Public Health Risk Management Plan

Temuka Water Supply

Timaru District Council

August 2013

Approved 30 September 2013

TIMARU DISTRICT COUNCIL

Public Health Risk Management Plan for the Temuka Water Supply

CONTENTS

Appendix 1

Procedure for City Care – Prevention of Contamination to Water Supply System.

1 Introduction

1.1 Purpose of the Public Health Risk Management Plan

The Temuka Water Supply PHRMP aims to identify all events that could lead to illness, and includes, preventive measures, corrective actions, control limits and contingency plans. These are either in place now or improvements that can be made to reduce or mitigate any identified risks.

The PHRMP compilation process involved site visits to the water supply intakes and treatment plant with the operators and subsequent research to gather up recorded data needed for the PHRMP. Several workshops were held, to review the water supply elements from source to reticulation system and begin the risk analysis for each.

Table 1-1: Staff who have attended a PHRMP workshop.

Staff Member	Designated Role	Qualifications
Judy Blakemore	Utility Operations Engineer	Diploma, Drinking Water Assessor BE (Agricultural)
Grant Hall	Drainage and Water Manager	BE, MSc(Public Health)
John Clemens	Water Plant Manager	Diploma, Water Treatment Technician
Mike Schaab	Senior Water Treatment Operator	C grade operators certificate, 1981
Murray Baillie	Water Treatment Technician	Diploma, Water Treatment Technician
Jonathan Halkett	Water Treatment Trainee	
Gerard Cody	Utility Network Engineer	NZCE (Mechanical)
Andrew Washington	Utility Development and Renewals Engineer	
Liberty Guinto	Utility Strategy Officer	BSc/M Agri. Economics.

1.2 Background to the Temuka Water Supply

The Temuka Water Supply is the responsibility of the Timaru District Council (TDC) and is managed by the Drainage and Water Unit staff of the TDC.

The water supply feeds the township of Temuka and stock and domestic water to the Orari area. Winchester will also be supplied from the Temuka treatment plant from 2015.

Table 1-2: Water Supply Statistics

Supply Aspect	Key Statistic or Description
Population	4164
Sources	Temuka Reservoir bores (2 at 11m-14m deep) Temuka Reservoir bore (26m deep) Orari Bore Temuka Spring
Average daily demand	3308m^3 Temuka 72m^3 Orari
Peak day demand	5688m3
Treatment process used	Aeration, UV and Chlorination
Storage	1600m3 enclosed concrete reservoir at treatment plant
Supply Grading,	Uu (ungraded)

1.2.1 Supply Location

The Temuka Water Supply is situated on the East Coast of the South Island within Timaru District Council.

The elements of the water supply, the sources, treatment and reticulation are shown in Figure 1.1.

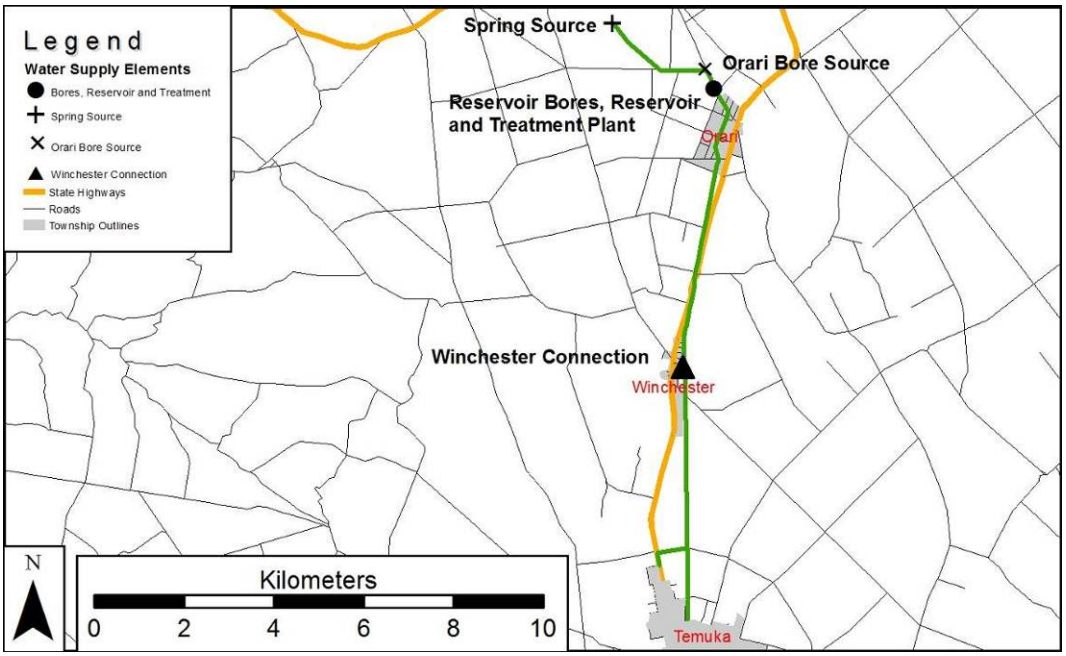


Figure 1-1: Temuka Water Supply Elements

1.3 WINZ Registration Status

This water supply is a Ministry of Health Registered supply, Community code TEM001 and in WINZ comprises four raw water sources, one treatment plant and two distribution zones as shown in the table below. Although there are 5 bores only four of the water sources show in the register as two bore of similar depth are close together and considered to be one source.

Table 1-3 : WINZ Registration

Component	Code	Name	Population	Grade
COMMUNITY:	**TEM001**	**Temuka**	**4,164**	
ZONE:	TEM001OR	Orari	180	u
Plant:	TP00299	Temuka		U
Source:	G01332	» Temuka Bore 3		
Source:	G00199	» Temuka Bores		
Source:	G00460	» Temuka Spring		
Source:	G00200	» Orari Bore		
ZONE:	TEM001TE	Temuka	3,984	u
Plant:	TP00299	Temuka		U
Source:	G01332	» Temuka Bore 3		
Source:	G00199	» Temuka Bores		

└ Source: G00460 » Temuka Spring
└ Source: G00200 » Orari Bore

1.4 The Health (Drinking Water) Amendment Act 2007 Implications

The Health (Drinking Water) Amendment Act 2007 was passed by Parliament in October 2007 and came in to effect on 1 July 2008. The passing of this Act signals the end of a long era of voluntary compliance with the Drinking Water Standards for New Zealand and replaces this with a highly prescriptive regulatory environment based around risk management principles and risk management plans as a core requirement.

Public Health Risk Management Plans are the means by which suppliers are expected to describe and define the risks in their supplies and detail how they will take "all practicable steps" to comply with the H(DW) Amendment Act 2007 and drinking water standards to minimise the risks to consumers.

Recognising that there will be financial and other resource implications arising from the introduction of the Act, the Ministry of Health has allowed for the changes to be introduced in stages based on the size, (population served), of the water supply. Temuka is in the 501-5000 population band and these supplies must comply on or before 1 July 2014.

The most immediate, and arguably most important, changes for water suppliers are contained in Sections 69S to 69Z of the Act as follows:

1. 69S - Drinking water supply to be adequate at all supply points.
2. 69T - Imminent risk in the supply to be reported to an MoH without delay.
3. 69U - Duty to protect water sources/catchments from contamination – "all practicable steps approach".
4. 69V - "All practicable steps" to be taken to comply with DWSNZ.
5. 69W - Duty to provide wholesome water. (i.e. comply with DWSNZ).
6. 69X - New source water determinands not to exceed the maximum acceptable values,(MAV's) in DWSNZ.
7. 69Y - Monitoring of the supply to be in accordance with DWSNZ.
8. 69Z - Duty to implement a PHRMP on or before the date on which this section begins to apply to the supply.

The PHRMP for Temuka Water Supply sets out the means by which it is intended to meet the requirements of the H(DW) Amendment Act 2007, and includes methods and timeframes for compliance with DWSNZ 2005.

1.5 National and Regional Matters

A PHRMP may incorporate other material by reference if that incorporation helps the plan to comply with the requirements of subsection (2).

There are a significant number of national, regional and local statutory and non-statutory requirements and activities that have recently and are currently being implemented that need consideration and action associated with the Temuka Water Supply. It is expected that each of these will have an input into many of the matters that are included in this PHRMP, and set out in accordance with the requirements of

Section 69Z (2) (a). In particular, statutory and non-statutory requirements will have beneficial inputs to the following Section 69Z (2) (a) matters:

- The reliability of water source – quantity for drinking water purposes.
- The enhancement of the quality of the water supply source.
- The efficiency of the use of the water supplied.
- The resilience of the water supply infrastructure.
- The economic efficiency and related benefits of the water supply.
- The overall elimination of risks.

