publicly available online via the Harvest Electronics website.

Installation of sampling points within the reticulation system, as recommended by Council, was approved by the OWSA committee and testing is now undertaken three times per week by OWSA and once a month by Masterton District Council.

Assessment to meet Future Demands

Opaki Water Supply Association (OWSA) manage this scheme and provide a WSP along with supporting documents. The Opaki Water supply should be the subject of future consultation/ investigations to ensure compliance with current NZDWS.

Quantity

The current covered storage capacity for treated water is adequate to meet future demands.

Quality

Opaki Water Supply is listed as compliant with Drinking Water Standards 2000 (National WINZ database, Feb 2018- DW Online).

5.1.6.5 TAUERU (TAUWERU)

Table 5.11 Taueru Water Supply Details

Status		Non-potable
Properties Connected		15 (incl. church and hall)
Estimated Population		50
Catchment		Groundwater (Spring)
Intake		Concrete collection box
Storage	m3	46
Treatment		No Treatment
Pressure Zones		Single
Pumped/ Gravity		Gravity
Estimated Daily	m3/ day	
Maximum Take	m3/ day	86.4
Consent Expiry		2021 (WAR 110245)
Water Grading (source and treatment/ distribution)		u
Compliance		Nitrate concentration

Existing Quality and Adequacy of Supply

The Taueru water supply was commissioned and developed between 1977 and 1978. A community decision was made in 2002 and communicated to all affected parties that this supply is now for non-potable use only.

The scheme currently services a steady residential population estimated at 50 people, with some 15 residences. Of these 15 residences, in 2002 there were:

- 11 residences which had rainwater supplies for drinking water,
- 3 residences which w ere solely connected to the Taueru non-potable scheme – with drinking water from roof water tanks,
- 1 residence which was using spring supply.

Refer to Section 5.1.4, for assessment of this un-serviced, water supply.

Source and Abstraction

The supply for the Taueru Village is sourced from the Taueru Spring. The spring is covered by a concrete box and is located 1km above the village. The water is abstracted for outside water use, toilet cisterns and fire-fighting purposes.

Treatment, Delivery and Storage

From the spring 400mm galvanised iron piping gravity feeds to two 23 m3 pre-cast concrete storage tanks. Water is then gravity fed throughout the settlement through uPVC pipes ranging from 25-80mm in diameter.

The Taueru supply is ungraded and untreated.

5.2 WASTEWATER

5.2.1 FULLY SERVED COMMUNITIES

5.2.1.1 MASTERTON

Existing Quality and Adequacy of Service

Masterton's wastewater scheme is owned and operated by Masterton District Council and consists of:

- Approximately 8,180 connections, mostly from households but also including a small industrial contribution;
- A piped reticulation system;
- Four pump stations and a siphon pump station;
- A wastewater treatment plant (WWTP) at Homebush.

Homebush Treatment Plant was upgraded in 2013. Key features of the new WWTP include:

- New oxidation ponds: two primary ponds operating in parallel and five maturation ponds operating in series
- New inlet works
- New influent pumping station
- New river discharge – structures referred to as the 'diffuser'
- Live storage (controlled by automated valves) of up to 275,000m^3 in the ponds for when irrigation or river discharge is not possible
- Pond effluent pumping station and distribution system
- Border-strip irrigation system covering a net area of 72 hectares on existing pasture.

The strip irrigation system was fully operational at the end of 2015.

The Masterton urban sewerage system serves the Masterton urban area (including Lansdowne and Solway) and receives trade waste from the Waingawa industrial area. Based on the Stats ID projection June 2017 census, the population of this area is approximately 21,200

Resource Consent

Council's resource consent, WAR090066, from Greater Wellington Regional Council (GWRC) allows:

- Discharge of treated effluent to land when land conditions allow this, and especially when river flow is low and/or weather conditions dry.
- Discharge of treated effluent to the Ruamahunga River when flows exceed half median flow (12.3m3/sec between 1 November and 30 April, or 6.15m3/sec between 1 May and 31 October)
- Discharge of odour and aerosols to air from the Masterton oxidation ponds.

It includes conditions that address a number of issues, including:

- Managing, and monitoring of, the discharge and receiving environment;
- Regular reporting to GWRC and the community.

Effluent Discharge:

Treated wastewater is discharged to the Ruamahanga River when river flows exceed 6.15m^3/s in winter or 12.3m^3/s in summer. The effluent quality standards required by the resource consent are given in Table 5.13.

Table 5.13 Masterton WWTP Resource Consent Effluent Quality Standards –

Parameter	Units	Compliance Standard
BOD5 Total	g O2/m3	42 (no more than 3 over any consecutive 12 samples)
Dissolved BOD5 Total	g O2/m3	28 (no more than 3 over any consecutive 12 samples)
Suspended Solids	g/m3	91 (no more than 3 over any consecutive 12 samples)
Dissolved Reactive Phosphorus	g/m3	4 (no more than 3 over any consecutive 12 samples)
Total Nitrogen	g/m3	20 (no more than 3 over any consecutive 12 samples)
Nitrate Nitrogen	g/m3	7 (no more than 3 over any consecutive 12 samples)
Nitrite Nitrogen	g/m3	2 (no more than 3 over any consecutive 12 samples)
Total Ammoniacal - N Summer	g/m3	14 (no more than 2 over any consecutive 12 samples)
Total Ammoniacal - N Winter	g/m3	16 (no more than 2 over any consecutive 12 samples)
Escherichia coli Summer	cfu/100ml	330 (no more than 5 over any consecutive 6 samples)
Escherichia coli Summer	cfu/100ml	1800 (no more than 1 over any consecutive 6 samples)
Escherichia coli Winter	cfu/100ml	1000 (no more than 5 over any consecutive 6 samples)
Escherichia coli Winter	cfu/100ml	4000 (no more than 1 over any consecutive 6 samples)

Current Compliance Levels

GWRC's annual compliance summary dated 14 December 2017 reported that the Treatment Plant fully complied with the conditions of resource consent, with the exception of the QMCI measurements in the Ruamahanga River, a missed infiltration test for soil monitoring and the remnant sludge in the decommissioned ponds. These matter are in hand for the 2018 Reporting period and are anticipated to be sequentially resolved as the site matures and additional work in the old ponds is carried out.

Monitoring

Council currently regularly monitors, records and reports the following, in accordance with its resource consent:

- Water quality in Makoura Stream;
- Water quality in Ruamahanga River;
- Groundwater quality from monitoring bores around the WWTP site.

GWRC regularly monitors the Ruamahanga River at a number of sites for recreational water quality during the bathing season and this information is available to the public on their website. GWRC also carry out monthly State of the Environment water quality monitoring at a number of sites on the Ruamahanga River.

A plan for the upgraded Homebush operation, including monitoring and compliance, is complete. The Homebush Operations and Management Plan is reviewed annually and was last updated in 2017.

<u>Reticulation Description</u>

There are currently in the order of 8180 private connections to the sewerage in Masterton.

The Masterton urban area is serviced by 176 km of piped reticulation, which varies in diameter from 100 to 840 mm. Pipe materials used include earthenware, concrete, asbestos cement, PVC and polyethylene. The age of the pipes ranges between 0 (new) and approximately 100 years old.

The Masterton sewer system gravitates from northwest to southeast, with a siphon over the Waipoua River at Colombo Road serving the Lansdowne area. There are two minor pump stations, one at Chapel Street and the other on the south side of the Waingawa Bridge. The main pipelines converge at the Homebush corner with Pokohiwi Road and a single 840 mm diameter pipeline carries the flow from there to the WWTP. The gradual duplication of under capacity lines over time has resulted in a number of flow diversions or splits in the system, where flow can go either way within the network.

Council has an ongoing programme of work to replace and update the reticulation system, with an annual budget of $1.1 - 1.6M.

Pumps

Currently there are four pump stations and one siphon (with pumps) in the reticulation system. These are summarised in Table 5.14 with pump models and expected useful lives.

In case of power failure, Council has two portable generators that can be used to pump the wet wells down.

Storage

Apart from normal operational storage provisions within the pipes and pump stations, there are currently no storage tanks within the Masterton sewerage system.

Table 5.14 Masterton Sewerage Pump Stations

Description	No.	Pump Make	Pump Model	Year of Construction	Base Life (Years)
Chapel Street pump station					
- Pumps	2	Flygt	3085-181	1982	20
- Structure	1			1982	80
- Pumps	2	Flygt	3101-180	1992	20
- Structure	1			1972	80
Colombo Road siphon					
- Vacuum pumps	2		AC10	1997	12.5
- Structure	1			1997	50
John McDonald Mews	2			2015	20
Opaki	2			2016	8
Second St (Mast)	1	Flygt		1997	20

<u>Reticulation - Current Demand and Demand Management</u>

There have been very few overflows from the sewerage system in the past due to the high capacity of the existing pipes. Therefore, the risk to public health from sewage overflow s from manholes etc. is minimal.

<u>Demand</u>

Table 5.15 summarises the current estimated total flows and loads within the Masterton urban sewerage system.

Table 5.15 Masterton Sewer Flows and Loads (2017) - 2018 WW AMP

	Average Flow (m3/d)	Peak Flow (l/sec)	BOD (kg/d)	SS (kg/d)
Domestic	14,830	692	1,316	1,530
Trade	670	8	516	292
Total	15,500	700	1,832	1,822

Peak flow assumed based on a theoretical peaking factor of 3.

From Table 5.15 it can be seen that a small percentage of the average flow (4.5%) is attributed to industrial sources. However, in comparison, trade waste appears to exert a disproportionate load (39% for BOD, 19% for SS) on the system.

The average wastewater flow to the WWTP is in the order of 14,830 m3/ day. This is significantly higher than the 5,200 m3/ day flow that would be expected from a township with a population of approximately 19,233 people on the basis of 270 litres/ person/ day. The high influent flows are due to groundwater infiltration and stormwater inflow to the reticulation system.

The influent flow can be as low as 8,000 m3/ day during the summer and has exceeded 40,000 m3/ day during wet weather in a normal year. A high of 60,000 was recorded in July 2006 during a storm event.

The influent flows received at the WWTP are typically lowest at about 06:00 am and peak at about 10:00am.

Management and Operation

Council's levels of service for the wastewater service are:

- To provide efficient and effective wastewater systems for the collection, transfer and disposal of wastewater;
- To provide wastewater disposal that is acceptable, safe and has minimal environmental impact.

Maintenance

City Care Limited, Council's maintenance contractor, currently carries out renewals, extensions and maintenance of the reticulation system.

Council's Service Engineer – Water and Wastewater manages private connections to the sewerage system.

Council's Service Engineer is responsible for trade waste discharges and the implementation of the trade waste bylaw.

Council's contractors attend emergency callouts to incidents such as blockages and surcharging of the sewerage system.

Renewals

Wastewater pipelines are assessed and graded based on their risk of failure. Pipes assessed as a structural grade 5 require replacement. Other parts of the wastewater system are replaced when they are no longer able to provide an acceptable level of service.

New wastewater pipelines are designed to cope with an average discharge of 270 L/ d from every person using the system. Additional capacity is also provided to enable pipelines to cope with unusual flows up to 4 time's normal flow and to cope with future development including industrial areas.

For more information, please refer to the Wastewater Asset Management Plan.

Performance

A significant expansion of the system capacity to eliminate existing overflows and allow for future expansion and the inclusion of the Waingawa industrial area was undertaken in the 1970s. This, combined with the 1997 upgrade of the syphon serving Lansdowne, has all but eliminated sewage overflows.

An assessment of system performance has shown that the reticulation has generous hydraulic capacity, a conclusion supported by the virtual absence of overflows in spite of the high flows that exist (Beca, 2004a).

The approach of eliminating overflows by increasing capacity, combined with an ageing system and relatively high groundwater levels, has resulted in high levels of stormwater inflow and groundwater infiltration to the reticulation system. Consequently, Masterton's wastewater flows are greater than normally accepted design figures, which is not unusual in terms of existing infrastructure.

Treatment Description

The Masterton WWTP biologically treats the wastewater from the Masterton urban area and septic tank wastes. The location of the WWTP is shown below. This section discusses the current treatment and disposal process and its operation and maintenance.

