Ashburton DISTRICT COUNCIL

Fairton Water Supply

Water Safety Plan

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Version 2.1: August 2016

Authorised by: _____

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Review Date: June 2017

Document Control

Version No	Description	Authorised	Approval Date
V 1.0	For submission to DWA for approval	AG	March 2008
V 2.0	Five yearly revision to DWA for approval	AG	June 2015
V 2.1	Annual Review & Update of Improvement Schedule	AG	August 2016

Contents

1 Background

Ashburton District Council (ADC) own and operate the Fairton drinking water supply. Under the Health (Drinking Water) Amendment Act 2007 (the Act) water suppliers have a duty to prepare and implement Water Safety Plans (WSP), formerly Public Health Risk Management Plans (PHRMP) [Section 69Z].

Under the Act Council has a responsibility to take all practicable steps to comply with the drinking water standards [Section 69V]. This requirement can be met in part by implementing the provisions of an approved Water Safety Plan that relate to the drinking water standards.

The purpose of a Water Safety Plan is to identify the public health risks associated with a drinking water supply. A Water Safety Plan includes a list of what could go wrong with a supply and what measures can be put in place to prevent or eliminate risk to public health.

Fairton is classified as a small supply under the legislation and is required to be compliant with the Act by 01 July 2015. In 2008 the Ministry of Health (MoH) approved a PHRMP for Fairton. The approved PHRMP expired in 2013. This WSP has been prepared to meet the requirements of section 69Z of the Act.

2 Implementation, Review and Reporting

2.1 Implementation of the Plan

The ADC Assets Manager is responsible for the implementation of the WSP within the timeframes indicated, subject to community and Council approvals, funding constraints and availability of resources. The Assets Manager is also responsible for the ongoing review and updating of the WSP and associated Improvement Schedule.

The document will be kept current through the following steps:

- Collating comments from those regularly using the WSP and making any required changes;
- Monitoring customer complaints and making any required changes;
- Incorporating any minor changes that have been made to the water supply;
- Updating the risk tables as required;
- Updating the improvements schedule.

2.2 Review Plan Performance

It is a requirement that the WSP be reviewed, revised and submitted for re-approval within five years of approval. During the five year period, the document will be kept current through the following steps:

- Collating comments from those regularly using the WSP and making any required changes;
- Monitoring customer complaints and making any required changes;
- Incorporating any minor changes that have been made to the water supply;
- Updating the risk tables as required;
- Updating the improvement schedule.

2.3 Duration of the Plan

This Plan shall remain in force for a period of up to five years following approval.

2.4 Revision and Re-approval of the Plan

It is a requirement that the Plan be reviewed, revised and submitted for re-approval within five years of approval. Revision processes are detailed above.

2.5 Links to other Quality Systems

This Plan will contribute improvement measures to the AMP for prioritisation and funding via the LTP.

3 Supply Details

Supply	
Supply Name	*Fairton*
WINZ Community Code	*FAI001*
Supply Owner	*Ashburton District Council*
Supply Manager	*Andrew Guthrie*
Supply Operator	*Ashburton Contracting Ltd – Robin Jenkinson (NZCE Civil, R.E.A.)*
Population Served by Supply	*200* (WINZ)
Supply Grading	*Uu (current)*
Source	
Source Name	*Fairton Deep Well*
Source WINZ Code	*G01931*
Location	*Fairfield Road*
Map Reference of Source	*NZTM 1504877easting, 5141794 northing*
Type of Source	*Bore*
Depth of Bore	*101.2m*
Consent Number	*CRC980747.1*
Consent Expires	*03 December 2032*
Maximum Consented water take:	*7.5 L/s, 648 m^3/day*
Treatment Plant	
Treatment Plant Name	*Fairton*
Treatment Plant WINZ Code	*TP00332*
Location	*Fairfield Road*
Map Reference	*NZTM 1504875 easting, 5141800 northing*
Treatment Processes	*Chlorination*
Consented Daily Volume	*648 m^3/day*
Peak Daily Volume	*291.3 m^3/day*
Distribution	
Distribution Zone Name	*Fairton*
Distribution Zone WINZ Code	*FAI001FA*
Distribution Zone Population	*200*

Regulatory Compliance	
Standards compliance assessed against	*DWSNZ 2005 (rev 2008)*
Laboratory undertaking analyses	*Ashburton District Council*
Secure bore water	*Yes*
Bacterial compliance criteria used for water leaving the treatment plant	*Criterion 1*
Bacterial compliance for water leaving the treatment plant has been achieved for the last four quarters	*Yes*
Protozoa log removal requirement required for the supply	*Not required*
Protozoa treatment process	*None*
Protozoa compliance for water leaving the treatment plant has been achieved for the last four quarters	*N/A*
Compliance criteria used for water in the distribution zone	*Criterion 6A*
Bacteria compliance for water in the distribution zone has been achieved for the last four quarters	*Yes*
P2 determinands allocated to supply	*Type 1, Nitrate*
Chemical compliance achieved for the last four quarters	*Yes*
Cyanobacteria identified in the supply	*No*
Cyano bacterial compliance has been achieved for the last four quarters	*N/A*
Identify any transgressions that have occurred in the last four quarters *Nil*	