The following traverses the relevant national, regional and local statutory and non-statutory considerations that TDC is presently involved in assessing and developing strategies and actions to meet these.

National Matters −

The National Policy Statement (NPS) on Freshwater Management 2011
This NPS document Gazetted on 12 May 2011 has some very specific objectives that relate to drinking water supplies. These include the water quantity - *"Objective B3 To improve and maximise the efficient allocation and efficient use of water."*

The Water Quality Objectives - "*Objective A2 The overall quality of fresh water within a region is maintained or improved...."* and also the integrated management objective and tangata whenua roles and interests objective.

The Land and Water Forum
This Forum has been established by the Ministry for the Environment (MfE). The forum brought together a range of industry groups, electricity generators, environmental and recreational NGOs, iwi, scientists, and other organisations with a stake in freshwater and land management. They are joined by central and local government observers in developing a common direction for freshwater management in New Zealand and provide advice to the Government.

The first phase of the Forum's work lasted from August 2009 to August 2010 and resulted in the report A Fresh Start for Freshwater, which identifies a set of outcomes and goals for freshwater management and recommends a number of policy changes to achieve those. Public meetings to discuss the Forum's Report were held around the country at the end of 2010 and the beginning of 2011.

The government issued a response to the Forum's recommendations in September 2011, and asked it to carry on its consensus-building work and come up with recommendations on the methods, tools and governance processes required for setting and managing limits on water quality and quantity.

The Land and Water Forum reported to Government in the course of 2012, first on a general framework for setting limits, including the governance arrangements which would ensure the successful involvement of all stakeholders and in particular of iwi, and second on the methods and strategies required to achieve and manage those limits, through better land use management and improved allocation mechanisms. It recommends integrated decision-making in catchments, continuous improvement of management practices to improve water quality and clearer rights to take and use water within set limits.

In response to the Forum's recommendations, the Government issued its consultation document Freshwater reform: 2013 and beyond in March 2013. The Forum has discussed this document with Ministers.

Resource Management Act Phase 2 Provisions
The output of the Land and Water Forum and the Government appointed Technical Advisory Group will provide recommendations on proposed changes to the RMA in respect of freshwater matters. The Cabinet is due to consider these changes sometime this year.

Regional Matters −

Regional Plans and the Canterbury Water Management Strategy
The Canterbury Water Management Strategy (CWMS) developed in 2009 sets out in its strategic framework the following vision of success:
"To enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework."

This vision has been further developed through a number of targets, and individual water zone implementation programmes.

The CWMS Targets and the Orari-Opihi-Pareora Zone Implementation Programme are considered to be of significant importance for the future management of the water resource and drinking water supply.

Key Targets set in the CWMS July 2010 document includes a number of goals and activities relating to drinking water quality and quantity. An important activity and one that TDC has already embarked on, is the development of the Water Services Risk Assessment. This Plan will include all the PHRMPs as they are developed, but cover a much wider range of risk identification and management matters associated with the water supply infrastructure. The Targets also include a section on Water Efficient Use.

The relevant zone for Temuka Water Supply is the Orari-Opihi-Pareora Zone. The zone implementation programme released 2012 sets out the recommendations and actions that TDC need to address in respect to its Temuka and other water supplies. These include:

- Increased public awareness of water values and characteristics, trends and land use in the zone, and future opportunities.
- Establishment and support of vibrant catchment groups.
- The prioritisation of resources.
- Protection of water yield from upper catchments.
- The land use changes and protection of water quality for drinking water, customary use and indigenous biodiversity.
- Resource consent support and enabling good practice.
- Using the water efficiently in urban areas.
- New infrastructure that supports delivery of the principles and targets of CWMS.

Canterbury Regional Council – Draft Land and Water Regional Plan

This Plan is currently under development. Hearings commenced in 2012 but no decisions have been released. It will replace chapters 1, 2 and 4-8 of the current operative Canterbury Natural Resources Regional Plan (NRRP). This Plan includes

many of the objectives, desired outcomes and suggested actions of the Canterbury CWMS and the Zone Implementation Plans. Accordingly, it will require TDC to follow certain procedures and meet certain requirements relating to water quantity, quality and efficient use. These matters will provide support for the PHRMP in terms of providing the safe supply of drinking water.

2 Temuka Water Supply Description

2.1 Overview of Supply Elements

The following schematic summarises the water supply elements from the catchment and sources to the consumer.

2.2 Raw Water Sources, Abstraction

2.2.1 Temuka Bore 3

This bore, K38/1273, was installed in 2001. It intercepts a different aquifer to the Temuka Bores and is sited at the Temuka reservoir and treatment plant site.

The bore has a stainless steel screen from 19.2 m to 25.2m depth.

The water is pumped up to the aerator.

It is difficult to determine the catchment for the groundwater. The Community Water Supply protection zone has not been modified from that set out in the Canterbury NRRP.

2.2.2 Temuka Bores

These two bores, K38/0010 and K38/0011, were installed in 1982 at the Temuka reservoir and treatment plant site. They intercept the same aquifer but are screened at slightly different depths, 5 to 11m and 8 to 14m.

The water is pumped up to the aerator.

It is difficult to determine the catchment for the groundwater. The Community Water Supply protection zones have not been modified from that set out in the Canterbury NRRP

2.2.3 Temuka Spring

The spring source was installed in 1961. Several pipes collect water and feed it into a small chamber. The water is piped from this source to the reservoir 3 km distance. The water flows by gravity until the reservoir site where a small booster pump lifts the water to the aerator.

It is difficult to determine the catchment for the spring water. The Community Water Supply protection zone has not been modified from that set out in the Canterbury NRRP.

The spring is sited within a fenced off area in the middle of a dairy farm. Water quality is affected when irrigation alongside the fenced area occurs. Improvements to protect the chamber have been made after a stoat was found in the pipeline.

This source is currently not in use. The pipeline requires replacement. This will cost several million to replace and is not yet programmed in the LTP. When this work is carried out the intake will be upgraded.

2.2.4 Orari Bore.

The Orari bore, K38/0298 or well 4, sited within a Council forestry block, was installed in 1978 and is screened to a depth of 10.8m. It was originally the source for the Orari water supply which in 2004 utilised water from the Temuka treatment plant. The bore was therefore unused from 2004 to 2012

The water is pumped up to the aerator. The site has its own power connection but the controls are from the Temuka site PLC which is linked via a fibre optic cable alongside the water main.

It is difficult to determine the catchment for the spring water. The Community Water Supply protection zone is based on the methodology set out in the Canterbury NRRP.

2.2.5 Resource Consents and Plan Implications.

The take of water for Temuka, Orari and Winchester was renewed for 35 years in August 2013. The take for these communities now sits in a single consent. This has increased the flexibility in the taking of water. An increased volume of water is able to be taken from the reservoir bores enabling the spring take to be shut for an extended period.

This consent is subject to 25% and 50% restrictions as within the Opihi River Regional Plan (ORRP). These will not impact on public health.

Opihi River Regional Plan
This plan which became operative in 2000 covers all the source takes. It specifies the restrictions imposed on water takes from the Opihi River and tributaries where the take can impact on river flows. Although three of the takes are not listed in Schedule B of the ORRP they have since been identified as being within this plan. All the takes are A permits (in existence prior to 1999).

The ORRP is due for review but the ECan LTP indicates this will be delayed until 2018 when the Orari Opihi Pareora zone section of the Land and Water Plan is reviewed.

The review may alter the restrictions imposed on Community Drinking Water Supplies. The CWMS is resulting in reduced restrictions being imposed on Community Water Supplies.

In addition the review will set agricultural limits that may enhance water quality. The TDC will be involved on ECan committees during this process.

Canterbury Natural Resources Regional Plan

As required within the NRRP any consent application within a Community Water Supply Protection Zone is referred to TDC for assessment of the impact on the water supply, and approval.

2.3 Treatment Processes and Process Control

2.3.1 Treatment

All water passes through an aerator, a series of timbers creating cascades which have a large surface area, before being chlorinated on entry to the reservoir. The FAC is measured prior to the water entering the reservoir. This measurement is for dosing purposes only and is not used for compliance monitoring for bacteria.

The reservoir is a fully enclosed concrete reservoir that holds 1600m^3 or approximately 8 hours storage at high demand times. The reservoir level controls the operations of the source pumps, and is monitored and alarmed.

As the water leaves the reservoir it passes through one of two UV units and enters the reticulation.

Alarms are sent from the treatment plant as in the tables below.