Process within Current Ponds

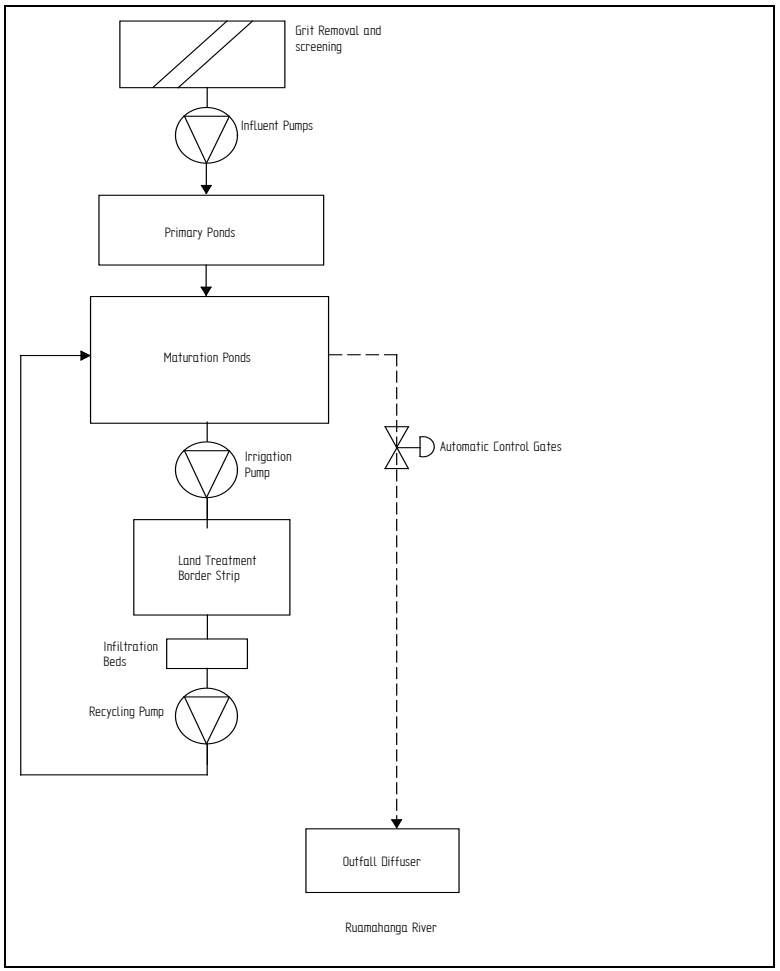
Homebush WWTP process is primarily border strip irrigation with only partial discharge to the Ruamahanga River during higher than median flows.

There are 7 ponds, covering an area of 24.90 ha. Ponds 1A and 1B are operated in parallel and are known as the Primary Treatment Ponds. Ponds 2 to 6 are Maturation Ponds and also double as storage ponds through allowance surcharging when river discharge is not possible. Total pond live storage provided for is 275,000m3. Ponds 2 to 6 have a series of baffles through them to assist with directing the through-flow and avoid short circuiting.

The current plant process is summarised below.

Please note for a more details on Masterton Waste Water Treatment plant please refer to Masterton District Councils Operations and Management Plan 2017 Revision C (August 2017) MDC.

Masterton WWTP Process Schematic



Grit removal and Screening

Grit and solids are removed by grit traps and mechanical screening prior to pumping. Two screens are available (Duty and Stand-by), although the plant can operate with one.

Influent Flow Measurement

The influent flow is measured prior to preliminary treatment by a magflow meter located on the inlet pumps. The meter is calibrated as accurate to +1%.

Preliminary Ponds

There are two primary ponds operating in parallel and five maturation ponds operating in series. These ponds cater for up to 275,000 m3 of live storage (in addition to treatment capacity) when irrigation or discharge to the Ruamahanga River is not possible.

Ponds

Following preliminary treatment, the flow is evenly split between the two primary ponds (Ponds 1A and 1B). The areas of Ponds 1A and 1B are 8.47 ha and 8.07 ha respectively. These ponds function as oxidations ponds and provide storage of the wastewater.

The Maturation Ponds (Ponds 2-6) provide further reduction of organic matter and some removal of solids, however principally provides removal of bacteria and pathogens.

The ponds are lined with a 400mm thick compacted clay layer, overlaid with 4mm polyethylene sheeting, and is leak proof. This prevents contamination of the ground water and infiltration.

For more information, please refer to the Wastewater Asset Management Plan.

Effluent

Treated effluent is discharged to land as part of a border strip irrigation system. Wipe off drains collect excess irrigation water and direct it to infiltration basins, which are collected and pumped back to the maturation ponds. Irrigation will occur whenever soil conditions will allow this, typically between 1 November and 30 April each year. Discharge to the Ruamahanga River will also be allowed when flows are higher than the median, providing an alternative option for discharge during periods of high rainfall.

Facilities

There is a building at the WWTP that contains a garage/ workshop, control room, laboratory, office, lunch room and ablution facilities.

Access to the treatment site is via a formed, metaled right-of-way (recorded on Certificate of Title 49C/ 901 Wellington Land Registry) from the Te Whiti Road.

Power

Power to the plant is provided via overhead power lines along the Manaia Road corridor. Due to the nature of facultative oxidation ponds and the oxygen for oxidising organic matter being provided by algae, the WWTP is not heavily reliant on power. Power failure would not have significant consequences in the short term.

However, the following components do require power and thus would be affected by a power failure:

- Inlet flow meter;
- Inlet pumps x 4;
- Automatic step screen and screenings press;
- Aerators;
- Ultrasonic level sensor at the outlet; and
- Dissolved oxygen probes.

A 300 kW diesel generator at the WWTP can provide power for the step screen and press in the event of a blackout. If there is a fault with the inlet step screen or power cannot be supplied to it, the influent is diverted to pass through the manually raked screen.

If the aerators are out of service and the dissolved oxygen levels in the ponds are low or there is insufficient wind for mixing, a dinghy

with an outboard motor can be run on the ponds to provide additional oxygenation and mixing.

Treatment – Current Demand and Demand Management

The Masterton WWTP is performing in accordance with its interim resource consent.

Council's Trade Waste Bylaw was adopted as part of the Consolidated Bylaw, and came into force on 1st Sept 2012. This is a tool that will help Council and industry manage the discharge of toxic substances to the plant. As the Masterton WWTP uses a biological treatment process, these substances may adversely affect the plant's ability to treat the wastewater.

The treatment plant is completely fenced and there is a sign at the entrance from Masterton-Martinborough Road warning visitors of hazards.

Personnel

The WWTP is operated and maintained by three operators that report to the Manager, Utility Services. The operators are based at Council's Kaituna Water Treatment Plant. The operators attend the WWTP approximately three or four times a week to check the operation of the plant, dispose of the screenings and carry out maintenance work.

One of Council's Environmental Health Officers regularly monitors the effluent quality, receiving water quality, groundwater quality, groundwater level, and pond performance and odour. The Environmental Health Officer also completes the plants operational log, which records changes in procedures and unusual or significant events that occur at the plant.

Maintenance

- Checking the performance of all mechanical and electrical equipment at the plant;
- Checking the inlet flow meter and removing obstructions;
- Maintaining the step screen and screenings press in accordance with the suppliers instructions and removing any debris trapped in the screen;
- Lubricating the aerators in accordance with the suppliers' instructions;
- Checking for pipe blockages and removing obstructions;
- Cleaning the outlet screen and outlet weir of trapped material;
- Removal of pond weed for the outlet level monitor stilling well and flushing the stilling well;
- Greasing wheel gates to prevent rust and seizure;
- Maintaining the scum baffles on the outlets of the ponds;
- Maintaining the pond wave bands with rip-rap to prevent internal erosion;

- Removing vegetation from the inner slopes of the pond embankments;

- Removing scum from the surface of the ponds.

Sludge Removal

Desludging is a normal part of oxidation pond maintenance. The frequency of desludging depends on the loading rate to the ponds. When sludge accumulation is excessive, the pond performance deteriorates due to a loss in treatment pond volume.

As the new ponds age and sludge builds up consideration must be given to de-sludging the ponds. The use of level control in the ponds can be used to minimize odour.

Performance

Flow rates of the effluent to the Ruamahanga River are measured by flow meters installed at the two river discharge gates. Flow rates are automatically recorded for the effluent discharged to the border strips by a flow meter at the irrigation pump station. The flows to the drip irrigation system are monitored by a separate stand-alone system.

The MWWTP has a SCADA system that records data from the overall site, including the ponds. The following effluent outflow data is collected:

- Flow to land and river – running total, monthly strip application volumes and annual average.

- Instantaneous river discharge and irrigation flow rates (transmitted via telemetry to GWRC), plus annual and daily rainfall

On a weekly basis the WTPS ensures that continual measurement and recording of the treated wastewater flow is carried out and that the necessary meters are well maintained and calibrated in compliance with resource consent conditions.

Effluent Quality

Effluent to be discharged to river or to land must not exceed the specified standards outlined the resource consent. This requires various monitoring on a daily, weekly, monthly, 6 monthly, and annual basis.

With the current system, treated wastewater effluent is discharged to the Ruamahanga River. The Ruamahanga River is used for recreational activities (e.g. bathing) and food gathering. Therefore, there are potential health risks to river users from the effluent discharge. Council undertakes the following activities to minimise these risks:

- Efficient operation and maintenance of the WWTP;

- Regular monitoring of water quality in the Ruamahanga River and public notification if bacterial levels exceed accepted guidelines;

- Implementation of risk communication strategy, including warning signs.

To date there is no evidence of disease or illness due to inadequate disposal of sewage effluent in Masterton.

The water quality of the Ruamahanga River, downstream of the MWWTP, typically meets most national water quality guidelines including water clarity change, colour change, livestock drinking water, aquatic life, temperature and pH change, dissolved oxygen and periphyton cover

Future Demand and Demand Management

Flow prediction

In order to estimate the future flows to, and loads on, the Masterton WWTP, both domestic and industrial sources must be considered.

Domestic Population Growth

For the purpose of determining the future flows and loads to the Masterton WWTP, a static domestic population over the next 20 years has been assumed. Therefore, it is expected that the domestic wastewater flows and loads to the Masterton WWTP will remain unchanged over the next 20 years. There may be some reduction in wastewater flows from water conservation measures such as appliances with water- saving systems (e.g., dishwashers and washing machines) and half-flush toilet cisterns. However, the reduction is likely to be small in comparison to the total influent flow.

Council has advised that it expects more subdivisions and infill to continue in the urban area in the future. However, as recent population trends indicate an unexpected rise in population for the district (Statistics NZ, 2017), it is likely that urban infill will only result in a lower occupancy rate and an increase in population. Census results show a trend of decreasing occupancy rate both nationally and within the Masterton district. Further 2018 census results in late 2018 and early 2019 will aid in demographic data.

Trade Waste Increases

Wood volumes are expected to increase over the next 15-20 years. Therefore, an allowance has been made for wood processing discharges based on the characteristics of typical pre-treated wood processing wastewater.

Table 5.16 Estimated Industrial Flows and Loads (poss future load from Beca, 2008)

Industry	Current Load 2017 (AMP)			Poss. Future Load 2027		
Industry	Flow m3/d	BOD kg/d	SS kg/d	Flow m3/d	BOD kg/d	SS kg/d
Current discharges	670	516	292	892	687	409
Wood processing discharges	N/A	N/A	N/A	329	23	20
Total	**670**	**516**	**292**	**1,221**	**710**	**429**

Summary \

The 2017 baseline flows and loads, and estimated future wastewater flows and loads from both domestic and industrial sources to the Masterton WWTP are summarised in Table 5.17

Table 5.17 Masterton WWTP Flows and Loads (WW AMP 2018)

	2017				2027 (Projected)			
	Av. Flow (m^3/d)	Peak Flow (l/sec)	BOD (kg/d)	SS (kg/d)	Av. Flow (m^3/d)	Peak Flow (l/sec)	BOD (kg/d)	SS (kg/d)
Domestic	14,830	692	1,316	1,530	14,830	692	1,316	1,530
Trade	670	8	516	292	1,220	14	710	429
TOTAL	**15,500**	**700***	**1,832**	**1,822**	**16,050**	**706**	**2,026**	**1,956**

Reticulation upgrades

Ongoing reticulation investigations have been undertaken in Masterton, including closed circuit television inspections and smoke testing. The results of these investigations have assisted in identifying sewer inflow and infiltration sources, and guide sewer replacement and maintenance work.

The information gained from the investigations has also been incorporated into the Council's asset management planning process. The existing sewer asset database has been updated improving the assessment of required future investment. This will enable identification of appropriate expenditures, and therefore the scope and timing, of future repair and rehabilitation contracts.

For more information, please refer to the Wastewater Asset Management Plan.

Treatment upgrades

As noted, Homebush WWTP has recently been upgraded. The new facility was operational in 2013 and has improved environmental outcomes. For more information, please refer to the Wastewater Asset Management Plan.