3.1 Contact Information

Water Supply Owner:

Ashburton District Council
PO Box 94, Ashburton
Contact: Andrew Guthrie, Assets Manager
Phone: 03 307-7741

Water Supply Operator:

Ashburton Contracting Ltd
PO Box 264, Ashburton
Contact: Robin Jenkinson
Phone 03: 308-4039

4 Methodology

This WSP has been prepared with regard to "Small Drinking-water Supplies: Preparing a Water Safety Plan", Ministry of Health (2014).

A qualitative risk assessment approach based on the guidance notes in Appendix 2 of "A Framework on How to Prepare and Develop Water Safety Plans for Drinking-water Supplies", Ministry of Health (2014), has been undertaken.

4.1 System Description

Within this WSP the water supply is described and a schematic diagram prepared to illustrate the key elements of the supply. Critical points and barriers to contamination are also illustrated.

4.2 Consultation

In May 2014 a site visit was undertaken by ADC Assets staff. During the site visit critical points, barriers to contamination, risks to the supply, and preventative measures in place were identified. Information gathered during this visit has been used to inform the risk tables provided.

The draft WSP was reviewed and discussed with Andrew Guthrie, Assets Manager, Ashburton District Council, and Robin Jenkinson, Ashburton Contracting Ltd, prior to completion.

4.3 Risk Assessment

The qualitative risk assessment approach used allows for the prioritisation of improvement needs and the development of the Improvement Schedule.

Risk tables have been prepared to summarise:

a) what could happen that may cause drinking water to become unsafe,
b) what measures are in place to prevent this from occurring and whether this is sufficient,
c) the assessed level of risk, and
d) what could be done to eliminate, isolate or minimise the risks.

Potential public health risks have been evaluated using the Likelihood and Consequence scales tabulated below (tables 1-3) to determine a risk level from low to extreme.

The scales used have been adapted from those suggested in Appendix 2 of "A Framework on How to Prepare and Develop Water Safety Plans for Drinking-water Supplies", Ministry of Health (2014). Changes have been made to achieve a better spread of risk level outcomes, and to ensure relativity between the risks assessed for supplies of varying sizes. This is necessary as it is intended that improvement schedule items from individual supplies can be consolidated into a master list for implementation.

Table 1, Table 2 and Table 3 detail the criteria used and their definitions.

Table 1 Likelihood Scale

Likelihood	Frequency	Description
Likely	More than once per year	The threat can be expected to occur
Quite Common	Once per 1-5 years	The threat will quite commonly occur
Unlikely	Once per 5-10 years	The threat may occur occasionally
Unusual	Once per 10-50 years	The threat could infrequently occur
Rare	Less than once per 50 years	The threat may occur in exceptional circumstances

Table 2 Consequence Scale

Consequences	Microbiologically contaminated water	Chemically contaminated water	Supply interruption	Poor aesthetic water quality
Negligible		Minor chemical contamination event	Unplanned supply interruption for up to 8 hours	Poor aesthetic water quality of nuisance value only
Minor	Microbiological contamination (<100 population)	Recurrent chemical contamination (<100 population)	Unplanned supply interruption for in excess of 8 hours (<100 population)	
Medium	Microbiological contamination (100-500 population)	Recurrent chemical contamination (100-500 population)	Unplanned supply interruption for in excess of 8 hours (100-500 population)	Ongoing poor aesthetic water quality (may lead consumers to obtain water from other sources)
Major	Microbiological contamination (500-5000 population)	Recurrent chemical contamination (500-5000 population)	Unplanned supply interruption for in excess of 8 hours (500-5000 population)	
Substantial	Microbiological contamination (>5000 population) OR high potential for loss of life or hospitalisation with life threatening or long-term consequences	Recurrent chemical contamination (>5000 population). OR high potential for loss of life or hospitalisation with life threatening or long-term consequences.	Unplanned supply interruption for in excess of 8 hours (>5000 population)	

Table 3 Risk Level Allocation Table

	Consequence				
Likelihood	**Negligible**	**Minor**	**Medium**	**Major**	**Substantial**
Likely	Low	Medium	Very High	Extreme	Extreme
Quite Common	Low	Medium	High	Very High	Extreme
Unlikely	Low	Medium	High	Very High	Very High
Unusual	Low	Low	Medium	High	Very High
Rare	Low	Low	Medium	Medium	High

4.4 Improvement Schedule

An Improvement Schedule has been derived from the Risk Tables and is prioritised according to the assessed level of public health risk associated with hazards that are not adequately controlled at present.