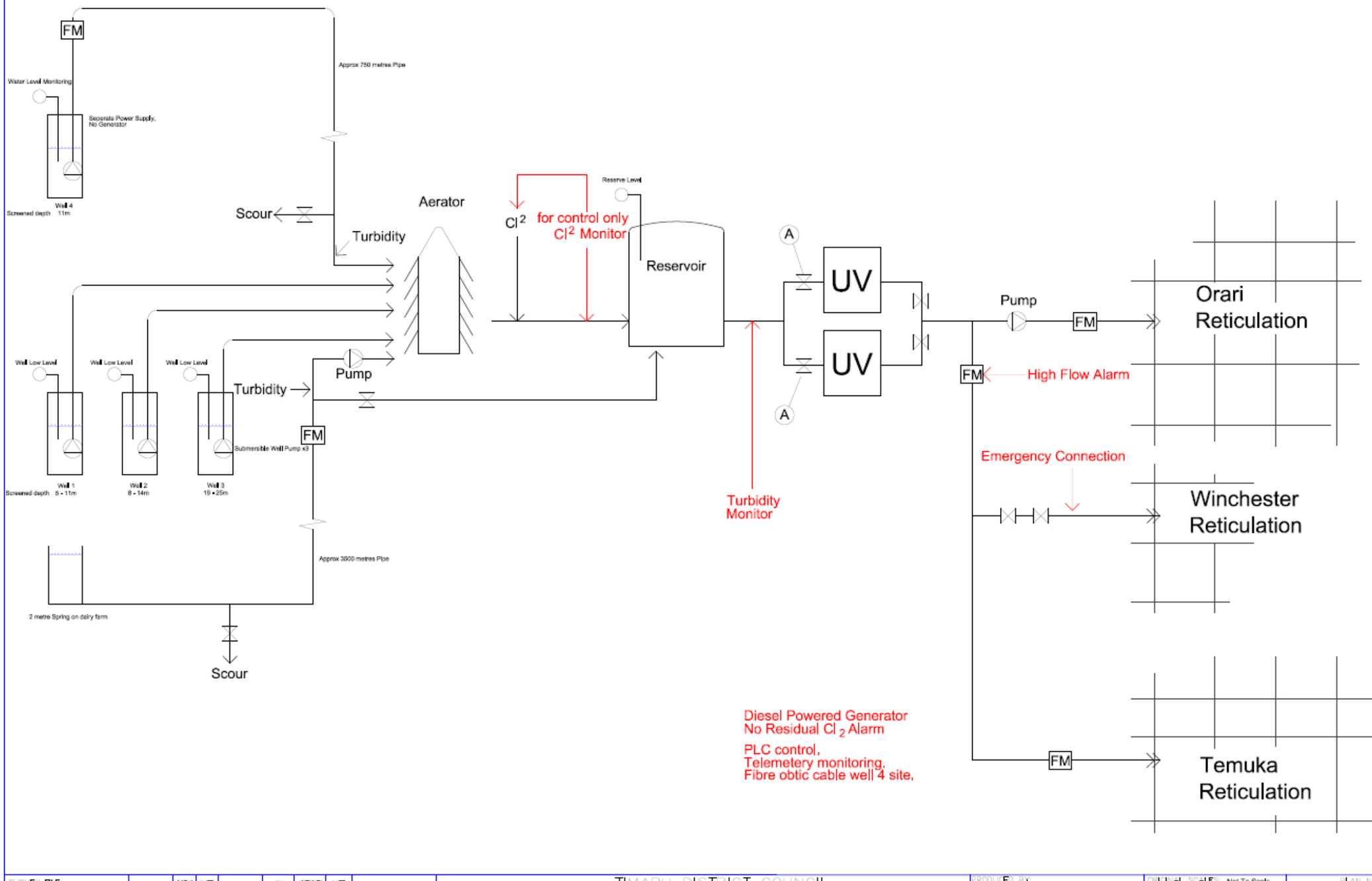
Digital Alarm
Power fail
New Chlorine cylinder in use
High reservoir
Low reservoir
Generator fault
Pump fault (5 of)
UV fault (2 of)
Orari pump site power fail

Analogue Alarm	Units	Low Set point	High Set point
Turbidity	NTU		0.8
FAC-	ppm		0.8
UV1 low intensity	w/m2	19	
UV2 low intensity	w/m2	19	
Temuka flow	l/s	10	90
Temuka reservoir level	mm	1650	3900

The water from the spring source is subject to turbidity increases in heavy rain or after irrigation of the close surrounding land. The flow is shut down when the turbidity increase. This source is currently not in use and is unlikely to be utilised until after the replacement of the spring trunk main. This is not scheduled but there is access to sufficient water without this source at present.

Turbid water from the remaining sources is infrequent and did not occur in the extreme rain in August 2012 or June 2013, when other ground water sources were impacted. The pumps in each bore are programmed to rotate duties regularly. If a pump has been off for an extended period start up may need to be managed as turbid water can occur. There is no treatment process to reduce turbidity.

The following schematics show the process from the source to the treatment plant.



SURVEY FILE:		INIT'L	DATE		BY	SHEET	DATE
DATA SOURCE:	WATER			SURVEYED	—		—
LEVEL DATUM	DRAINAGE	—	—	DESIGN			
	ROADING	—	—	DRAWN	SWS		11,05
	ELEC. PWR	—	—	RECORDED	SWS		11,05
	TELECOM	—	—	APPROVED			
	PLANNING	—	—				

TIMARU DISTRICT COUNCIL

TEMUKA WATER SUPPLY SCHEMATIC

PRODUCED BY:
FOR:
DOC NO: # 344840
FILE No:
THIS DRAWING IS THE PROPERTY OF THE TIMARU DISTRICT COUNCIL AND IS NOT TO BE REPRODUCED WITHOUT THE PERMISSION OF THE TIMARU DISTRICT COUNCIL

ORIGINAL SCALE(S): Not To Scale
ORIGINAL SHEET SIZE: A2
DRAWING STATUS: ☐ DRAFT ☐ FINAL ☐ TENDER ☒ AS BUILT
REVISION No:
DATE OF PLOT: 10,11,2005

PLAN No: 5195
SHEET One OF One

2.3.2 Process Control

A PLC controls the pumps at both the reservoir and Orari Bore site and the treatment plant. Functions include maintaining the reservoir level, shutting down any water source delivering turbid water and controlling, monitoring and alarming of the chlorination and UV plant. The PLC is set up and serviced by Industrial Controls South Canterbury (ICSC).

The level of the reservoir at the treatment plant determines the requirement for water. As the level drops a pump will start. If the level continues to drop a 2nd and then if necessary a 3rd pump will start. When the reservoir is full all pumps turn off. Staff selects the duty pump and order for the pumps to operate. This selection will consider issues such as pump faults and ground water level

The PLC overrides the duty selection once each week to ensure that each pump is operated to minimise the risk of turbid water after a period of no use

The inputs which are required for UV compliance are all monitored by the PLC. The PLC determines that the UV is within the compliance criteria, will shut down the flow through a UV unit and send an alarm if this occurs. Each UV unit is compliant provided the flow is less than 70l/s and the intensity is higher than 19w/m2. This means that a single UV unit is sufficient for most flows. Demand management, e.g. limited watering of gardens, could be used to ensure flow remains less than 70l/s. Flows exceeded 70l/s for short periods on 45 days in the period 1 June 2012 to 31 May 2013

The treatment plant is monitored using Abbey Systems telemetry. Inputs come from both the PLC and direct wired to the telemetry. The site is monitored from the master unit in the office every 15 minutes but sends alarms instantly from the site to the master unit. In addition the data required for compliance is stored on site every minute and downloaded to the master regularly, currently every hour.

The monitoring of the site enable the operators to see how the system is performing and they can often anticipate and remedy issues by observing the trends before they become alarm events. The operators check the telemetry at least daily.

The desired action for each alarm has been determined by the Utility Operations Engineer in conjunction with the operators. Although there are three categories only two are used. The categories are

- Warn, where the response does not need to be prompt. The alarm is kept on the alarm queue and observed by the operator. A pump fault is an example of this as the next duty pump will start.
- Rural. The alarm is not sent out between 11pm and 7am. At 7am it becomes an Urgent alarm. This is not used in Temuka.
- Urgent. The alarm is sent immediately to the duty operator. Alarms are acknowledged on the telemetry, either by a text response, by accessing the telemetry direct or via the internet. If the alarm is not acknowledged within 15 minutes the alarm backs up to an alarm monitored by Code 9 resulting in the duty operator, or if no response an alternative operator, being contacted by phone.