5.2.1.2 TINUI

Table 5.19 Tinui Sewerage Scheme Details

Properties Connected	20 equivalent properties including the School, Hall and Playgroup
Estimated Population (2001)	Approx. 114 being served
Estimated daily ADWF	7.1 m3/ day
Estimated daily PWWF	100 m3/ day
Discharge Location	Disposal to Land
Maximum Discharge	35 m3/ day or 210 m^3/ w eek
Consent Expiry	WAR 050019 – expires 30 September 2030

Existing Quality and Adequacy of Supply

Reticulation

The WWTP at Tinui was upgraded between 2007 and 2011 from a septic tank system to a pumping station and infiltration wetland system near the Whareama River.

Reticulation and private drainage at Tinui were replaced between 2007 and 2011 when the WWTP was upgraded. This is now a newly built system and all pipes are in 'as new' condition.

Treatment/ Discharge

A 23m3 reinforced concrete septic tank that is located beside the community hall on Black Hill Road, Tinui serves the community wastewater scheme and was built in 1950. The main septic tank serving the Tinui School is beneath the playing fields and a second septic tank at the school serves the swimming pool changing sheds. Another septic tank serving the play-centre is also connected to the sewerage reticulation.

Wastewater from the septic tanks is pumped to a constructed wetland for final treatment and disposal to land.

Resource Consent

Council's resource consent from Greater Wellington Regional Council (GWRC) WAR050019 allow s:

- Discharge of treated effluent to land, and contaminants and odour to air

It includes conditions that address a number of issues, including:

- Managing and monitoring of the discharge and receiving environment;
- Regular reporting to the Regional Council and community

Current Demand / Future Demand

The current average demand on the existing Tinui wastewater scheme was last measured as 7.1m3/ day in 2002.

Assessment to Meet Future Demand

Quantity

The upgraded Tinui sewerage scheme is believed to have sufficient capacity for current and future demands. No increased demand for wastewater disposal is expected at Tinui

Quality

The conditions of the current resource consent, granted in December 2005, address quality issues now and for the foreseeable future.

5.2.1.3 RIVERSDALE

Table 5.20 Riversdale Sewerage Scheme Details

Properties Connected	Approx. 293 houses + 66 house equivalents from two campgrounds
Estimated Population (2017)	Approx. 2,113 peak summer population
Estimated daily ADWF during peak population	389 m / day
Estimated daily PWWF	9 m3/ day off pea
Discharge Location	Disposal to Land
Maximum Discharge	468 m3/ day at maximum development
Resource Consent - Expiry	WAR090346 – 30th September 2039

Existing Quality and Adequacy of Supply

Reticulation

Construction of a new wastewater system, with associated sewer reticulation, at Riversdale Beach commenced in 2009. The scheme received its first flows in October 2011.

The system is gravity fed with the exception of six known (poss nine) properties that require small pumps. There are six pump stations across the network: five lift pumps and one main pump station. Effluent will be transported to a main pump station at the Southern end of the community and then pumped 2.8km to the treatment plant.

The scheme provides reticulation to all houses, campground and public facilities within the community.

Treatment/ Discharge

The Riversdale WWTP is located 2.8km inland and consists of three oxidation treatment ponds lined with 2mm thick HDPE (high density polyethylene) liner, and a spray irrigation scheme. Treated effluent will be disposed to land

Resource Consent

An application for resource consent was made and granted in 2009.
Current Demand / Future Demand

Riversdale Beach has a varying population. It is made up of approx. 270 houses and

66 house equivalents from two campgrounds. Riversdale Terraces subdivision, when fully developed, will add an additional 80 houses. The community has approximately 60 permanent residents but the population swells dramatically during the summer holiday period to approx. 2,113 people.

The Riversdale scheme has been built to cater for peak summer populations. Additional land has been acquired to enable further expansion in the future if required.

Assessment to Meet Future Demand

Quantity

Peak summer flows have been estimated by Duffill Watts (2009) and are expected to be in the order of 20 l/s, with a future average daily dry weather flow of 4.5 L/s (388 m3/day) during peak occupancy.

The annual projected wastewater volume to be irrigated by the year 2038 is projected to be between 23,250 and 39,011 m^3 per year.

Quality

There are no industrial areas at Riversdale Beach, so it has been assumed that the effluent strength will be typical of domestic wastewater. However, given the seasonal and holiday nature of the community the raw wastewater may be slightly stronger than that typically observed in permanent urban communities.

The conditions of the current resource consent, granted in 2009, address quality issues now and for the foreseeable future

5.2.1.4 CASTLEPOINT

Table 5.21 Castlepoint Sewerage Scheme Details

Properties Connected	Presently 197 equivalent lots
Estimated Population	Up to 1,300 during peak holiday periods
Estimated Daily ADWF (2005)	32 m3/ day (0.37 L/ s)
Estimated Daily PWWF (2005)	90 m3/ day (1.04 L/ s)
Discharge Location	Castlepoint Stream
Maximum Consented Discharge	1987 m3/ day (23L/ s)
Resource Consent ID	WAR080010 Exp 10/04/29

Existing Quality and Adequacy of Supply

Reticulation

In 1994, a community wastewater scheme was designed and constructed based on a fully reticulated system. A network of PVC gravity mains collects sewerage and transfers it to a wastewater pump stations near the local fire station. Wastewater is then pumped via a 100mm diameter rising main to the treatment site.

A second pump station at the far end of the lower catchment on Jetty Road is used as an intermediate system to pump up a small rise to the main gravity system.

The reticulated wastewater network predominantly serves residential properties. Known commercial connections include the Castlepoint Motor Camp, motel and takeaway food outlet. The golf club and fish processing plant are located some distance from the settlement so are not connected to the wastewater reticulation, and are understood to have private onsite treatment facilities that may include septic tank or packaging plant.

Treatment/ Discharge

Existing treatment is carried out by a single oxidation pond and three infiltration wetland cells. Treatment and eventual disposal occurs via the primary oxidation pond followed by three evapo-transporation and soakage basins. The remaining effluent overflows to a natural wetland area.

The Castlepoint treatment system was designed to cope with loads varying from 22 people midweek to almost 600 during the Christmas and Easter holiday periods. However, during holiday periods peak population can reach 1,300 people.

Investigations in 1997 showed higher than anticipated treatment plant inflows due to wet weather. Other causes included some illegal private connections and lower than originally estimated ground soakage/evapo-transpiration rates.

The ponds operate in an unloaded state for most of the season but are overloaded during the peak holiday and rainfall periods. A mobile aeration unit was installed in 2004, powered by reticulated power, to increase the performance of the treatment system on demand and help prevent overloading.

The original design was intended to promote evaporation and infiltration. H ow ever, the site has resource consent to discharge directly to the stream in periods of high rainfall. An overflow system discharges into Castlepoint Stream at a point downstream of the Castlepoint Station. All overflow s are monitored to determine the quality of discharge.

Pump Stations

There are two wastewater pump stations serving Castlepoint. A submersible pump station is located at the far end of the catchment in Jetty Road. This station pumps wastewater collected from the lower eastern end of Jetty Road to the main gravity system via a 63mm diameter rising main.

The main duty/ standby pump station is located near the fire station and pumps wastewater collected from the entire reticulated system to the treatment site via a 100mm PVC rising main. The main pump station can be utilised as an emergency storage chamber during peak demands.

Consumer Issues

Illegal Private Connections

A study in 1997 to investigate stormwater infiltration found a number of illegal connections within the wastewater system. Some infiltration was caused by stormwater being misdirected over private gully traps.

House by house inspections together with smoke testing w ere used to identify illegal connections and discharges. Council served requisitions to property owners to rectify faults and those identified w ere later fixed.

Other Consumer Issues

The public perception regarding the Castlepoint wastewater collection and treatment system is believed to be good. Council regularly clean the pump station wet wells to remove fatty build ups.

Infiltration

Like most wastewater networks, Castlepoint has a history of stormwater infiltration within its reticulation system. Increased wastewater discharges have been found to closely follow local precipitation rates. Investigations into sources of infiltration have been carried out to rectify and minimise infiltration. It is not known what quantity of stormwater infiltration is currently entering the system.

Current Demand / Future Demand

The current base and peak inflows to the infiltration basins are well within consent limits, as is the future demand.

Effluent Quality and Overflow Monitoring

Effluent quality is monitored at an overflow when the treatment ponds become overloaded. During peak rainfall effluent bypasses the wetlands and overflow s directly to Castlepoint Stream. Monitoring of the steam and treatment site overflow has been carried out since 2002 by Council and results have met the resource consent conditions.

Monitoring of Castlepoint Stream is carried out in two locations to compare upstream quality from the Castlepoint farming station and downstream quality including the treatment overflow discharge. In some cases the upstream water quality from the farm has been below the treatment site overflow quality, making the treatment site discharge non-critical.

5.2.2 UNSERVICED COMMUNITIES

5.2.2.1 GENERAL

Unserviced areas do not have a Council operated treatment or reticulation system. These areas primarily use privately owned and privately maintained systems for the disposal of sew age.

Inappropriate and poorly maintained septic tank systems pose the greatest risk to the public health and the environment. Exposure to faecal and pathogenic pollution can result in adverse health impacts for persons exposed to contact with polluted waters.

The assessments have identified options that are available to address potential public health risks, integrating systems and stakeholders understanding. It is acknowledged that individual owners of the facilities may have adopted some of these options already by way of:

- Purchase and installation of more sophisticated equipment
- Greater level of planned maintenance

5.2.2.2 RURAL SETTLEMENTS

Many of the rural settlements of the Masterton District have an unserviced sewerage system. Within these communities is long established residential, educational and commercial land usage. Individual septic tank systems with a range of disposal methods serve these communities.

These communities include:

- Wainuioru
- Taueru
- Mataikona
- Opaki

5.2.2.3 RURAL SCHOOLS

Within the boundaries of Masterton District, there are a number of rural schools that have an unserviced sewerage system. For purposes of the Water and Sanitary Services Assessments, they have been regarded as separate communities. Key features relevant to the description of the wastewater services are summarised in the table below:

Table 5.22 School Wastewater Systems (School numbers 2017 – Education counts)

School Name	Number of Pupils	Septic Tank		Pumped	Discharge Process	Effluent Testing
		No of	Vol (L)			
Fernridge	210	1		No gravity	Leaching field	No
Mauriceville	32	1		Pumped	Sand filter to leaching field	No
Opaki	200	2		To and from Septic Tank	Leaching field	No
Rathkeale College	327	Private Treatment Plant including 1x Septic Tank		No Gravity	Sewage ponds	Yes
Wainuioru	87	1	3000	from tank	Leaching field	No

Fernridge School

Fernridge School operates a septic tank and leaching field system.

Mauriceville School

An existing septic tank and sand filter system was upgraded in 1999 to incorporate a pumping chamber with small diameter rising main to an irrigation disposal field. A multi stage submersible pump delivers settled and filtered effluent over a distance of approximately 200 metres via a small diameter rising main to the leaching field.

Opaki School

Opaki School operate a double septic tank system with pumped inflow and outflow to a leaching field.

Wainuioru School

Wainuioru School operates a septic tank and leaching field system.

The Board of Trustees of each school has responsibility for the management of wastewater services, receiving funding from the Ministry of Education's Operational Grant.

Capital expenditure to replace depreciating wastewater services assets is also the responsibility of the Board of Trustees.

5.2.2.4 RURAL FACILITIES (HOMESTAYS, CAMPS AND MARAE ETC.)

While many of these facilities do not meet the community criteria of '25 people for

60 days', these are situations that are considered to be of high risk and have therefore also been included in this part of the Assessment.

Due to the undocumented nature of these facilities, it was not practical to investigate these communities individually. As the risks are unlikely to differ between these facilities and individual dwellings, a single generic risk assessment has been completed (see Chapter 6). During consultation, or in future studies, more information may be gained which might point towards some facilities presenting a higher risk to public health than others.

Known facilities include:

- Ararangi Camp
- Clark Memorial Reserve (Mauriceville)
- Homewood Marae
- Te Ore Ore Marae
- Whakataki Hotel

See Appendix 4 for a full community listing.

5.2.3 SEPTIC TANKS

Existing Quality and Adequacy of Service

Treatment and Storage

There are many different types of septic tank systems used in the Masterton District. Septic tank wastewater disposal systems include:

- Single Chamber
- Multi Chamber
- Aerated System
- Pumped System
- Siphon Dosing System

Old private septic tank systems were commonly installed without a building consent and some of this older information is not readily available.

There is currently no monitoring of system performance post construction, unless environmental issues occur on the site.

Disposal

Most septic tank systems use a land application system for the disposal of wastewater. Disposal systems are also known as drain fields or leaching fields. Land application systems should be determined depending on local soil types and draining characteristics. Types of land application systems for wastewater discharge/ disposal include:

- Drip line irrigation systems
- Evapo-transpiration seepage beds
- Low pressure effluent distribution trenches
- Wisconsin mounds

Current Demand and Demand Management

Septic tanks pose a risk to public health and the environment due to possible failure. Failure of a septic tank system is usually the result of inappropriate installation or poor maintenance. Failure is usually gradual and can go unnoticed. Septic tank failure leads to contamination of groundwater or water courses and often affects properties downstream of the septic tank system.