Improvement measures identified in this WSP will be carried forward to the next AMP and LTP for approval and inclusion in annual budgets following the statutory public consultation process. Implementation of the Improvement Schedule is ultimately subject to Council funding approval, and/or obtaining alternative funding.

4.5 Benefits of Proposed Improvements

The proposed improvements will provide public health benefits by reducing the risk of adverse health outcomes associated with drinking water quality. In particular, risks will be reduced through the provision of water treatment systems that are appropriate to the raw water quality and catchment conditions, and that are compliant with the Drinking-water Standards for New Zealand.

The introduction of contaminants through backflow is partially addressed already, through backflow preventers being standard equipment on all new connections and ADC's wellhead also incorporating a backflow preventer.

New connections are evaluated against the backflow prevention policy, although this policy has not yet been formally adopted by Council. To further mitigate the risk an audit of properties on the scheme, the activities carried out there, and the backflow prevention in place and that required is proposed.

Given that there is only one commercial property on the scheme, a farm on Rakaia Highway at the end of a branch of the scheme, the risk is relatively low.

Uncertainties over the condition of pipes and equipment pose a risk of unexpected leaks, breakdowns and variations in performance which may lead to undesirable outcomes.

To address this, Council is implementing an asset management and information system (AMIS) which will assist with recording and programming maintenance and with performing criticality assessments to

prioritise attention on the riskier elements of the infrastructure. It will also help to consolidate information about the plant and infrastructure.

4.6 Contingency Plans

Contingency plans have been prepared (section 12) to provide guidance in the event that control measures fail to prevent the occurrence of a risk event that may present acute risk to public health. The Water Supply Operator is responsible for implementation of the contingency plans when monitoring has identified the occurrence of a risk event.

5 General Description

The Fairton water supply is a small scheme, serving approximately 73 connections with some 200 customers. Six of the connections are serviced as extraordinary connections outside the town boundary. Three properties on the scheme are metered.

The water abstraction is consented under CRC980747.1, which allows for a combined total of 7.5l/s and 648m^3/day from the old and new bores.

The average winter demand is approximately 85m^3/day. This is an average of around 1,160 litres per property per day, or 425 litres per person per day. The average summer peak demand is approximately 250m^3/day. This is an average of around 3,400 litres per property per day, or 1,250 litres per person per day.

5.1 Location Map

Figure 1: Location Map

5.2 Description of Source

The current source is groundwater from one bore, ECan number L37/1716 (see map above), drilled in June 2009. The bore is 300mm in diameter and is located on Ashburton District Council land adjacent to the Fairton Primary School.

There is a Zurn/Wilkins 350 DC testable double-check back flow prevention system installed directly after the well head, and a water level sensor installed in the bore.

5.3 Treatment and Distribution

Raw water is dosed with sodium hypochlorite before it flows into the storage reservoirs. Each row of tanks has high level inlets and low level outlets to promote circulation to promote turnover to ensure that water does not remain in the tanks for long periods.

A depiction of the Fairton water supply process is included below in Figure 2.