The telemetry system alarms are sent to the duty operators and acknowledged via a text. This places high reliance on the telecom cell phone network. Not all of the areas

where the operators work are within cell phone range. The alarms are managed during these times by diverting the alarms to an alternative operator.

A maintenance contract with Abbey gives prompt assistance to any issues that arise plus one visit to the council each year.

With the remoteness of many Timaru District Council sites the telemetry uses two radio repeaters. This gives added security if the repeater is compromised in a weather event. Temuka has access to both channels, although changing the channel requires a site visit. The repeaters are maintained within the channel lease agreement.

In addition the site is visited by an electronics and radio specialist annually to reduce the risk of failure.

All information from telemetry is backed up each day and the information available for trending and reporting. Assistance is given by ICSC for the data management. A maintenance agreement gives prompt support to Timaru District Council if needed.

The Timaru District Council Computer system is also networked to Claremont, where the operators are based, via a wireless system. This allows the operators to work on all systems within the council computer network from the reservoir. This is used extensively for document management and WINZ. Operators can access the telemetry from the main office, council laptop and home computers that have been set up to access to the council network.

Power Loss

In the event of a power failure site an alarm is sent to the duty operator. The generator should start automatically and if this fails to start a generator fault alarm is also sent.

The generator at the reservoir site has sufficient capacity to run two bore pumps, the PLC, treatment and telemetry. This reduces the volume of water available into the reservoir. The operator will liaise with Alpine Energy Ltd to determine the length of the outage. If the outage is expected to exceed eight hours demand management will be implemented.

2.4 Treated Water Storage and Distribution System

2.4.1 Treated Water Storage

There is no treated water storage. However the trunk main from the reservoir to the Temuka Township will sustain water in Temuka for approximately 8 hours allowing treatment to be shut down for short periods. A reservoir is proposed to be constructed in 2016/17. The location of this has not been determined.

Orari consumers require on site storage.

2.4.2 Distribution System Temuka

The trunk main which runs from the reservoir to Springfield Road on the north side of Temuka, a distance of approximately 11km is a single pipe. The first 3.2 km is concrete pipe installed in 1961 subject to joint failure and excess leakage. Supply to Temuka is vulnerable to failure of this entire pipe.

Part way along this trunk main there is an emergency supply connection for Winchester Township. This is expected to be disconnected in 2014 with a new connection that will supply water into the Winchester storage tanks. The existing Winchester booster pump will then pump into the Winchester reticulation.

The reticulation is a ring main system and there are not many dead end mains. Few give water quality issues.

FAC residuals of approx. 0.2ppm are maintained in the majority of the reticulation.

2.4.3 Distribution System Orari

Immediately following the UV treatment the water is pumped into the Orari reticulation.

Delivery of water to each consumer is into an on-site tank. Until 2007 the storage requirement was 1800 litres. Tanks installed since March 2007 must be a minimum of 10,000 litres and hold at least three days storage.

The tanks are not part of the network and are excluded from this PHRMP. The majority of complaints about contaminated water in tank supply schemes, are caused by lack of tank maintenance by the consumers, although there have been no such complaints from Orari since 2005. The tank may have plants surrounding it to reduce the visual impact and if leaves are left on the top of the tank there is ideal habitat for slaters to nest. These will enter the tank.

The Timaru District Council recommends tanks are cleaned annually and has the method to clean and sterilise a tank on the website.

There are some dwellings within the networked area which are not connected to the scheme, relying on rain or bore water. These are excluded from the PHRMP.

Some consumers have a secondary source of water, either rainwater or a bore. However as all connections are feed into the storage tank through a ballcock, with an air gap there is little risk of backflow. All tanks are inspected regularly for restrictor wear and appropriate air gap with an inspection programmed for 2014.

Each property receives an allocation of water based on stock demand of 56l/ha/day and 900l/day for a dwelling. The allocation is then rounded to supply in units of 1800l/day. There are a number of properties restricted to 900 or 1000l/day and rated accordingly. The allocation is delivered via a restrictor jet which supplies at a constant flow rate over 24 hours unless the tank is full. In reality the supply rate of flow varies slightly with a change in the network demand and pressure.

3 Water Supply Management Systems

3.1 Overview of Management systems

Additional to the water supply elements discussed in section two there are the general supply elements of Operations, Maintenance Contract, Compliance with DWSNZ, Staff Training, Monitoring of the Supply, Record Keeping and other management systems.

The operation of the Temuka Water Supply is carried out by TDC operators whilst the maintenance of the reticulation is carried out by contractors, currently City Care Ltd.

An additional nine potable water supplies and three stock water supplies are also managed by Timaru District Council.

3.2 Operations

Operations are carried out by Council staff.

Operations include the operation and maintenance of the sources, trunk mains, treatment, pump stations and reservoirs and sampling.

Table 3-1: Personnel involved in operations

Person	Role	Qualifications	Time spent on Operations	Time spent on Temuka Operations
Judy Blakemore	Utility Operations Engineer	Diploma, Drinking Water Assessor BE(Agricultural)	50%	<1%
John Clemens	Water Plant Manager	Diploma, Water Treatment Technician	100%	4%
Mike Schaab	Senior Water Treatment Technician	C Grade Operators Certificate	100%	
Murray Baillie	Water Treatment Technician	Diploma, Water Treatment Technician	100%	
Jonathan Halkett	Water Treatment Trainee		100%	

The four operators are based at the Timaru Claremont reservoir and treatment plant. One operator is on-call 24/7, with a weekly rotation for this duty. The on-call operator works eight hours on a Saturday and two hours on a Sunday in addition to any call out required.

All water quality service requests (customer complaints) are forwarded to the operators for prompt attention. Most complaints are handled by the operators, however if the complaint is the result of reticulation maintenance City Care Ltd may be requested to carry out hydrant flushing. The action taken is recorded as required by MoH.

3.3 Reticulation Management Systems

Reticulation assets are managed in house.

Table 3-2: Council personnel involved in reticulation management

Person	Role	Qualifications
Gerard Cody	Utility Network Engineer	NZCE (Mechanical)
Dan Clifford	Water Network Assistant	MSc (Environmental)
Frank Monk	Water Network Technician.	Backflow Survey Certification

The reticulation maintenance is carried out by contract, by City Care Ltd. The contract commenced in July 2013 for a period of 5-8 years. They also had the previous contract for approximately 5 years.

The majority of the reticulation repairs are reactive following a service request from the public, or the network staff. Valve exercising and mains flushing are routinely programed.

The mains flushing program involves flushing the same 20 hydrants every 6 months. The hydrants are selected as they are at the end of dead end mains or low flow areas where water quality issues have been identified.

The contract specifies the acceptable repair methods, the maximum response time, sterilisation and sampling requirements as well as qualification requirements.

The contract requires sterilisation following all repairs. The level of sterilisation is dependent on the level of contamination risk during the repair. Sterilisation of all repairs is occurring. Post repair sampling for e-coli for 5% of low and medium risk repairs and all high risk repairs is a condition of the contract. Sampling is new to City Care Ltd. Results for July 2013 show no contamination.

5% of all repairs are audited for compliance with the contract specifications, including Health and Safety, Service Delivery, Quality Standards and Efficiency and Innovation. Included in the Quality Standards section of the audit is water quality assurance consisting checks for the sterilisation of tools and materials and the risk to the drinking water quality profile of the repair.

Routine reticulation sampling is unlikely to be in the vicinity of repairs and gives no indication of contract performance.

The maintenance contract also requires all water shut downs to be reported to Council. These are recorded within a spread sheet. A procedure to ensure the MOH is notified if the outage exceeds 8 hours has been established.

Qualifications required within the contract are:

Supervisor	National Certificate in Water Reticulation (supervisor)
Other staff	Unit Standards applicable including cleaning, repairs and sterilisation. Overseen by person with National Certificate in Water Reticulation (Service Person)

This requirement has not been enforced. The Contract Manager is currently completing the supervisor level qualification. Other staff hold the service person qualification or are working towards the qualification.

All maintenance is recorded against the asset in Hansen, the asset information system (AIS) used by the Council.

New asset installation can only be carried out by an Approved Contractor.

To become an approved contractor the following qualifications must be held are:

Supervisor	National Certificate in Water Reticulation (supervisor)
Other staff	National Certificate in Water Reticulation (Service Person)

New connections to the reticulation require written approval from the Council. Once approved the consumer must utilise an approved contractor to make the connection.

Renewals are managed in-house. As part of the renewal process for determining under performing parts of the reticulation a hydraulic model has been built and calibrated against live data for pressure and flow.