The failure of septic tanks can be attributed to the following:

- Land application system not coping
- Septic tank is full or blocked and needs pumping out or desludging
- Inflow rate is beyond capacity of land application system
- Toxic chemicals entering the septic tank system (e.g. hydrocarbons)

It is assumed that when the system is first constructed it meets the demand of the users.

Assessment to Meet Future Demand

Quantity

Where the rural areas show particular growth, and the possibility of land use issues in the future which Council may need to take a lead on in ensuring development caters for all on site demand issues.

Quality

Future quality of private systems or at risk systems will be an issue of consultation with community groups.

Treatment Options

- Septic tank upgrades
- Clean out old septic tank and ensure operation.
- Upgrade to a more sophisticated septic tank such as mechanical aeration or re-circulating filter.

Disposal field upgrades

Introduce drip line irrigation, or other system listed above to replace poorly operating soakage field in accordance with specific design requirements. Note that if effluent is to be disposed of at the surface, an increase in effluent quality will also be required, or an area of land may need to be fenced off to avoid human contact.

Education

Education of private septic tank owners to encourage maintenance of their systems is one cost effective option available to Council.

Information on known problems with septic tanks can assist Council with a direct approach for education or monitoring.

New Zealand Standard (NZS 1547:2012)

NZS 1547:2012 gives guidance on management procedures and information on sustainability for on-site domestic wastewater systems. In particular, the standard gives operational guidelines for compliance, with public health and environmental requirements. The standard is a useful document and is presently used by Council.

Handbook: "The Story of Your Septic Tank System"

The Ministry for the Environment together with NZ Water & Wastes Association (NZWWA) have published a useful handbook for owners and operators of private septic tank systems. The handbook describes septic tank systems and provides excellent advice on how to operate and maintain an effective wastewater system for protection of public health and the environment. The handbook can be purchased from NZWWA and is a good educational tool for Council to distribute to rate payers and the community. NZ Councils have had great success with the handbooks to date; some have negotiated with NZWWA publishing to have their contact details and logo printed on the back cover.

5.3 STORMWATER

5.3.1 FULLY SERVED COMMUNITIES

5.3.1.1 MDC STORMWATER DRAINAGE ASSET MANAGEMENT

Overall responsibility for the management and operation of the Masterton District Council (MDC) stormwater assets rests with the Manager Assets and Operations of MDC. The management of maintenance, capital works and operational contracts is delegated to the Manager, Utility Services, with some input from the Roading Manager.

Currently City Care Limited are contracted to carry out all planned maintenance of the stormwater assets. This includes ensuring sumps, open channels and outlets are free of debris, controlling plant growth and maintaining drainage channels.

Unplanned maintenance, including repair of erosion damage, is also mainly undertaken by City Care Limited.

Pipe replacement or renewals are programmed according to the level of service not being achieved and/ or frequent failure rate.

Several private flow paths exist in the drainage network. The condition of these open channels is primarily dependent on the landowners who are responsible for their maintenance.

GWRC also has a role to play in maintaining the receiving rivers and ensuring that high flow s can pass without aggravating flooding problems.

For more information please refer to the Stormwater Asset Management Plan 2018.

5.3.1.2 MASTERTON

Existing Quality and Adequacy of Service

Current System

The urban stormwater networks in Masterton District are relatively basic networks collecting predominantly runoff travelling along the kerb and channelling. A combination of sumps, pipes, manholes, man-made channels and natural flow paths are used to transfer the flow s from the roading network to the discharge outlets at neighbouring streams and rivers. This generally flows from the western to the eastern side of the town.

Residences typically have their roof water connected to a private soakpit, with overflow to kerb and channel. This reduces the volume of flow to the piped network significantly, while allowing a backup system for use in extreme events or when soakpits become clogged over time.

The roading department of Council also maintains several culverts and roadside drains to alleviate flooding problems at roadsides.

The stormwater reticulation system pipes vary in size from 150mm diameter up to 1,800mm diameter. It includes pipes made of earthenware, concrete, steel, aluminium and PVC. The earliest pipes were laid in the 1920s and the most recent in 2011.

Each pipe is assigned a condition rating with grades based on the NZ Pipe Inspection Manual (2006).

Table 5.23 Masterton stormwater drainage pipe sizes and materials.

Diameter	AC	Alu.	Steel	Conc.	EW & Drain	PVC & PE	Other
mm		m	m	m	m	m	m
100	27.41		18.5		806.7	1018.32	159.33
150	2.53		15.26	1821.75	769.63	288.62	2716.49
200	29.9		75.34	117.13	28.56	508.06	
225				6643.29	604.46	116.92	
250			348.35	1195.15	13.49	183.09	
300	186.6		48.24	10231.4	526.81	328.52	
325				259.38		108.61	
375				1884.43	216.49	317.59	
450		209.52		4742.05	208.22	10.15	16.76
530				1955.6			
600		112.83		2449.32			
675				114.22			

750				2031.08			20.7
825				47.64			
900				1491.98			25.33
1000				107.67			
1200				148.36			
1350				17.97			
1600				18.18			
1800				745.23			
22500				27.15			
Totals	**246.43**	**322.35**	**505.69**	**36048.98**	**3174.36**	**2879.87**	**2938.61**

There are no publicly owned stormwater treatment systems in the Masterton District.

Consumer Issues

Any complaints about the existing network are directed to MDC and are dealt with on a case by case basis. Those areas which appear to require further investigation are listed in the following section. Council aims to "have all stormwater ponding incidents cleared within 2 days of a rainfall event ending".

Current Demand and Demand Management

The existing stormwater system is generally believed to have the capacity to provide the level of service agreed with the community. H ow ever, problems do occur during extreme weather and when network components haven't been maintained properly. Typically the problems can be summarised as:

- Local ponding – caused by lack of capacity, low points unserviced by the system, overflow from roads etc.

- Flooding from system failures – due to high river levels, blockages etc.

A more in-depth study of the 'Town Drain' system was carried out in 1995 following flooding of the central business district in 1993. This study identified an action plan for capital works, the majority of which have been implemented to upgrade this system and reduce the risk of flooding.

Stormwater drainage is funded by a uniform rate, targeting each rating unit that is within the Council urban stormwater drainage area.

Due to limited funding, Council has traditionally concentrated on relieving major flooding problems in the urban areas, in preference to investigating quality issues and small scale flooding problems. However the Council believes that the stated level of service is generally being met, with roadways designed to act as secondary flow paths where necessary.

Council currently requires all proposed developments to demonstrate that they will not be discharging additional flows post development. Flow s from new roads, where required, are usually connected to the stormwater reticulation. Roof runoff however, is required to be disposed of on-site, through properly designed soakpits, typically with overflow s to kerb and channel. New developments in the urban area must comply with minimum design standards.

Assessment to Meet Future Demand

Population growth is not expected to significantly impact on Masterton District's urban stormwater systems. Population statistics suggest an increased population trend. New property development in the urban area has tended to be in the form of infill housing and this does influence the urban stormwater reticulation capacity.

New connections and extensions to the existing stormwater system for new developments are provided on a "User Pays" basis, with the consenting process being the catch net for any capacity issues caused by urban development. The developer is required to make appropriate upgrade contributions in cases where the existing system does not meet capacity requirements for proposed developments.

Additional demand management techniques, such as promotion of on-site collection and use, detention systems and impervious surface regulation are often useful in areas where capacity is limited.

The existing stormwater system, especially following cleaning, has sufficient capacity to accommodate these changes in demand.

Climate change is also likely to impact on stormwater services in the Masterton District. Rainfall figures collated by the New Zealand Climate Change Office between 1978 and 1998 showed that rainfall in Masterton District, on average, decreased over the twenty year period. This trend is expected to continue. The effects of climate change could also cause an increase in the number and frequency of extreme weather events and rising sea levels. These effects could have a significant impact on Council's stormwater assets, especially if more frequent, high intensity storms are experienced. Further monitoring and analysis work is recommended to gain a better understanding of the potential effects of climate change in the District.

In future there are also likely to be greater restrictions placed on stormwater discharges, as stated in the previous section. It is anticipated that Council will require consent for any future discharges and might need to install treatment systems to meet future consent conditions.

5.3.2 UNSERVICED COMMUNITIES (ROOF WATER SUPPLY AND SEPTIC TANK SYSTEMS)

5.3.2.1 GENERAL

The assessments have identified options that are available to address potential public health risks and flooding problems. It is acknowledged that individual property owners may have adopted some of these options already by w ay of:

- Construction of stormwater systems (e.g. soakpits or drainage channels)
- Greater level of planned maintenance

5.3.2.2 Communities

Within the boundaries of Masterton District Council, the majority of communities do not have any formal stormwater drainage. These communities include:

- Rural Settlements (including Tauweru and Wainuioru)
- Rural Schools
- Private Water Scheme Communities
- Rural Marae
- Rural Recreational Facilities (e.g. golf clubs)
- Rural Homestays/ pubs/ cafes etc. Existing Quality and adequacy of Service Existing Systems

In the majority of rural areas, stormwater landing on roofs is transferred into rain water tanks for use as a potable water supply. This system operates unless tanks become full or first flush diversion systems are used, and leads to a significant reduction in overall stormwater flows. Typically, excess water overflow s the tanks to either direct soakage or onto ground surface that ideally would slope away from the residence.

Where roof water is not used as a potable water supply (e.g. in Tinui or Tauweru), downpipes are typically connected directly to soakpits or discharged onto land.

In general, stormwater landing on surfaces flows through various man-made and natural channels until it reaches either a river, a basin or soaks into the ground. Some of these channels are owned and maintained by Council (particularly roadside channels), some by GW and others by private landowners.

There are no formal stormwater quality treatment systems in the Masterton District.

There are no private stormwater discharge consents (either discharges to water or ground) held by non-industrial sites in Masterton District. Discharges from areas where no hazardous substances are stored, and that aren't stockyards, are currently categorised as a Permitted Activities by Greater Wellington.

Consumer Issues

Overall, the level of complaint from rural communities in regard to stormwater is low.

There appears to be a reluctance of most rural residents to spend much money or time on shaping of land, channel maintenance or provision of soakage areas.

Current Demand and Demand Management

Currently the requirements of new properties are w ell defined. Council reserves the right to require appropriate drainage facilities to be put in place in any new developments to reduce the adverse effects of uncontrolled run-off of stormwater.

In areas of good drainage (typically underlying gravels), such as parts of the plains around Masterton, there are few reported problems with these soakage systems. However in the eastern hills and towards the coast, where the soils are generally inappropriate for soakage, greater restrictions (such as detention on site) may need to be placed on stormwater.

There is currently very little known about the level of environmental and public health problems caused by stormwater in the Masterton District. Typically the problems could be summarised as:

- Local ponding – caused by lack of capacity, low points unserviced by the system, overflow from roads etc
- Flooding from system failures – due to high river levels, blockages etc
- Scour/ Erosion – usually caused by unexpectedly high velocities in unprotected drains.

Future Demand

Population growth is not expected to significantly impact on Masterton District's rural stormwater systems. Whilst the overall population showed virtually no change between the 2006 and 2013 Census', recent data does indicate an increase in urban and rural population. This growth has predominantly been a result of sub-division in areas bordering the urban boundary. As noted, sub-division developers must comply with standards set by Council for managing stormwater.

The potential effects of Climate Change, as discussed in 5.3.1, will also affect the rural communities. Further monitoring and analysis work is recommended to gain a better understanding of the potential effects of climate change in the District.

Demand management techniques, such as promotion of on-site collection and use, detention systems and impervious surface regulation are often useful in rural areas to reduce the peak flow s. Maintenance of existing systems is also key to ensuring that these operate to their full capacity.

5.4 SANITARY SERVICES

5.4.1 PUBLIC SANITARY SERVICES

5.4.1.1 CEMETERIES

Description of Services

Table 5.24 Operational Cemeteries

Cemetery	Remaining Plots	Comment
Archer Street (Masterton Cemetery)	Approx. 110	All remaining plots reserved
Hastwell Cemetery	Approx. 14	
Riverside Cemetery	Hundreds under construction. Ex-service person section 8 & 27 Plots	Current available 2018 204 cremation plots 143 Full body plots
Tinui Cemetery	Approx. 200	

In addition to the above cemeteries, Pioneer cemetery is also a Council asset requiring regular maintenance, however this cemetery is no longer operational.