Areas of low flow are identified and prioritised for renewal based on other factors including pipe material and age. This approach provides mitigation against the build up of iron bacteria by maintaining velocities where bacteria cannot build up. Areas of high velocities are also identified based on pipe materials to ensure that delamination of the pipe material into the water cannot occur.

3.4 Compliance with the New Zealand Drinking Water Standards 2005

3.4.1 Reticulation E.coli Monitoring

Bacterial compliance is carried out by Compliance criteria 6A, using e-coli monitoring only.

The number of samples taken is 50% higher than that required by the DWSNZ2005. Although ungraded this is to minimise grading demerit points as a consistent FAC residual of 0.2mg/L is not achieved throughout the reticulation.

Sampling is predominately carried out at sites which are sampled repeatedly. The sites are chosen to ensure all areas including extremities of the reticulation are sampled.

The samples are collected by the operators who monitor and record the FAC and turbidity while on site. Medlab South who has a Ministry approved lab in Timaru process the sample for e-coli.

If a transgression is found Medlab immediately advises the operator who responds as specified in DWSNZ.

Table 3-3: Reticulation sampling results

Year	Zone	Samples	E-coli transgression	Compliance with DWSNZ
2008/09	TEM001TE	84	0	Yes
	TEM001OR	20	0	Yes
2009/10	TEM001TE	91	1	Yes
	TEM001OR	20	0	Yes
2010/11	TEM001TE	84	1	Yes
	TEM001OR	24	1	No
2011/12	TEM001TE	79	0	Yes
	TEM001OR	21	0	Yes
2012/13	TEM001TE	83	0	Yes
	TEM001OR	20	0	Yes

3.4.2 Treatment Plant

UV disinfection is the method of protozoal treatment at the treatment plant. The treatment must run perfectly to be compliant with DWSNZ 2005.

Criterion 5 is used for bacterial compliance at the treatment plant. E-coli samples are only taken when compliance with the UV treatment is not achieved. If this occurs samples must be taken twice each week.

Year	Treatment Plant	Compliance with DWSNZ (protozoa)	Compliance with DWSNZ (e-coli)
2008/09	TP00299	No treatment	Yes
2009/10	TP00299	No treatment	Yes
2010/11	TP00299	No 9 hours after earthquake, 57 minutes and 5 minute high turbidity	Yes
2011/12	TP00299	25 minutes high turbidity	Yes
2012/13	TP00299	Yes	Yes

3.4.3 Chemical, (P2), Compliance

Temuka has no P2 identified and therefore complies.

Plumbosolvent Water

Temuka complies with the Plumbosolvency by using section 8.2.1.4 a.

Notices are sent to all households twice each year.

Cyanotoxin Compliance

The following extract is from DWSNZ

Cyanotoxins are not found in groundwater, so this section does not apply to bore waters. However, unconfined bores less than 10 m deep and spring water (considered equivalent to surface water in the DWSNZ) could contain cyanotoxins due to runoff or seepage from ponded water or nearby wet soil that supports the growth of cyanobacteria.

There is no evidence from inspections to date that the sources could be contaminated. Discussion with specialists indicate that cyanotoxins are very unlikely from any of the bore sources as they are all in excess of 400m to surface water.

A management protocol will be developed for Cyanotoxins in the Temuka spring source prior to reinstatement.

3.5 Performance Assessment of Water Supply Management

The Timaru District Council does not have any formal process for auditing the operators. However informal systems, such as the Water Plant Manager observing operators when in the field together, are common.

The operators have each been audited by a DWA for calibration and monitoring processes as well as sampling techniques.

A weekly meeting with the Utility Operations Engineer regularly targets a section of the DWSNZ or other critical aspects and discusses the processes, management and improvements that may be required.

Auditing for Health and Safety in Employment occurs annually and this aspect is excluded from the PHRMP.

Procedures used in monitoring network maintenance contract performance are detailed in Section 3.2. The analysis of the monitoring are discussed as required at monthly Contract meetings. Appendix 1 has the contractor's procedure to prevent contamination of the water supply network.

3.6 Demand Management

Demand management is the tool that ensures adequate water is available for the consumers, that resource conditions are met, equity is achieved between the

consumers and neighbouring community and that the Council is planning for the future of the scheme.

Demand management ensures water is available to meet the public health requirements of the consumers.

The council has a stepped hosing restriction policy that is imposed at the level required to reduce demand to the required level.

In Temuka it may be necessary to impose a restriction to reduce demand as friction within the single trunk main in peak flows may reduce pressure within the reticulation, or if there is a total ban on irrigation for the farming community it is appropriate that consumers should not be irrigating their garden and lawn.

The levels of restrictions are:

Level 0
No restrictions. Demands are being regularly monitored. Use water wisely.

Level 1
Daily demands are being closely monitored. There is a requirement to decrease demand. No watering of lawns is permitted.

Level 2
A single hose with a sprinkler or micro jet system may be used to water gardens for a maximum of two hours per day between the hours of 7pm and 8am. No watering of lawns is permitted. Garden watering outside of these hours is not permitted.

Level 3
Hand held watering with a hose for a maximum of two hours per day or a micro jet system for a maximum of one hour per day may be used to water gardens between the hours of 7pm and 8am. No watering of lawns is permitted. Garden watering out side of these hours is not permitted.

Level 4
No hose or sprinkler system may be used. Consumers may carry water using a bucket, watering can or similar to maintain plants as necessary.

3.7 Emergency Management

The Timaru District Council is a member of the Canterbury Civil Defence Emergency Management (CDEM) Group established under the Civil Defence Emergency Management Act 2002. Arrangements for managing emergencies in a co-ordinated, multi-agency manner are specified in the Canterbury CDEM Group Plan.

The Lifeline Risk Management process is to be developed as a prudent disaster preparation activity and as part of the day-to-day operation of the Utility in relation to the CDEM.

Response Plans have not yet been documented for the Temuka Water Supply assets but these are anticipated as the lifelines project is further developed.

3.8 Customer Relations Management

Customer issues and service requests are logged within the customer relations management system, which was introduced on 1 July 2013.

Water Quality issues are forwarded to the operators and are processed promptly by the operators. All complainants are contacted to advise the outcome of the issue.

On occasion the operators may request City Care Ltd flush the offending main.

Water Quality issues which are the result of contractors working on mains are forwarded by the operator to the contractor and the Council staff member who is responsible for the work to rectify the problem.

Table 3-6: Number of water quality complaints each financial year

Zone	Issue	2008/09	2009/10	2010/11	2011/12	2012/13
Temuka	Chlorine	1	0	1	1	0
Temuka	Air in water	0	0	0	2	1
Temuka	Discussion on Quality	4	0	0	1	2
Temuka	Private Fault	0	0	1	0	1
Temuka	Sampled	0	1	0	0	0
Orari	Chlorine	0	0	0	1	0

Issues that are not water quality related such as a leaking toby are forwarded directly to the contractor.

4 Risks to Public Health

4.1 Barriers to Contamination

Water quality is protected by having several effective barriers against bacteria and protozoa in place. In the Temuka Water Supply the barriers to contamination in place are partially effective. These are summarised in table 4.1.

Table 4-1: Water Supply - Barriers to Contamination

Barrier	Barrier Description	Barrier Status
Stop contamination of raw water at source	No overall management plan is possible for the farmed catchment areas, largely under private ownership. CRC Regional Freshwater Plan and Clean Streams Accord aims to minimise water pollution from farms. Resource consent conditions are imposed on all point source discharges within the Community Drinking Water Supply Protection Zones,	Partially effective
Remove particles from the water	No specific particle removal process is provided. All sources are groundwater which reduces the particle content in the water	Partially effective
Kill germs in the water	UV and Chlorine disinfection. Effective against Protozoa and bacteria.	Effective
Prevent recontamination after treatment in the storage and reticulation system	Reticulation monitoring of FAC with E.coli monitoring shows effective FAC is maintained >0.2mg/l in most areas. Trained City Care Ltd staff do all repairs and maintenance. Tankered water operators or contactor taking water from the mains may only take water via a hydrant standpipe which is inspected by council staff annually or a tanker with an air gap.	Effective

4.2 Risk Information Tables

The Ministry of Health PHRMP Guides for drinking water supply provide comprehensive schedules to manage the risk to public health. These have been referred to in the development of this PHRMP.

In determining risks existing mitigation measures such as on site power generation are considered.

Risk Information Table 4-5, Table 4-6, Table 4-7 and Table 4-8 summarize these risk items and identify the areas of risk upon which the Timaru District Council will prioritize its resources in the future for the Temuka Water Supply.

Relevant **Contingency Plans** which are to be invoked when events occur despite the Preventive Measures and Corrective Actions already in place are discussed in Section 6.

Each hazard event in the table has been evaluated based on the likelihood of the event occurring and the consequences, (or expected outcome), if it occurs, with definitions provided in Table 4-2 and Table 4-3 respectively. The overall risk estimate for each event is determined by using the risk level matrix provided in Table 4-4.

Assigning a level of risk to each hazard event provides Council with a means by which they can prioritise the Improvements to be made to reduce or remove the level of risk from a particular event. This can be dovetailed into the Annual Planning, Water Activity Management Plan and LTCCP process under the Local Government Act 2002 for capital works.

Table 4-2: Likelihood Rating Scale

Likelihood Rating	Description
Rare	May occur only in exceptional circumstances (>30 years)
Unlikely	Could occur (perhaps once in 11-30 years)
Possible	Will occur (once in 5-10 years)
Likely	Known to occur every 2-5 years
Almost Certain	Is expected to occur annually

Table 4-3: Consequence Rating Scale

Consequence Ranking	Description
Insignificant	Insignificant.
Minor	Minor impact for small population / portion of the scheme. No illness. Disruption of service <I day.
Moderate	Moderate impact for whole scheme. No illness. Perhaps odour and discoloration. Disruption of service for 1-2 days, or boil water notice necessary.
Major	Major impact to small population or part of the scheme. Incident of illness related to drinking water or loss of service for 2-3 days. Prolonged boil water notice. National bad press and public suspicion of drinking water quality.
Catastrophic	Major impact to whole scheme. Several instances of illness in the community or instance of death. Prolonged boil water notices. Lengthy disruption to service (> 3 days) across whole town. International negative press and public perception of drinking water.

The numbering and reference colours used provide a guide to the risks to public health identified in Table 4-5, Table 4-6, Table 4-7 and Table 4-8.

Table 4-4: Risk Level Matrix

		Consequence				
		Insignificant (I)	**Minor (Mi)**	**Moderate (Mo)**	**Major (Ma)**	**Catastrophic (Ca)**
Likelihood	Almost Certain (AC)					
	Likely (Li)					
	Possible (Po)					
	Unlikely (Un)					
	Rare (Ra)					

	Ins	Lo	Mod	Hi	Ex
Overall Risk Rating Key	**Insignificant**	**Low**	**Moderate**	**High**	**Extreme**

4.3 Risk Information Tables

Note: In determining these risks existing mitigation measures such as On site power generation are considered.

Table 4-5 : Risks to Public Health – Catchment, Source and Abstraction

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures/Corrective Actions (Improvements)
Contaminated source water.	1	Vehicle or aircraft accident.	Un	Mo	Lo	4 sources.	Maintain liaison process with ECan.	Shut down source. Sample to confirm contamination event over.	Consider scheme storage.
	2	Agricultural contamination.	Po	Mi	Lo				Sample for chemical analysis every 2 years and trend components.
	3	Cyanobacteria.	Un	Ma	Mod	3 Sources >400m from creeks or rivers 4th source not in use			Develop Cyanobacteria protocol if spring source reinstated.
Raw water quality poor	5	Turbidity >1 NTU from Spring source	AC	Mi	Hi	Turbidity continuously monitored and source pump turned off with increase Source not in use until renewal of spring trunk main	Turbidity Continually monitored.	Drain Spring trunk main	Spring Intake modification prior to next use
	6	Turbidity >1NTU from any bore source	Li	Mi	Mod		Turbidity Continually monitored.	Shut off pump in affected well. Dilute water from other sources.	
	7	UV Transmittance of source reduces to <80%	Po	Mo	Mod		Measured monthly		
	8	Protozoa increase to require >3 log removal	Un	Ma	Mod	Maintain awareness of changes in the catchments.	5 yearly monitoring		

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures/Corrective Actions (Improvements)
Unable to extract adequate water.	9	Adequate water not available as water table low.	Po	Mi	Lo	1 bore intercepts deeper aquifer	Scheme monitoring. Flow measurement.	Demand management	Consider scheme storage Consider an additional bore Consider the renewal of the spring trunk main to enable the use of the Spring source
	10	No Water available. This would be a major event such as earthquake.	Ra	Ca	Mod	Civil Defence and lifelines.		Supply potable water from tanker at strategic sites.	Develop lifelines further.
	11	Pump fails	Po	Mi	Lo	Not all pumps run at any time	Alarm will be sent. Monitor flow.	Arrange pump repair or replacement Demand management.	
	12	Power failure at reservoir > 8 hours.	Un	Mi	Lo	Generator runs 2 bore pumps and treatment.	Power alarm will be sent Scheme demand. Reservoir level	Confirm Orari Bore has power Determine duration of power outage. Demand management. Maintain diesel in generator	
	13	Power failure at Orari Bore> 8 hours.	Un	I	Ins	Reservoir bore will still run and maintain adequate water	Power alarm will be sent Scheme demand. Reservoir level	Confirm Reservoir has power Determine duration of power outage.	Install generator plug at Orari Bore

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures/Corrective Actions (Improvements)
Unable to extract adequate water.	14	Power failure at reservoir and Orari bore > 8 hours.	Un	Mod	Lo		Power alarms will be sent Scheme demand. Reservoir level	Determine duration of power outage. If > 8 hours determine if generator required for Orari bore Demand management. Maintain diesel in generator	Consider scheme storage Install generator plug at Orari Bore.

Table 4-6 : Risks to Public Health – Treatment Processes

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Reservoir Failure	1	Structural Failure Earthquake	Ra	Ma	Lo		Monthly inspection	Commence actions to bypass reservoir	Consider treated water storage.
Scheme Storage Contaminated	2	Vandalism.	Un	Mo	Lo	Site secure. UV treatment Chlorine dosing.	Monthly inspection.	Drain and refill reservoir. Scour trunk Main Notify consumers.	
	3	Reservoir ingress occurs.	Un	I	Ins	UV treatment Chlorine dosing	UV compliance monitored Reservoir inspections		
Storage empty	4	Controlling or Monitoring equipment failure.	Un	Mo	Lo	Low reservoir will send alarm Transducer failure will cause alarm Telemetry serviced annually.	Reservoir level monitored and alarmed Alarms will be sent from site or within office if communication lost.	Turn pumps to manual	Consider treated water storage.
Water not treated	5	UV Disinfection Equipment fails.	Po	Mi	Lo	2 UV units each capable of supplying all but peak times. Flow ceases through UV unit if failure occurs Water will be chlorinated	UV compliance UV alarms Demand monitored	Operator attends to issue Daily e-coli sampling	
	6	Generator fails to start within 3 minutes.	Po	Mi	Lo	Generator set for autostart and tested regularly Water discharging from reservoir will be chlorinated.	Generator tested regularly Power and generator fail alarms sent	Operator attends to issue Daily e-coli sampling	Consider pneumatic closure of valves on power failure.

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Low Chlorine residual leaving TP	7	Chlorine not available.	Po	Mi	Lo	Automatic changeover 70 kg cylinder always available at Claremont reservoir for immediate delivery. UV will treat water	FAC monitored Cylinder change over monitored.	Take chlorine to site.	
	8	Equipment Failure.	Po	Mi	Lo	UV will treat water	FAC Monitored.	Repair equipment.	
Staff unable to access treatment plant	9	Adverse weather (rain, snow or wind).	Un	Mo	Lo		Road conditions. Weather warnings.	Hire 4WD or tractor.	Develop Lifelines Further.