Existing Quality and Adequacy of supply

Recent cemetery use rates are shown in the table below

Table 5.24 Recent Burial Statistics

Year	Cremations	Burials
Mar 18 - Jun 18	26	11
Nov.17 - Feb 18	23	13
Jul 17 - Oct 17	17	12
Mar 17 - Jun 17	24	8
Nov 16- Feb 17	23	7
Jul 16 - Oct 16	17	16
Mar 16 - Jun 16	14	11
Nov 15- Feb 16	26	14
Jul 15 - Oct 15	16	10
Mar 15 - Jun 15	8	11
Nov 14- Feb 15	37	14

Most of these interments were carried out at Riverside Cemetery

Uniform annual rates are used to fund cemeteries, with the exception of internment and plot fees, which are paid directly to Council.

At Riverside Cemetery, only single depth plots are available, due to underlying alluvial gravels.

There are currently no public toilet facilities provided at the cemeteries. Maintenance

Recreational Services Ltd performs all maintenance tasks as covered under the Parks and Reserves Maintenance Contract. Planned operations and maintenance includes law n mowing, gardens, plot digging, burials and topdressing existing graves.

Vandalism is not a major concern at cemeteries throughout the district, however some problems do occur during school holidays.

Assessment to meet future demand

Masterton District Council is satisfied that the operation of a single public cemetery in the District is adequate to meet the requirements of the communities.

Riverside Cemetery has hundreds of constructed plots available (possibly enough to be sufficient for the next 10 years), with an abundance of further public land at this site for future use.

5.4.1.2 PUBLIC TOILETS

Description of Services

Council currently has 15 sites with public conveniences. The existing facilities are as follow s:

Table 5.25 Current Public Toilet Facilities.

Location		Open Hours	Urinal	Pans	Basin	D
Colombo Road Henley Lake		Winter 8am – 5pm	1	4	6	
		Summer 8am-7pm				
Dixon Street	Opposite Shear History	24 hours	1	3	2	D
	Mini Putt	Opening Hours		2	2	D
	Memorial park	As req'd	9	15	11	
Kuripuni Village		Winter 8am – 5pm	1	3	3	D
		Summer 8am-7pm				
Queen Elizabeth Park	Sports Ground	As req'd	1	4	2	D
	Sports bowl	As req'd	1	4	2	
	Grandstand	As req'd	2	2	2	
Castlepoint Beach	East	24 hors	1	3	2	D
	West	24 hours	1	3	2	
Riversdale Beach	North	24 hours	1	3	2	

	South	24 Hours		3		D
Surf Life Saving Club Riversdale Beach		As req'd	1	6	6	D
Bannister St Toilets Masterton		24 Hours	3	6	6	D
Tinui Store, Tinui		Store hours Mon - Fri		1		
Clarkes Domain Nr Mauriceville		As req'd	1	3	2	
Total			**24**	**65**	**50**	

* D indicates that there is access for the disabled at these facilities

Existing Quality and Adequacy of supply

At the majority of facilities listed above, Masterton District Council takes full responsibility for the operation and maintenance of the service. The exception is Tinui, where a single toilet behind the store is operated by the store owners.

Most facilities are fairly standard apart from exceptions at Castlepoint and Riversdale, where the water supply for the toilets is from non-potable bore supplies. Where non-potable water supplies are used, this is communicated to the public through signage.

Bannister Street toilets, situated in the central business area are the most utilised facilities year round whereas toilets at the coastal settlements have quite significant seasonal trends.

There is no anecdotal evidence to suggest that there is a shortage of public toilets in the district. However, there has been recent community demand for public conveniences to be placed at Riverside Cemetery.

<u>Maintenance</u>

Recreational Services Ltd performs all maintenance tasks as covered under the Parks and Reserves Maintenance Contract. Planned maintenance includes daily cleaning with the contractor expected to

report any additional maintenance issues to Council for instruction. Council occasionally perform spot checks to ensure the appropriate standards are being met.

Vandalism is not a major problem for the toilet facilities, however there have been incidents where doors have been locked from the inside prior to the occupants exiting above or below the doors. These issues tend to occur during school holidays.

Assessment to meet future demand

With the population of Masterton District not expected to increase rapidly, it is unlikely that any additional facilities will be required in the short term. Additional requirements are only likely if the habits of the population change or additional public areas are developed.

5.4.1.3 SOLID WASTE

Sanitary service requirements related to Solid Waste are covered in the Wellington Region Waste Management and Minimisation Draft Plan 2017 - 2023 (WRWMMP). Therefore, it is no longer a requirement to discuss solid waste matters in this document.

Please refer to WRWMMP for further information re solid waste.

5.4.2 PRIVATE SANITARY SERVICES

With the limits of time and budget for this assessment only these private sanitary services have been identified.

Table 5.27 Private Cemetery Information

Private Cemeteries	Open/Closed	Comments
Ahipanepane	Open	Ruamahanga River near Te Ore Ore
Akura	Open	Kibblewhite Road
Annadale		
Castlepoint		
Eparaima		
Fernglen		
Homewood		Possibly known as Maungamoria
ICA		
Kaiwhata		
Langdale		
Mangapakeha		
Mataikona		

Matapihi	Fairly recent burial	Black Rock area
Mauriceville		Lutheran
		Public
		Methodist
Meldrum		
Mt Misery		
Nicholls		Black Hill Road, Tinui
Pakowhai		
Seven Oaks		
Taueru		
Te Mai		
Te Ore Ore		Past marae on left
Te Whiti	Open	Cavelands Road
		Martinborough Road 1
		Martinborough Road 2
Waikaraka		
Whakataki		
Whakataki/ Okau		Holes' family
Whareama		

Very little information is known about the above cemeteries as they are privately owned and operated, often on a small scale.

There is only one crematorium in the Masterton district, at Wairarapa Funeral Services in Lincoln Rd, Masterton. There is no anecdotal evidence to suggest that this crematorium is unable to cope with the demand from the district.

6 RISK ASSESSMENT

6.1 APPROACH

The intention of this part of the study is to provide a comparative evaluation of risk events between communities in Masterton District. Once this is done, priorities can be established to implement preventative measures.

The risk assessments are for communities in which Masterton District Council (or any other group managing a reticulated supply) does not own the water supply and wastewater infrastructure. The options that are available to the Council to mitigate risk fit within four broad areas:

- Funding the provision of new infrastructure
- Regulation through bylaw s and enforcing compliance with legislation
- Persuasion and education
- Do nothing

In assessing the qualitative risk of an event, there are three components (as per NZS4360:2004 and Wairarapa Lifelines project), the product of which provides a comparative evaluation:

(i) Probability of the event

(ii) Number of people exposed

(iii) Impact to an individual (consequence)

Risk= (probability of occurrence x (consequence x population factor))

The long term planning functions of a Council are addressed through the Long Term Plan (LTP). The community outcomes and the subsequent implementation of District Plans determine the extent of Council influence where the lack of water services may adversely affect:

- Economic growth,
- Public image
- Social and cultural health,
- Risk of prosecution for reasons other than public health and
- Environmental sustainability (that does not also offer a public health risk)

Many of these consequences are beyond the control or intended sphere of influence for a Council, noting that these risk assessments are undertaken for communities with privately owned water,

wastewater and stormwater systems (i.e. un-reticulated communities).

There is a fundamental requirement for Masterton District Council to protect the public health of the community (Health Act 1956). Specific reference is made to Health Act 1956 obligations in Part 7 of the LGA 2002.

The risk assessments in communities where there is an "absence of either a reticulated water supply or a reticulated wastewater service or both" will therefore focus on **public health risk.**

Inherently, the impact to an individual of a public health risk can be described as catastrophic – because death or sickness may result. For all communities this factor therefore remains unchanged (i.e. it is a "constant" in the risk equation).

To meaningfully compare the public health risk of unserviced communities within Masterton District involves the comparison of the product of the remaining two components in the risk equation: probability and number of people who are exposed to the risk.

(i) For each event, a qualitative probability of occurrence (or likelihood) scale can be determined using the following table:

Likelihood Ranking	Description
Rare	May occur only in exceptional circumstances (not known to have occurred but have heard of it happening in other water supplies)
Unlikely	Could occur at some time(could occur/would have occurred at some stage in the last 100 years under the current operating conditions)
Possible	Might occur at some time(have known of the occurrence in the last 10 years)
Likely	Will probably occur(will probably occur – once every 1-2 years)
Almost certain	Is expected to occur in most circumstances(is expected to occur)

It is assumed that the number of people exposed to the risk event is directly related to the population of the community. (It is accepted that there are other issues – such as extent of an individual's use of the system and their vulnerability to becoming sick). However, these risk assessments are a comparative tool, and for this purpose variables have been evaluated as the product of:

(i) Probability of the event (see above table)

(ii) Impact to an individual = sickness or death = 1 (hence ignored)

(iii) Population

For each risk event a qualitative risk description can be allocated that evaluates the probability and population factor using the following table:

Likelihood	Consequence (population factor)					
		<10	<100	<1000	<10000	>10000
	Almost Certain	Med	High	High	V.High	V.High
	Likely	Med	Med	High	High	V.High
	Possible	Low	Med	High	High	High
	Unlikely	Low	Low	Med	Med	High
	Rare	Low	Low	Med	Med	High

Some communities may have a higher than normal percentage of "at risk people". An example would be a community on soils with poor drainage resulting in septic tank issues. These are dealt with by also assessing the non-generic risks.

Furthermore, the risk events have been assessed on the basis that no preventative measures are in place – other than the infrastructure that is either know n to exist or assumed to be in place.

In some circumstances, an appropriate solution to an identified risk may simply be to confirm whether the infrastructure, operational procedures and monitoring systems are actually better than has been assumed.

Priority of future works should be given to the risks ranked 'Very High' and then 'High'.

6.2 WORKSHOP APPROACH

To assess the risk events for each community it was decided to first look at a generic set of risks in a workshop environment. Participants at the workshop included Masterton District Council staff and consultants.

Generic risk events were considered for water supply (bore, roof tank and surface water), wastewater and stormwater.

The communities within the Masterton District were then considered individually as to whether or not they fitted the generic model.

6.3 RISK TABLES

The risk events analysed to produce a generic risk profile for the district are provided in Appendix 3. The preventative measures are the measures available to Masterton District Council and not the owner of the water supply.

Table 6.1 Generic Risk Profile for unserviced Properties

Risk Assessment Summary	
Community	Generic Communities
Population	<10 per dwelling

Source	Event	Risk
Roof Tank	Bacterial and microbiological contamination of supply	Medium
	Chemical contamination of supply	Low
	Insufficient supply	Low
	Interrupted supply	Low
Bore	Bacterial and microbiological contamination of supply	Medium
	Chemical contamination of supply	Low
	Insufficient supply	Low
	Interrupted supply	Low
Surface Water	Bacterial and microbiological contamination of supply	Medium
	Chemical contamination of supply	Low
	Insufficient supply	Low
	Interrupted supply	Low

System	Event	Risk
Septic Tank	Faecal contamination of groundwater	Medium
	Faecal contamination of receiving surface water	Medium
	Chemical contamination of groundwater	Low
	Chemical contamination of receiving surface water	Low
	Inability to receive wastes	Low
	Inability to dispose of effluent	Medium

System	Event	Risk
	Flooding	Medium
	Chemical contamination of SW system	Low
	Faecal contamination of SW system	Low
	Damp houses	Medium

6.4 SPECIFIC COMMUNITY RISKS

The following table sets out specific events that impact on the generic risk profile for unserviced communities to be used to provide a specific risk profile for any given community

Community	Event	Cause	Probability/Population
Riversdale	Faecal contamination of ground water	High water table over aquifer, lack of integrity in private systems.	Almost Certain/ <1000 High
Ararangi Camp	Bacterial and Microbiological contamination of supply	High risk for individual property with little or no treatment.	Likely / <1000 High
Camp Anderson Waimanaaki	Bacterial and Microbiological contamination of supply	High risk for individual property with little or no treatment.	Likely / <1000 High
Riversdale Holiday Camp	Bacterial and Microbiological contamination of supply	High risk for individual property with little or no treatment.	Likely / <1000 High
Riversdale Motor Camp	Bacterial and Microbiological contamination of supply	High risk for individual property with little or no treatment.	Likely / <1000 High
Castlepoint Motor Camp	Bacterial and Microbiological contamination of supply	High risk for individual property with little or no treatment	Likely / <1000 High

7 TERRITORIAL AUTHORITY'S ROLE AND PROPOSAL FOR MEETING DEMANDS

7.1 GENERAL

In general Council sees its role in the Assessment of Water and Sanitary Services as one of facilitator to ensure all community groups are heard, and their issues assessed.

This process is well advanced within Council and ties in to other projects:-

7.1.1 LTP

Council will consult on its fifth draft Long Term Plan (previously known as LTCCP) in April 2018. A final version was adopted by 30th June 2018.

This is a critical process and supports the consultation principals of the LGA 2002 and those required for the Water and Sanitary Services Assessment.

The Water and Sanitary Services Assessment will be considered as part of this process.

7.1.2 COMMUNITY OUTCOMES

As part of the LTP process Council must identify outcomes for its community. Some pre-consultation on draft community outcomes has been undertaken. Formal consultation will be undertaken as part of the LTP consultation process.

7.1.3 ASSET MANAGEMENT PLANS

Many of the issues for meeting demand are covered under relevant sections of Council's Asset Management Plans.

7.2 WATER SUPPLY

The table below summarises the water issues identified by the assessment, and Council's role in these issues.

In 2014 Council completed the Water Safety Plan process for the Masterton urban water supply. An updated 2018 WSP has been completed and is currently being revised and assessed by Regional Public Health. It is currently being reviewed. The WSP outlines a number of prioritised measures to lower the health risk from the supply.

Reticulation networks will continue to be upgraded as scheduled

Issue	Role for Council
Education of relevant issues to communities.	Action on behalf of communities to resolve specific issues, these include knowledge and compliance of private water supplies within the district.
Monitoring of relevant public health issues.	Monitoring of public health issues under the Health Act (in conjunction with MoH). Meet monitoring requirements of current legislation.
Funding of asset management, investigations, design, physical works and maintenance.	Manage funding for capital work requirements in line with capital expenditure programme.
Water supply levels of service: • Quality • Quantity • Fire fighting	Levels of service to be established with community via the LTP process and a greater knowledge of small supplies developed within the district.
Resource consents.	Ensure district water take consents are in place and adhered to.
Drinking water standards.	Ensure district water standards are achieved and maintained.
Development in the district	Council to monitor/ respond to growth scenarios, in line with levels of service.
Water Safety Plan for Masterton Water Supply	New 2018 WSP draft awaiting Regional approval

7.3 WASTEWATER

Wastewater issues identified in the assessment along with Council's role are summarised in the table below

Issue	Role for Council
Education of relevant issues to communities.	Action on behalf of communities to resolve specific issues
Monitoring of relevant public health issues.	Monitoring of public health issues under the Health Act (in conjunction with MoH). Meet monitoring requirements of current legislation.

Funding of asset management, investigations, design, physical works and maintenance.	Manage funding for capital work requirements in line with capital expenditure programme.
Wastewater scheme levels of service:	Levels of service to be established with community via the LTP process and a greater knowledge of small supplies developed within the district.
Resource consents.	Ensure district discharge consents are in place and adhered to.

7.4 STORMWATER

Stormwater issues identified in the assessment along with Council's role are summarised in the table below:-

Issue	Role for Council
Education of relevant issues to communities.	Action on behalf of communities to resolve specific issues
Monitoring of relevant public health issues.	Monitoring of public health issues under the Health Act (in conjunction with MoH). Meet monitoring requirements of current legislation.
Funding of asset management, investigations, design, physical works and maintenance.	Manage funding for capital work requirements in line with capital expenditure programme and Levels of Service
Stormwater scheme levels of service:	Levels of service to be established with community via the LTP process and a greater knowledge of small supplies developed within the district.
Discharge consents.	Identify all catchments with significant risks (industrial discharges)
Increased pressure on Council SW reticulation.	Monitor/ respond to potential outcomes of development.

7.5 SANITARY SERVICES PUBLIC

Sanitary Services issues identified in the assessment along with Council's role are summarised in the table below:-

Issue	Role for Council
Legislation updates	Operate facilities in accordance with current legislation
Funding of asset management and maintenance	Manage funding for capital work requirements in line with levels of service.

8 CONSULTATION

It is proposed that the Executive Summary of this document be used as a base to broadly explain the issues dealt with in this assessment, with the full document being made available on request to the general public.

8.1 COMMUNITIES

The Water and Sanitary Services Assessment will be consulted on as part of Council's Long Term Plan consultation process, which follows the special consultative process with statutory requirements for submission times.

8.2 REVIEW AS PART OF LTP PROCESS

Once the initial plan has been adopted with the 2012 LTP a review of the significant issues will be undertaken at 6 yearly intervals, plan next due for review as part of Council's 2024 LTP process.

APPENDIX A1 – GLOSSARY OF TERMS

A1 GLOSSARY OF TERMS

(DWS) = terms from Ministry of Health Drinking Water Standards

(LGA) = terms from the Local Government Act 2002

ADWF Average Dry weather flow

Aerobic digestion A biological process by which wastewater (e.g. waste activated sludge) is subjected to prolonged aeration so that its organic content is partially oxidised and the amount reduced by a combination of endogenous respiration, general growth, predator activity, and slow oxidation of residual organic matter.

Aggressive Water A term usually applied to waters that hasten corrosion of water pipes (e.g. copper, iron) causing heavy metal concentrations to rise to above 50 percent of their MAVs (refer DWS and MAV).

Air Gap A clear vertical space between water supply and water use thereby preventing a reverse flow (backflow) from wastewater into the water supply system.

Anaerobic digestion normally a controlled process of anaerobic decomposition of sludge or strong organic waste.

Annual plan (LGA) a document developed by Territorial Authorities to meet the requirements of section 95 of LGA 2002

Aquifer A water saturated zone of the ground (of porous layers of sand, rock or gravel) that will yield water to wells or springs at a sufficient rate to serve as an adequate source of water.

Asbestos cement pipe (A/C) A pipe made from Portland cement and asbestos fibre.

Asset Management Plan (AM P) A plan prepared by a territorial authority that outlines how a particular type of asset (e.g. water supply) is going to be managed.

Backflow Flow of water in a pipe or line in a direction opposite to the normal flow; often associated with back siphonage or the flow of possibly contaminated water into a potable water system.

Backflow Preventer A device or system installed in a water line to stop backflow from a non-potable source.

Bacteria Unicellular micro-organisms (from Monera kingdom) which typically reproduce by binary fission (cells splitting in two). Many different types of bacterial organisms are often found in drinking water.

Biological filter A bed of relatively inert material (such as rock, or moulded plastic), usually contained within circular or rectangular walls and so constructed that air is continuously present throughout the bed (45% media, 55% air gaps). In use, settled wastewater is distributed uniformly over the upper surface and trickles through the bed to underdrains, thus giving rise to the development of the purifying biological 'film'.

CCTV Closed circuit television used to carry out internal inspection and survey of pipelines.

Chlorination The application of chlorine to a domestic or industrial wastewater to prevent septicity, or to effluent or water for the purpose of disinfection.

Clarification The removal of turbidity and suspended matter from water or wastewater rendering it more transparent/ cleaner.

Coagulant (coagulation) A chemical added to water, wastewater or sludge (and the process) to promote flocculation and agglomeration of suspended solids to induce faster settlement or more efficient filtration.

Contact Time The actual time which water remains in contact with a chemical or within a treatment unit.

Contaminant (DWS) A substance or organism in the water that can cause undesirable public health or aesthetic effects.

Coliform Bacteria A group of organisms from the family Enterobacteriaceae that include the faecal coliforms and their relatives.

Corrosion The gradual removal or weakening of the surface of a material, especially a metal, by the action of moisture, air or chemicals.

Cross Connection Any physical connection between two otherwise separated piping systems one of which contains potable water and the other of unknown or questionable safety, whereby flow may occur from one system to the other depending on the pressure differential between the two systems.

Community (LGA) A community as meeting the criteria defined in the "Register of Community Drinking Water Supplies in NZ" of 25 person's resident for more than 60 days.

Determinand (DWS) A constituent or property of the water which is determined, or estimated, in a sample, for example, microbiological determinand: total coliforms; chemical determinand: chloride; physical determinand: turbidity; radiological determinand: radon.

Digestion Strictly, the process by which nutrient materials are rendered absorbable by the action of various digestive justice containing enzymes. Used in the wastewater industry to mean the breakdown of organic substances by microbiological activity.

Discharge The rate of flow through a pipe or channel, expressed in litres per second (L/ s) or cubic metres per day (m3/ day).

Disinfection The destruction/ inactivation of pathogens in water or wastewater. The most common methods of disinfection are chlorination, ozonation, ultraviolet irradiation and boiling.

Disinfection residual (DWS) The amount of disinfectant that is still present in the water at any time. After disinfectant is added to drinking-water its concentration can fall due to chemical reactions.

Disposal (LGA) means final deposit of waste on land set apart for the purpose.

Distribution system (DWS) All the trunk main, storage, and distribution system components that follow a treatment plant and any post-treatment storage facility at the treatment plant. A network under the control of a network utility operator.

Distribution zone (DWS) The part of the drinking-water supply network within which all consumers receive drinking-water of identical quality, from the same or similar sources, with the same treatment and usually at the same pressure. It is part of the supply network which is clearly separated from other parts of the network, generally by location, but in some cases by the layout of the pipe network.

District (LGA) means the district of a territorial authority.

Drinking Water Standards (DWS) A yardstick to assess the quality of drinking water. The Standards define the MAVs (Maximum Acceptable Values) of health significant determinands and specify methods for determining whether a drinking water supply complies with the Standards. Written and controlled by Ministry of Health.

Dry Weather Flow (DWF) – The quantity of sew age discharged by the sewerage system in 24 hours during normal dry weather. Alternatively, it may be the average rate of flow in a sewer during dry weather, generally expressed in m3/ day.

Effluent The outflow from a water or wastewater treatment device or plant – also see final effluent.

Escherichia coli A bacterium living in the alimentary tract of man and other mammals. As it is passed out with faeces in large numbers its presence in water is indicative of faecal contamination and the possible presence of pathogenic organisms of enteric origin; it is not itself normally pathogenic. Also known as E. coli, Esch. Coli or Bact. Coli.

Filter (water) A device used to clean water by removing iron, silt, taste, odour, colour, etc., before it is fed into the softener or supply lines of the consumer. Includes mechanical, adsorptive, oxidizing and neutralizing filters. Available as media beds in tanks or as cartridge type devices.

Flow Rate The volume of solution which passes by a point within a given time. Flow rate is usually expressed in terms of m3/ second or m3/ day.

Free available chlorine (FAC) The chlorine present in chlorinated water in the form of hypochlorous acid and hypochlorite ion.

Groundwater The term describing all subsurface water and the source of w ell water. It can be found in aquifers as deep as thousands of meters.

Guideline value (DWS) The value for an aesthetic determinand that, if exceeded, will render the water unattractive to consumers.

Gully Trap – A water trap to prevent gases and odours from the main sewer entering the household plumbing system.

Hardness A characteristic of natural water due to the presence of dissolved calcium and magnesium; water hardness is responsible for most scale formation in pipes and water heaters.

Household Drain – A household drain is in private property and connects the buildings internal plumbing to the street sewer, either a lateral main or trunk sewer, depending on the layout of the system.

Imhoff tank A development of Travis's hydrolytic tank, consisting of an upper continuous-flow sedimentation chamber and a lower sludge-digestion chamber. The floor of the upper chamber slopes steeply to trapped slots through which solids may slide into the lower chamber. The lower chamber receives no fresh wastewater directly, but is provided with gas vents and with means for withdrawing digested sludge from near the bottom.

Infiltration: Water in the surrounding ground that enters through cracks or defective joints in a pipeline or its lateral connections. Also from 'illegal' roof and yard connections, and from defective fittings, pipes and pipe joints.

Infiltration/I nflow (I/I): The total quantity of water from both infiltration and inflow without distinguishing the source.

Long-Term Council Community Plan (LGA) means a long-term council community plan adopted under section 93 of the LGA. (Now superseded by the Long term Plan LTP)

M AV (Maximum Acceptable Value). The concentration of a determinand below which the presence of the determinand does not result in any significant risk to a consumer over a lifetime of consumption.

Monitoring (DWS) The sampling and analysis of a drinking-water supply to test for compliance with the Standards, or for process control, by detecting changes in the concentrations of its constituent determinands or deviations of these from target values.

Outfall sewer. The final length of sewer which conveys the whole of the wastewater from a sewerage system to a treatment works or a receiving water, or the pipeline which conveys the effluent from a wastewater-treatment works to a receiving water.

Oxidation A chemical process in which electrons are removed from an atom, ion or compound. The addition of oxygen is a specific form of oxidation. Combustion is an extremely rapid form of oxidation, while the rusting of iron is a slow form. Oxidation never occurs alone but always as a part of the oxidation-reduction (redox) reaction.

Oxidation pond A large shallow basin used for the stabilisation of organic matter in crude or settled wastewater. Also termed a `stabilisation pond'.

Pathogen A Pathogen An organism which is capable of producing disease.