Table 4-7: Risks to Public Health – Distribution System

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventative / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Water from Winchester distributed into Temuka reticulation	1	Winchester valving at connection fails	Po	Mi	Lo	2 valves required to be opened for flow between the schemes. Valves tagged for non operation Winchester water chlorinated		Shut down valve.	New connection to Winchester
No water to consumers for 8 hours	2	Trunk main burst or shut down for repair	Po	Mo	Mod	Storage in trunk main below repair	Telemetered meter at treatment plant	Repair main	Consider replacement of concrete section of trunk main Consider storage within Temuka
	3	Burst Main	Po	Mi	Lo	Planned outages managed to less than 8 hours. Failure analysis and pipe material investigation drives renewal programme. All maintenance recorded and patterns detected.	Shutdowns recorded, monitored and audited.	Notify consumers Arrange alternative supply Notify MOH	Reticulation renewals ongoing
Unable to supply water at appropriate pressure to all consumers	4	Trunk Main leakage	Po	Mo	Mod		Flow rate recorded at each end of trunk main		Consider replacement of concrete section of trunk main Consider storage within Temuka
	5	Excessive Demand or leakage.	Po	Mi	Lo	Model recalibration. Leak Detection Programme. Renewal.	Model. Maintenance checks.	Maintenance. Urgent renewals. Impose water restrictions.	Consider storage within Temuka Further development of leak detection and maintenance analysis for renewals. Reticulation renewals ongoing

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventative / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Reticulation Contaminated	6	Contamination from sewer maintenance	Un	Ma	Mod	Plans showing water and sewer mains available Maintenance contractor and approved contractors qualified	Contract Auditing	Isolate section of main. Sterilise and sample. Arrange alternative supply Flush section of main after all clear given	
	7	Backflow.	Po	Mo	Mod	Known at risk properties have Backflow protection. Approval necessary to take water from hydrants. Contractors' tankers and standpipe must be backflow protected and checked annually. All new industrial and commercial connections require backflow protection although may not be testable Orari on-site tanks are inspected every 4 years for an air gap.		Isolate section of water main. Sterilise and sample. Arrange alternative supply. Flush section of main after all clear given	Survey commercial consumers to identify risk and require backflow to be installed if risk identified Consider installing a designated and protected site for tankers to utilise Educate consumers on backflow and the risks.
	8	Poor maintenance practices.	Li	Mi	Mod	Maintenance contract with 5% of repairs sampled for e-coli. Only approved contractor allowed to work on reticulation.	Approved contractors monitored. Water quality complaints monitored.	Water Quality complaints Resolved.	Audit to ensure maintenance contractor and approved contractors are meeting qualification requirements annually. Audit to ensure maintenance contractor is meeting continuing education requirements annually

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventative / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Reticulation contaminated	9	Resuspension of material caused by increased pipe velocity (burst main).	Li	Mi	Mod	Failure analysis and pipe material investigation drives renewal programme. All maintenance recorded and patterns detected.	Pipe material sampling for life determination.	Repair burst main. Flush after repair.	Reticulation renewal on-going.
	10	Low FAC in reticulation extremity.	AC	I	Mod	. Reticulation sampling increased from DWSNZ requirements by 50%. Maintenance contract specifies sterilisation requirements 5% of repairs sampled for e-coli.	Reticulation sampling includes extremity of reticulation.		
	11	Dead End mains affect quality.	Li	Mi	Mod	Problem Mains flushed every 6 months. No quality complaints received from consumers.	Contract auditing occurs.	Flush main as required.	Monitor water quality complaints to ensure flushing program remains effective.
	12	Pressure Reduction	Po	Mi	Lo	Cl2 in reticulation Staff and contractor trained to prevent shutdown of critical mains.	Demand monitoring and reticulation modelling	Identify cause and remedy	Valve shutdown monitoring to reduce valves left in incorrect position
	13	Air in reticulation following maintenance	AC	I	Mod	Recommissioning of pipeline procedures developed	Contract auditing occurs	Flush mains	Education
Plumbosolvency	14	Poor household plumbing fittings.	AC	I	Mod	Letter sent out every 6 months.			
Contamination of reticulated water or no water	15	Major event such as earthquake, flooding or landslide.	Ra	Ca	Mod	Civil Defence and lifelines.		Supply water from tanker.	Develop lifelines further.

Table 4-8: Risks to Public Health – General Supply Elements, Monitoring and Management

Risk Event	No.	Potential Cause	Likelihood	Consequence	Overall Risk	Preventive / Mitigating Measures	Essential Monitoring Checks and Records	Immediate Corrective Actions	Future Preventive Measures / Corrective Actions (Improvements)
Staff unable to promptly reinstate scheme	1	Staff unfamiliar with event.	Po	Mo	Mod	3 operators have Water Industry training and participating in WIOP registration scheme for operators Office staff qualified. On-going training. Operations Manual.		Liaise with other staff.	Review and update the operations manual and ensure it is user friendly.
	2	Staff illness	Un	Mo	Lo	4 operators Operators can monitor and manage scheme from there home and support other staff if necessary	Telemetry of scheme		
Contaminated or no water	3	Terrorism.	Ra	Ca	Mod	Staff are vigilant.		Liaise with DWA.	Develop lifelines further.
Data and records lost	4	Telemetry or Computer system failure.	Un	Mo	Lo	Data is backed up and stored	All monitoring and compliance records.	Advise DWA. Meet criteria specified in DWSNZ.	
Alarms not communicated	5	Telemetry system failure.	Un	Mo	Lo	2nd computer for telemetry system can become master. Spare communicator held for telemetry. Computer replaced 3 yearly.	Allied alarm and telemetry system linked to detect open switch. Alarm sent via Allied alarms.	Reinstate.	
	6	Telecom cell phone system failure.	Po	Mi	Li	Staff can monitor alarms from office if cell phone system known to be unavailable.		Monitor telemetry utilising 2nd operator if necessary.	

4.4 Risk Summary

No risks stand out as extreme risks

There is one high risk, being the high turbidity from the spring intake. This intake has been out of use since June 2012. There are no plans to renew the spring trunk main and use this source within the LTP. Further use will follow a full assessment and redevelopment of the spring intake.

There are a number of moderate and low risks, a number of which can be readily addressed for little staff time or additional cost. The potential causes are:

- Agricultural contamination.
- Cyanobacteria.
- Backflow.
- Poor maintenance practices.
- Dead end mains.
- Pressure Reduction
- Air in reticulation following maintenance
- Staff unfamiliar with event

In addition lifelines should be developed further. This is a significant staff time commitment and covers a number of events.

The Improvements Schedule to follow in Section 5 gives priority to these risks most of which are items of moderate to major capital works expenditure that need further investigation and evaluation.

5 Improvement Plan

5.1 Introduction

Implementation of a successful Public Health Risk Management Plan is an iterative process. The Schedule of Improvements presented in this section of the PHRMP is the first in a series of improvements proposed to ensure that the quality of the water supply for Temuka is maintained or improved in line with DWSNZ 2005 as far as is practicable.

The list includes improvements necessary to address the partially effective barriers, identified earlier.

The PHRMP is one of the plans and tools used to manage the Activity. These plans are continually monitored and reviewed with the LTP being developed from these every three years.

This Improvement Plan will be reviewed and updated after major works have been determined or completed, to reflect changing circumstances and requirements. The Timaru District Council's Water and Drainage Manager is ultimately responsible for ensuring the improvements are actioned.

5.2 Improvement Costs and Cost-benefit Assessment

The Improvement Schedule Tables below list the proposed improvements, indicative cost and benefit-cost estimation of high, medium or low and timeframe for completion where this is achievable. Some items, (such as the need for the spring source), are still under consideration or need further investigation and more detailed costing out as indicated in the tables below.

Where improvement items are already included in the Council Long Term Plan for actioning the timeframes and costings are subject to adjustment for updated quotes from suppliers and contractors for supply and installation. These Improvement items are identified in **bold type** in the Improvements Schedule table.

The estimate not in bold type are subject to council approval and will not be approved or scheduled until approximately June 2015. Staff have indicated their preferred timetable for this work.

Staff time and work less than $15,000 is included in the operational budget and does not need further approvals.

As a general rule, improvements which are low cost but return a high benefit either for public health or safety, are given a high cost benefit rating. An example of this is the implementation of the WIOP registration scheme which is a low cost but high cost-benefit improvement. These are implemented promptly.

5.3 Schedule of Improvements

Table 5-1: Schedule of Improvements for the Temuka Water Supply Taken From Tables 4.5 to 4.8

ID	Supply Process Element	Improvement Identified	Risks Addressed	Timeframe and Cost estimate	Benefit – Cost Assessment Comments	Who is Responsible
1	Table 4.5 Catchment, Source and Abstraction	Consider scheme storage	Contaminated source water Unable to extract adequate water.	Refer ID 13		
2	Table 4.5 Catchment, Source and Abstraction	Sample for chemical analysis every 2 years and trend components	Contaminated source water	Commenced 2012 Ongoing	Medium	Utility Operations Engineer
3	Table 4.5 Catchment, Source and Abstraction	Develop Cyanobacteria protocol if spring source reinstated.	Contaminated source water	2030 Refer ID 6	Low	Utility Operations Engineer
4	Table 4.5 Catchment, Source and Abstraction	Spring Intake modification prior to next use	Raw water quality poor	2030 Refer ID 6	Low	Utility Operations Engineer
5	Table 4.5 Catchment, Source and Abstraction	Consider an additional bore	Unable to extract adequate water.	2015/16 $0.3m	Medium	Drainage and Water Manager
6	Table 4.5 Catchment, Source and Abstraction	Consider the renewal of the spring trunk main to enable the use of the Spring source	Unable to extract adequate water.	2030	Low	Drainage and Water Manager
7	Table 4.5 Catchment, Source and Abstraction	Install generator plug at Orari Bore	Unable to extract adequate water.	2020	Low	Utility Operations Engineer
8	Table 4.6 Treatment Processes	Consider treated water storage.	Reservoir Failure Storage empty	Refer ID 13		