PE Pipe A pipe made of polyethylene

Peak Wet Weather Flow (PWWF) – The quantity of sewage discharged by the sewerage system in 24 hours during extreme wet weather. Alternatively, it may be the peak (instantaneous) rate of flow in a sewer including stormwater infiltration, generally, expressed in m3/ day.

pH (potential of Hydrogen) An expression of the acidity of a solution; the negative logarithm of the hydrogen ion concentration (pH 1 very acidic; pH 14, very basic; pH 7, neutral).

PH RM P- A Public Health Risk Management Plan developed to assess risk under the guidelines produced by the Ministry of Health.

Point of Entry (POE) A water treatment device which is installed at the main inlet to a building and acts as centralized treatment.

Point-of-Use (POU) A water treatment system designed to connect at the actual point-of-use for water; countertop or undersink treatment systems.

Pollution The impairment of the suitability of water for some considered purpose.

Potable Water - Water which is considered safe and fit for human consumption, culinary and domestic purposes and meets the requirements of the health authority having jurisdiction; i.e. Drinking-water which does not contain any determinands which exceed the Maximum Acceptable Values (MAVs) given in the Drinking Water Standards New Zealand – aka wholesome drinking-water.

Pretreatment The treatment which an industrial wastewater receives at the factory before discharge into the public sewer. Pretreatment of a sludge refers to conditioning before dewatering.

Primary treatment -The first major stage of treatment following preliminary treatment in a wastewater works, usually involving removal of settleable solids.

Protozoa A phylum of unicellular micro-organisms. Contains a heterogeneous collection of organisms of considerable diversity of form and nutrition, and comprises four classes. The DWS Priority 1 protozoa are currently Giardia and Cryptosporidium.

PV C Pipe A pipe made of Polyvinyl chloride

Receiving water A body of water, flowing or otherwise, such as a stream, river, lake, estuary or the sea.

Recycling (LGA) means the reprocessing of waste materials to produce new products

Regional Council (LGA) means a regional council named in Part 1 of Schedule 2 of the LGA

Residual The amount of a specific material remaining in the water following a water treatment process. It may refer to material remaining as the result of incomplete removal, or of a substance meant to remain in the treated water such as residual chlorine.

Residual chlorine -Chlorine remaining in solution after a specified period of contact with the liquor being chlorinated, in a form available to act as an oxidant. Also termed `free residual chlorine', i.e. Cl2, HOCl, Ocl; and 1 combined residual chlorine', i.e. chloramines.

Rising main -A pipeline through which a liquid is pumped to a higher level.

Sand Filter A treatment device or structure for removing solid or colloidal material of a type that cannot be removed by sedimentation. Such filters can be gravity rapid- rate or enclosed pressure type.

Sanitary Services (LGA) has the same meaning as sanitary works in section 25(1)(a), (b), (c), (d), (h), and (i) of the Health Act 1956 (i.e. Drainage works, sewerage works, and works for the disposal of sew age; Waterworks; Works for the collection and disposal of refuse, night-soil, and other offensive matter; Sanitary conveniences for the use of the public; Cemeteries; Crematoria).

Secondary treatment -The treatment of wastewater, usually after the removal of gross suspended solids, by bacteria under aerobic conditions during which organic matter in solution is oxidised or incorporated into cells which may be removed by settlement, thus reducing BOD and SS. This may be achieved by biological filtration, by the activated-sludge process or the oxidation pond system. Sometimes termed `aerobic biological treatment'.

Sedimentation tank -A tank in which wastewater is retained for a sufficient period and at the same time is flowing at a sufficiently low velocity for a portion of the solids to be removed by gravity.

Septic tank -A type of sedimentation tank in which the sludge is retained for sufficient time for the organic content to undergo anaerobic digestion.

Service Connection (LGA) means a physical connection to a service provided by, or on behalf of, a territorial authority.

Sludge A mixture of solids and water produced during the treatment of wastewater.

Special Consultative Procedure (LGA) means the procedure set out in section 83 of the LGA

Stormwater – Water uncontaminated by human trade or trade wastes, including rainwater, surface water and ground water.

Strategic Asset (LGA), in relation to the assets held by a local authority, means an asset or group of assets that the local authority needs to retain if the local authority is to maintain the local authority's capacity to achieve or promote any outcome that the local authority determines to be important to the current or future well-being of the community.

Surface water -The runoff of natural water (usually rainwater or other precipitation) from the ground surface, including roads and other sealed areas, roofs and unpaved land. Surface water can also be defined as all water open to the atmosphere and subject to surface runoff.

Territorial Authority (LGA) means a city council or a district council named in Part 2 of Schedule 2 of the LGA

Tertiary Treatment The further treatment (generally third stage) of biologically- treated wastewater by removing suspended matter to enable the effluent to comply with the Resource Consent (often 30:20 or better). Also termed `polishing'.

Treatment (LGA) means, in relation to waste, subjecting the waste to any physical, biological, or chemical process to change the volume or character of that waste so that it may be disposed of with no, or reduced significant adverse effect on the environment.

Turbidity A measure of the amount of finely divided suspended matter in water, which causes the scattering and adsorption of light rays. Turbidity is usually reported in arbitrary nephelometric turbidity units (NTU) determined by measurements of light scattering. NTU should not exceed 0.5 in potable water. Turbidity can protect bacteria from sterilization.

Ultraviolet Light Radiation having a wave length shorter than 4000 angstroms (visible light) down to 100 angstroms on the border of the x-ray region. Ultraviolet light is used as a disinfectant.

Virus Very small parasitic organisms that can only reproduce if they can colonise a living cell by "hi-jacking" some of the host cell's metabolic processes, as compared to cell division as most other organisms do. They are sub-microscopic particles of nucleic material enclosed in a protein coat. Viruses are responsible for several waterborne diseases such as infectious hepatitis and polio.

Waste Management Plan (LGA) means, in relation to a district, any plan for the management of waste in the district, being a plan developed after consideration, in the following order of priority, of the following methods (methods are listed in order of their importance).

Wastewater Services (LGA) means sewerage, treatment and disposal of sew age, and stormwater drainage.

Water and Sanitary Services Assessment (LGA) An assessment of water services and other sanitary services available to communities in the district of the territorial authority; but does not include assessments in relation to individual properties.

Water conservation: The preservation, control and development of water resources (both surface and ground) whether by storage, including natural ground storage, prevention of pollution, or other means, so as to ensure that adequate and reliable supplies of water are made available for all purposes in the most suitable and economical way whilst safeguarding legitimate interests.

Water consumption: The volume of water supplied to a district during a given period, or the volume per head of the population, including the volume used, wasted, lost or otherwise unaccounted for.

Water Safety Plan (WSP) A Public Health Risk Management Plan developed to assess risk under the guidelines produced by the Wellington Region and Local Councils and aligned with the Ministry of Health.

Water Services (LGA) means water supply and wastewater services.

Water Supply (LGA) means the provision of drinking water to communities by network reticulation to the point of supply of each dwelling and commercial premise to which drinking water is supplied.

Water table. The surface below which the ground is saturated with water, except where the surface is impermeable.

Water treatment plant (DWS). The point where the drinking-water supply enters the distribution system, regardless of the treatment process.

Water treatment process (DWS). A chemical, biological or physical process employed to enhance the quality of a drinking-water supply prior to distribution.

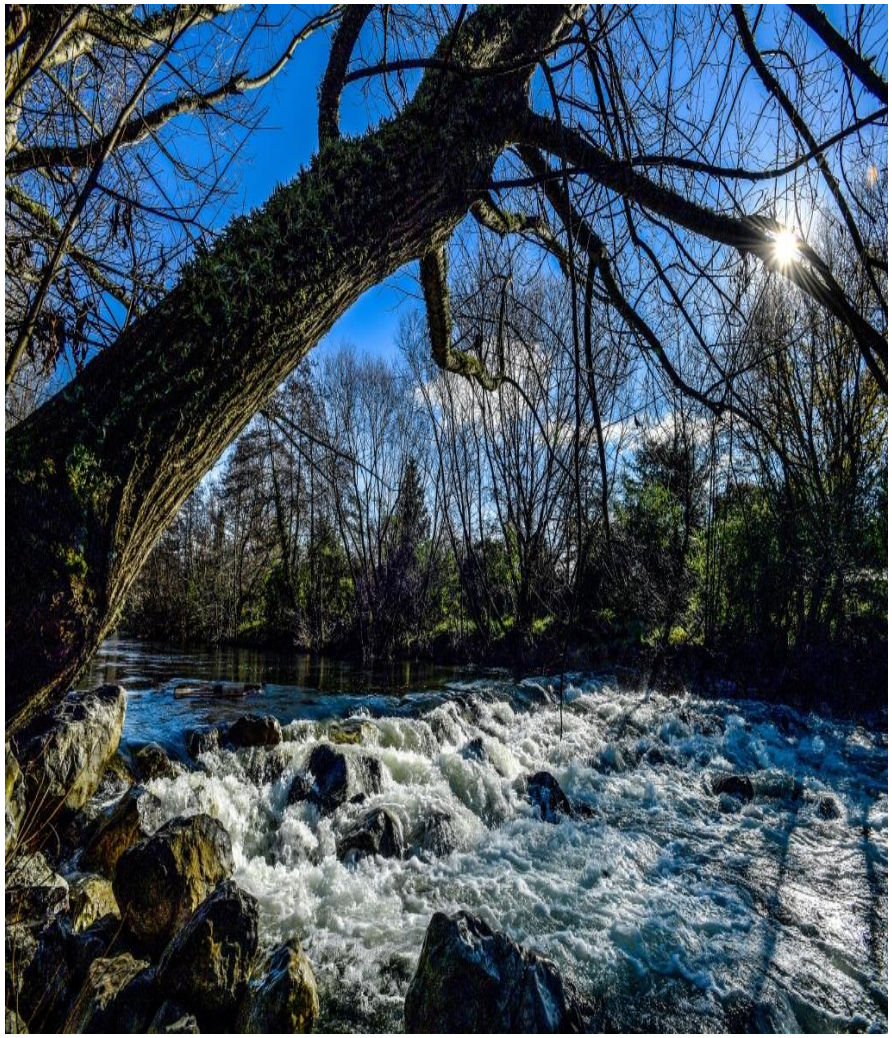
Waterworks (LGA), in relation to the provision of water supply within and outside the district of a territorial authority, includes water sources (e.g. rivers, land), treatment works and reticulation.

APPENDIX A2 – RISK TABLES

A2 RISK TABLES

The risk events for water services are summarised in the attached tables. The tables show the risks associated with a generic situation.

The preventative measures are the measures available to Council and not the owner of the water supply.



WATER SUPPLY ROOF TANK	
Event: Bacterial and microbiological contamination of supply **Probability:** Likely **Population:** <10 **Risk without Preventative Measures:** Med	
Causes	**Preventative Measures – Options**
• Runoff from roof – accessed by birds/ animals • Inadequate treatment • Contamination of storage tank • Poor maintenance of infrastructure –including sediment accumulation and cleaning • Vandalism/ sabotage • Overhanging vegetation	(i) Direct funding of connection to existing community supply (ii) Require owner to: a. complete and implement public health risk management plans for assessment by EH O b. elevate monitoring of water quality (refer draft NZDWS 2005) c. Implement a comprehensive maintenance programme to ensure roof, and tank is cleaned regularly and is secure from contamination d. Through bylaw / building WOF/ consent process and subsequent inspection service. (iii) Encourage owner to: a. Upgrade water supply system to provide adequate barriers to faecal contamination b. Install first flush diverters on collection pipework c. Review the design of pipework and tanks to minimise risk of drawing collected sediment (refer NZWWA Journal Sept 2004 P30 – article by John Ashworth – "Simple Measures to Improve Tank Water Quality". d. Prepare and implement public health risk management plans accompanied by a planned maintenance and monitoring programme e. Elevate monitoring of water quality (refer draft NZDWS 2005) • Encouragement can be enhanced through cooperation with HPO/ Drinking Water Assessor to jointly disseminate literature and advice about alternatives for water supply treatment improvements and the benefits of maintenance and monitoring programmes

WATER SUPPLY ROOF TANK SUPPLY	
Event: Chemical contamination of supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures Options**
• Runoff from roof from pesticide/ herbicide spray drift • Inadequate treatment • Use of inappropriateroof paints (e.g. lead based) • Accumulation of soot/ dirt from chimneys • Leaching from storagetank (NB replacement of concrete tank with plastic may result in corrosive water) • Vandalism/ terrorism • Poor maintenance of infrastructure	(i) Direct funding of connection to existing community supply (ii) Require owner to: (a) complete and implement public health risk management plans for assessment by EHO (b) elevate monitoring of water quality (refer draft NZDWS 2005)to includepotential chemicals (c) Implement a comprehensive maintenance programme to ensure roof, and tank is cleaned regularly and is secure from contamination This could be implemented through bylaw / building WOF/ consent process and subsequent inspection service. (iii) Encourage owner to: (a) Upgrade water supply system to provide adequate barriers to chemicalcontamination (b) Install first flush diverters on collection pipework (c) Prepare and implement public health risk management plans accompanied by a planned maintenance and monitoring programme that focuses on chemical contamination causes) (d) Elevate monitoring of water quality (refer draft NZDWS2005)to include potential chemicals Encouragement can be enhanced through cooperation with HPO/ Drinking Water Assessor to jointly prepare and disseminate literature that provides advice about alternatives for water supply treatment improvements and the benefits of maintenance and monitoring programmes

WATER SUPPLY ROOF TANK	
Event: Insufficient supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Drought • Excessive consumption • Illegal / unpermitted use • Inst. high demand (e.g. fire) • High / unexpected growth in demand • Tanker supply • Inadequate storage • Water pipe leaking • Cost of upgrade	(i) Direct funding of connection to existing community supply (ii) Direct funding for alternative supply (iii) Support owner to determine most viable alternative source (iv) Encourage owner to: (a) Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes (b) Review the need for additional storage (c) Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY ROOF TANK	
Event: Interrupted Supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Accidental damage to infrastructure • Malicious damage to infrastructure • Flood • Power failure (for extended duration) • Fire • Earthquake • Landslide • Volcanic Ash	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY BORES	
Event: Bacterial and microbiological contamination of supply **Probability:** Likely **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• Infiltration from farmland into infiltration zone • Inadequate treatment • Infiltration from urban activities into infiltration zone • Insecure well head • Poor maintenance of infrastructure • Poor skills	(i) Direct funding of connection to existing community supply (ii) Require owner to: a. complete and implement public health risk management plans for assessment by EHO b. elevate monitoring of water quality (refer draft NZDWS 2005) c. Implement a comprehensive maintenance programme to ensure bore is secure from contamination This could be implemented through bylaw / building WOF/ consent process and subsequent inspection service. (iii) Encourage owner to: a. Upgrade water supply system to provide adequate barriers to faecal contamination b. Review the design of pipework and tanks to minimise risk of drawing collected sediment (refer NZWWA Journal Sept 2004 P30 – article by John Ashworth – "Simple Measures to Improve Tank Water Quality". c. Prepare and implement public health risk management plans accompanied by a planned maintenance and monitoring programme d. Elevate monitoring of water quality (refer draft NZDWS 2005) Encouragement can be enhanced through cooperation with HPO/ Drinking Water Assessor to jointly disseminate literature and advice about alternatives for water supply treatment improvements and the benefits of maintenance and monitoring programmes

WATER SUPPLY BORES	
Event: Chemical contamination of supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Infiltration from farmland into infiltration zone • Inadequate treatment • Infiltration from urban activities into infiltration zone • Insecure well head • Poor maintenance of infrastructure • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY BORES	
Event: Insufficient supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Drought • Excessive consumption • Water pipe leaking • Illegal / unpermitted use • Inst. high demand (e.g. fire) • High / unexpected growth • Upstream abstraction by new users • Inadequate storage • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY BORES	
Event: Interrupted Supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Accidental damage to infrastructure • Malicious damage to infrastructure • Flood • Power failure (for extended duration) • Fire • Earthquake • Landslide • Volcanic Ash • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY SURFACE WATER	
Event: Bacterial and microbiological contamination of supply **Probability:** Almost certain **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• Runoff from farmland upstream of abstraction • Inadequate treatment system • Runoff from urban development upstream of abstraction • Sewer discharge upstream • Stormwater discharge upstream • Stock access to waterway • Recreational use upstream of abstraction • Accidental discharge • Poor maintenance of infrastructure • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: (a) Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire-fighting purposes (b) Review the need for additional storage (c) Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY SURFACE WATER	
Event: Chemical contamination of supply **Probability:** Likely **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• Runoff from pesticide / herbicide application • Inadequate treatment system • Runoff from urban development upstream of abstraction • Sewer discharge upstream • Stormwater discharge • Accidental spill upstream • Vandalism / terrorism • Poor maintenance of infrastructure • Poor skills	(iv) Direct funding of connection to existing community supply (v) Direct funding of alternative supply (vi) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY SURFACE WATER	
Event: Insufficient supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Drought • Excessive consumption • Water pipe leaking • Illegal / unpermitted use • Inst. high demand (e.g. fire) • High / unexpected growth • Upstream abstraction by new users • Insufficient storage • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WATER SUPPLY SURFACE WATER	
Event: Interrupted Supply **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures – Options**
• Accidental damage to infrastructure • Malicious damage to infrastructure • Flood • Power failure (for extended duration) • Fire • Earthquake • Landslide • Poor skills	(i) Direct funding of connection to existing community supply (ii) Direct funding of alternative supply (iii) Encourage owner to: a. Upgrade water supply system to provide adequate storage – including the retention of pool water out of season for fire fighting purposes b. Review the need for additional storage c. Ensure a contract of supply with tankered water supplier ensures the water supplied is potable and delivered/ offloaded using hygienic procedures

WASTEWATER	
Event: Faecal contamination of groundwater **Probability:** Almost Certain **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures – Options**
• Excessive loading • Flooding • Poor maintenance of infrastructure • Blockage of pipe work • Unskilled operators or improper procedure • Insufficient system • Poor monitoring • Poor design / construction • Failure of process equipment (valves, control system, pipe work) • Deliberate action	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes. Ensure that septic tank emptying services are available to meet the community need. (v) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / building WOF/ consent process and subsequent inspection service (vi) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

WASTEWATER	
Event: Faecal contamination of receiving surface water **Probability:** Likely **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures – Options**
• Excessive loading • Flooding • Poor maintenance of infrastructure • Blockage of pipe work • Inadequate soakage • Unskilled operators or improper procedure • Poor design / construction • Failure of process equipment (valves, control system, pipe work)	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes. Ensure that septic tank emptying services are available to meet the community need. (v) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / building WOF/ consent process and subsequent inspection service. (vii) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

WASTEWATER	
Event: Chemical contamination of groundwater **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Discharge of chemicals into system • Unskilled operators or improper procedure • Poor design / construction • Failure of process equipment (valves, control system, pipe work	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on-site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes Ensure that septic tank emptying services are available to meet the community need. (v) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / building WOF/ consent process and subsequent inspection service. (vi) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

WASTEWATER	
Event: Chemical contamination of receiving surface water **Probability:** Unlikely **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Discharge of chemicals into system • Chemical spill • Poor design / construction • Failure of process equipment (valves, control system, pipe work)	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes Ensure that septic tank emptying services are available to meet the community need. (v) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / building WOF/ consent process and subsequent inspection service. (vi) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

WASTEWATER	
Event: Inability to receive wastes **Probability:** Possible **Population:** <10 **Risk without Preventative Measures:** Low	
Causes	**Preventative Measures - Options**
• Pipework blockage • Poor maintenance of infrastructure • Power and/ or pump failure • Poor design / construction • Failure of process equipment (valves, control system, pipe work)	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes (v) Ensure that septic tank emptying services are available to meet the community need. (vi) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / building WOF/ consent process and subsequent inspection service. (vii) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

WASTEWATER	
Event: Inability to dispose of effluent **Probability:** Likely **Population:** <10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• System failure / blockage • Dispersal media / leaching field problem • Power and/ or pump failure • Poor design / construction • Failure of process equipment (valves, control system, pipe work) • Flooding • Insufficient area / soil types	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative treatment (iii) Support owner to determine most viable alternative treatment (iv) Encourage owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Encouragement can be enhanced through dissemination of literature that provides advice about septic tanks and advice on the benefits of maintenance and monitoring programmes Ensure that septic tank emptying services are available to meet the community need. (vi) Require owner to: (a) Upgrade on site disposal system to provide adequate treatment (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw/ building WOF/ consent process and subsequent inspection service. (v) Council take over the responsibility of emptying the septic tanks and charge for this service through wastewater rates.

STORM WATER	
Event: Flooding **Probability:** Likely **Population:**<10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• Insufficient capacity • Blockage of system, poor maintenance • Intense rainfall event • Prolonged rainfall event • Power failure • Earthquake • Private / public responsibility • Climate change • Inadequate secondary flow path • Aggregationof river beds	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative system (iii) Support owner to determine most viable alternative system (iv) Encourage owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried Encouragement can be enhanced through dissemination of literature that provides advice on the benefits of maintenance programmes (vi) Require owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out Through bylaw/ building WOF/ consent process and subsequent inspection service

STORM WATER	
Event: Chemical contamination of SW system **Probability:** Possible **Population:** <10 **Risk without Preventative**	
Causes	**Preventative Measures - Options**
• Discharge of chemicals into system (accidental or otherwise) • Illegal discharge • Industrial runoff • Rural catchment (in urban SW system) • Crop spraying • Baiting programme	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative system (iii) Support owner to determine most viable alternative system (iv) Encourage owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out Encouragement can be enhanced through dissemination of literature that provides advice and the benefits of maintenance programmes (vii) Require owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out

STORM WATER	
Event: Faecal contamination of SW system **Probability:** Possible **Population:** <10 **Risk without Preventative**	
Causes	**Preventative Measures - Options**
• Discharge of contaminants into sewer • Flooding of adjacent sewer	(i) Direct funding of connection to existing/ new community scheme (ii) Direct funding for alternative system (iii) Support owner to determine most viable alternative system (iv) Encourage owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out Encouragement can be enhanced through dissemination of literature that provides advice on the benefits of maintenance programmes (viii) Require owner to: (a) Upgrade existing system to provide adequate storage (b) Review the need for additional storage and disposal fields (c) Ensure that adequate maintenance is carried out and septic tank is emptied when required Through bylaw / consent process and subsequent inspection service.

STORM WATER	
Event: Damp houses **Probability:** Likely **Population:**<10 **Risk without Preventative Measures:** Medium	
Causes	**Preventative Measures - Options**
• High groundwater table and poor drainage	(i) Encourage owner to: (a) upgrade drainage (b) Use higher than minimum building platform heights (c) Ensure that adequate maintenance is carried out (ii) Require owner to : Upgrade drainage Ensure that adequate maintenance is carried out Through bylaw / consent process and subsequent inspection service

APPENDIX A3 – FULL COMMUNITY LISTINGS AND AGGREGATION PRINCIPLES

A3 FULL COMMUNITY LISTINGS AND AGGREGATION PRINCIPLES

MASTERTON DISTRICT COUNCIL

Community	Aggregate
Urban Area	
Masterton	1
Rural Area	
Wainuioru & school	5
Taueru	5
Tinui & school	2
Castlepoint	4
Fernridge & school	3(9)
Mauriceville	3(9)
Opaki	9
Whakataki	5
Mataikona	5
Riversdale	5
Rural Schools	
Mauriceville School	
Opaki School	9
Rathkeale College	9
Whareama School	5
Camp Grounds	
Ararangi Camp	6
Camp Anderson	5(6)
Riversdale Holiday Park	5(6)
Castlepoint Motor Camp	4
Castlepoint Motels	4
Mauriceville Reserve	5
Water schemes	
Fernridge	9
Opaki	9
Wainuioru	9
Mauriceville	9
Castlepoint	9
Taueru	9
Rural Industries	
JNL	1
Wineries	8

Tinui Timber	8
Lime works Mauriceville	8
Taueru lime	8
Bennetts Hill lime	8
Castlepoint fish processing	8
Community	**Aggregate**
Golf clubs	
Riversdale	5
Castlepoint	5/6?
Mahunga	6
Aerodromes	
Hood	5(6)(1)(4)
Marae	
Homewood	5/6
Te Ore Ore	5/6
Riversdale (future - currently being re built)	
Rural Pubs/Hotels/Food premises	
Whakataki Hotel	5(6)
Castlepoint	4

Tinui Hotel	3
Homestays	7
Rural Halls	
Castlepoint	7
Bideford	7
Rangitumau	7
Taueru	7
Whareama	7
Whangaehu	7
Wainuioru	7
Tinui	1
Solid waste	
Masterton	10
Tinui	10
Cemeteries	
River Rd	10
Archer Street	10
Tinui	10
Taueru	10
Hastwell	10
Castlepoint	11
Kibblewhite Rd	11

Te Whiti	11
Rural Churches	
Mauriceville	
Pioneer Cemetery	10
Community	**Aggregate**
Public Toilets	
Kuripuni	10
Bannister Street	10
Dixon Street	10
QE Park	10
Eastern Castlepoint	10
Western Castlepoint	10
Northern Riversdale	10
Southern -Riversdale composting	10
Tinui	10
Henley lake	10
Wairarapa Funeral Services	11

AGGREGATION PRINCIPLES