ID	Supply Process Element	Improvement Identified	Risks Addressed	Timeframe and Cost estimate	Benefit – Cost Assessment Comments	Who is Responsible
9	Table 4.6 Treatment Processes	Consider pneumatic closure of valves on power failure	Water not treated	2020	Low	Utility Operations Engineer
10	Table 4.7 Distribution System	New connection to Winchester	Water from Winchester distributed into Temuka reticulation	2014/15 $0.2m	Low (High for Winchester)	Utility Development and Renewals Engineer
11	Table 4.7 Distribution System	Consider replacement of concrete section of trunk main	No water to consumers for 8 hours Unable to supply water at appropriate pressure to all consumers	2019/20 $0.85m	Medium	Utility Development and Renewals Engineer
12	Table 4.7 Distribution System	Reticulation renewals ongoing	No water to consumers for 8 hours Unable to supply water at appropriate pressure to all consumers Reticulation contaminated	On-Going Budget prioritised for urban schemes each year.	Medium	Utility Development and Renewals Engineer
13	Table 4.7 Distribution System	Consider storage within Temuka	No water to consumers for 8 hours Unable to supply water at appropriate pressure to all consumers	2016/17 $1.8m	Medium	Utility Development and Renewals Engineer
14	Table 4.7 Distribution System	Further development of leak detection and maintenance analysis for renewals.	Unable to supply water at appropriate pressure to all consumers	On going Staff time	High	Utility Network Engineer

ID	Supply Process Element	Improvement Identified	Risks Addressed	Timeframe and Cost estimate	Benefit – Cost Assessment Comments	Who is Responsible
15	Table 4.7 Distribution System	Survey commercial consumers to identify risk and require backflow to be installed if risk identified	Reticulation contaminated	On going Staff time	High	Utility Network Engineer
16	Table 4.7 Distribution System	Consider installing a designated and protected site for tankers to utilise	Reticulation contaminated		Medium	Utility Network Engineer
17	Table 4.7 Distribution System	Educate consumers	Reticulation contaminated	On going Staff time	An additional topics being forwarded to consumers with Plumbosolvency notification.	Utility Network Engineer
18	Table 4.7 Distribution System	Audit to ensure maintenance contractor and approved contractors are meeting qualification requirements annually.	Reticulation contaminated	2013	High	Utility Network Engineer
19	Table 4.7 Distribution System	Audit to ensure maintenance contractor is meeting continuing education requirements annually	Reticulation contaminated	On going	High	Utility Network Engineer
20	Table 4.7 Distribution System	Monitor water quality complaints to ensure flushing program remains effective.	Reticulation contaminated	2013 On going Staff time	High	Utility Network Engineer

ID	Supply Process Element	Improvement Identified	Risks Addressed	Timeframe and Cost estimate	Benefit – Cost Assessment Comments	Who is Responsible
21	Table 4.7 Distribution System	Valve shutdown monitoring to reduce valves left in incorrect position	Reticulation contaminated	2013 On going Staff time	High	Utility Network Engineer
22	Table 4.8 General Supply Elements, Monitoring and Management	Review and update the operations manual and ensure it is user friendly.	Staff unable to promptly reinstate scheme	2015 On going Staff time	Low	Water Plant Manager
23	Table 4.5 Catchment, Source and Abstraction Table 4.6 Treatment Processes Table 4.7 Distribution System Table 4.8 General Supply Elements, Monitoring and Management	Develop lifelines further.	Unable to extract adequate water Staff unable to access treatment plant Contamination of reticulated water or no water Contaminated or no water	On going Staff time	Low	Utility Strategy Officer

Contingency Plans

The MoH defines a contingency plan for a PHRMP process as:

> "A plan to be followed should corrective actions fail to stop a hazard, or hazards, entering the distribution system. In most cases, contingency plans are intended to deal with the possible breakthrough of germs into the distribution system, or situations in which *acute* risk to public health arises because of the presence of a *chemical* hazard."

For many events the plan will be as specified in the DWSNZ (for 2008). Figures 4.2 and 5.2 specify the response to a transgression in the reticulation and treatment plant.

Most hazards will be previously unidentified events and a plan will be developed promptly around each event. These could include shutting down a source if one of these are contaminated, isolating a section of reticulation for a backflow event, or supplying water via a tanker in an emergency event. Whilst no specific contingency is given they have been discussed amongst staff whom are trained to identify events and respond.

The development of lifelines will determine the contingency plan for a natural or significant event.

6 Review Process for the PHRMP

6.1 Content of Review

The Utility Operations Manager will be responsible for co-ordinating a review of this PHRMP to ensure it is operating correctly. The review is to include, but not be limited to:

- Checking whether the water quality has shown compliance with the DWSNZ 2005 (note any incidence where a MAV has been exceeded and whether the response taken was consistent with the responses specified in the PHRMP)
- Checking whether any problems have been found during the regular checks and maintenance schedules, based on observation and comments from the operator's plant sheets.

Where problems or changes have been identified, the PHRMP will be updated to include:

- Any new causes for events that have been found.
- New preventive measures identified for existing causes, or to deal with any new causes arising.
- Any changes to how often monitoring and/or maintenance checks should be made.
- Any new capital works and/or procedural improvements needed.

This requires an update to the Schedule of Improvements already completed and the addition of newly identified improvements. If there have been any changes to the supply, such as new treatment or changes to the source, new events may have to be added to the Risk Tables. If a Contingency Plan has been used, any improvements to the Contingency Plan that became evident should be made. This is consistent with the iterative process for PHRMP development over time.

6.2 Review Timeframe

This plan will be reviewed in July 2018. In the interim it will be updated after major work are identified. This does not include the supply to Winchester. This is a component of the overall Water Activity Plan which is carried out on an on-going basis with the LTP developed every three years.

6.3 PHRMP Reporting and Links to Other Documents

As a mandatory requirement, the PHRMP development process is streamlined to the Water Supply Services Activity as one the tasks that needs to be undertaken as scheduled.

This process is integrated into the Activity Management Plan (AMP) particularly on the aspect of risk management. The PHRMP form part of the entire risk management plan of the water supply services which covers beyond public health.

Programmes and projects identified in the PHRMP are also integrated to the budget of the Water Supply Services Activity for consideration and carried over to the Long Term Plan (LTP).

Appendix 1

Procedure for City Care – Prevention of Contamination to Water Supply System.

Purpose and Scope

To prevent contamination of the water supply networks from City Care maintenance staff and their equipment. This procedure covers staff illness, vehicles, machinery, tools sterilisation and the sterilisation and repair of damaged water supply systems.

Staffing Procedure

All Staff immediately report the onset of any gastro-intestinal (diarrhoea) illness to their Manager.

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Contract Manager places affected staff on work that does not involve handling of water supply parts, plant or equipment until free of illness for 48 hours.
Determines whether a medical clearance certificate is required before staff can return to water work. Certificates may be required for specific conditions such as Hepatitis A, Shigella, Typhoid, Cholera.

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All Staff maintain awareness of the need to separate work on waste systems from work on water system and maintain good hygiene practices.

Vehicles, Machinery, Tools and Equipment

All Staff maintain awareness that water only vehicles are not to be used on sewer works.
For water and drainage (split truck) compartment separation of vehicle tools. Where it is necessary to use drainage equipment for water work it is to be thoroughly cleaned and sterilise using a chlorine solution before using it for water work.

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All Staff keep vehicle clean at all times. Regularly clean interior and exterior, including storage area for tools and water components.

Repair Procedure

All Staff, Low risk - After the required repair is exposed positive pressure is maintained:

- Work area is sprayed with a chlorine solution prier to working on the repair.
- Pipes and fittings are to be cleaned with a chlorine solution prier to their installation

All Staff, Medium risk - The pipe has to be drained before the repair work can be cared out:

- Follow the above steps and,
- Drain water from the damaged area, the drained water is to be kept well below the damaged area of the pipe.
- Is to be flushed for a minimum of 5 minutes after repair

All Staff, High risk - If external solid or liquid material is likely to have entered the damaged area of the pipe or if there is stormwater or sewer utilities in the vicinity:

- Follow the above steps and,
- Inform City Care's Manager and the Engineer
- Isolate the water main and if practical affected connections
- Flush main thoroughly before repairing to remove any material from the pipe, the drained water is to be kept well below the damaged area of the pipe.
- Bacteriological sampling

Records

Associated Documents