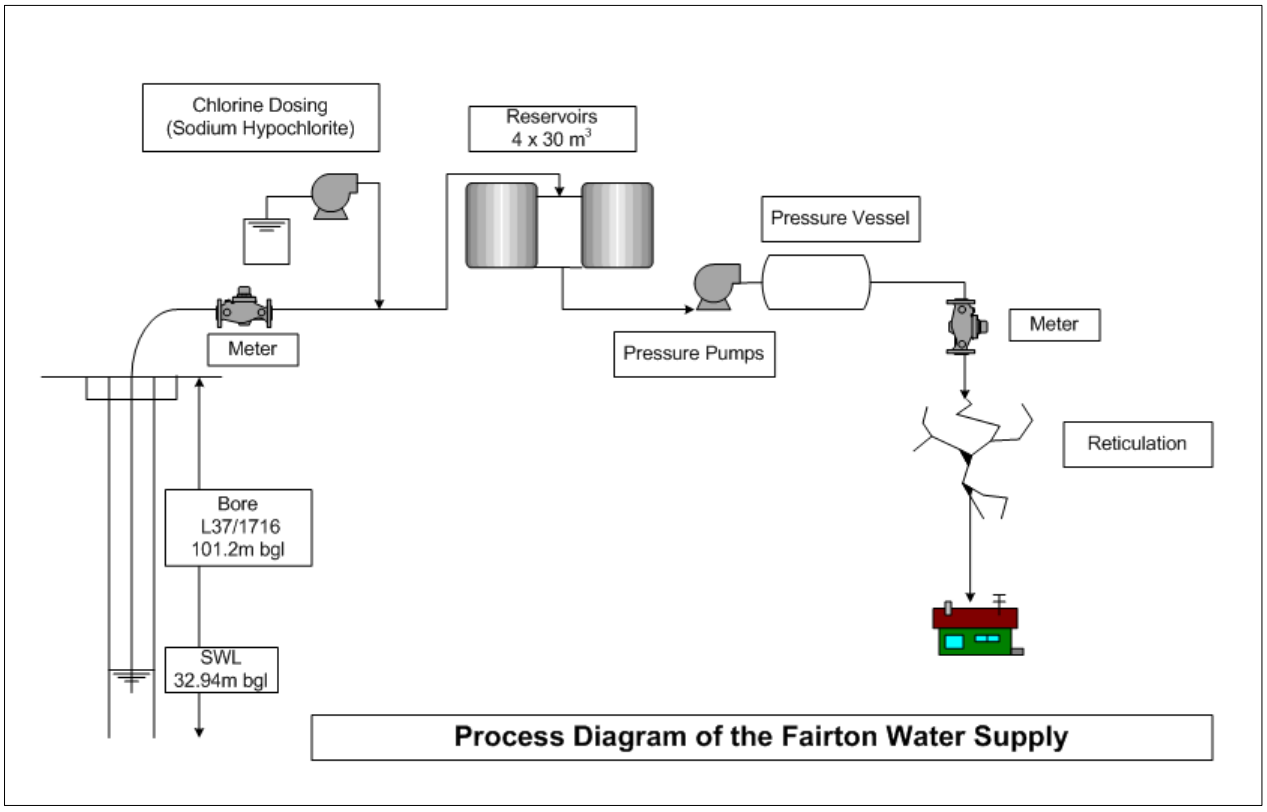

Figure 2: Fairton Water Supply Process Diagram

5.4 Monitoring and Alarms

The treated water is manually sampled weekly for FAC, pH and turbidity. While not required for compliance, this monitoring helps to provide a check on the treatment process and allows a higher source-treatment grading.

Three E. coli samples per quarter are required from the distribution zone. The samples must be taken with a maximum of 45 days between samples and cover at least 2 days of the week. Immediate action is required if a positive E. coli test result occurs.

Fairton has an official P2 for nitrate. Monthly nitrate samples are taken at the plant and in the distribution zone with a maximum interval between samples of 45 days.

The site is connected to the district-wide telemetry system. The bore and storage tank levels are monitored to ensure a continuous supply is maintainable. The system pressure is monitored to ensure the pressure in the distribution zone does not drop too low, creating a backflow risk.

Key alarms include low level alarms for the bore and storage tanks, alarms for pump and generator faults, a low pressure alarm and a power failure alarm. The list of monitored measures and alarms is shown below in figure 3.

State	Equipment Name	Point Name	Value	Units	Notes Available	Output	I/O Point Reference
NML	Booster Pump 1	Fault	0				RDI 11
	Booster Pump 1	Running	0				RDI 10
NML	Booster Pump 2	Fault	0				RDI 13
	Booster Pump 2	Running	1				RDI 12
	Booster Pump Flow	Accumulated Today	41.9	m3			NAI 3
	Booster Pump Flow	Accumulated Yesterday	59.8	m3			NAI 4
	Booster Pump Flow	Instantaneous	0.9	l/s			RAI 2
	Bore 1	Level	8.47	m			RAI 3
NML	Bore 1	Level Low	0				RDI 6
	Bore 2	Level	0	m			RAI 4
NML	Bore 2	Level Low	0				RDI 9
NML	Bore Pump 1	Fault	0				RDI 3
	Bore Pump 1	Running	0				RDI 2
NML	Bore Pump 2	Fault	0				RDI 5
	Bore Pump 2	Running	0				RDI 4
	Bore Pump Flow	Accumulated Today	40.3	m3			NAI 1
	Bore Pump Flow	Accumulated Yesterday	60.2	m3			NAI 2
	Bore Pump Flow	Instantaneous	0	l/s			RAI 1
NML	Site	Expansion Module Comms Failure	0				NDI 5
	Site	Generator Running	0				RDI 15
NML	Site	Generator System Fault	0				RDI 16
	Site	Last Comms	2014-04-29 16:0...				
NML	Site	Mains Power Failure	0				RDI 1
	Storage Tank	High Level Setpoint	98	%			NAO 1
	Storage Tank	Level	85.6	%			RAI 5
NML	Storage Tank	Level High	0				NDI 1
NML	Storage Tank	Level Low	0				NDI 2
NML	Storage Tank	Level Low - Booster Pump Cutout	0				RDI 14
	Storage Tank	Low Level Setpoint	40	%			NAO 2
NML	System Pressure	Low	0				NDI 4
	System Pressure	Low Level Setpoint	200	kPa			NAO 4
	System Pressure	Pressure	398.8	kPa			RAI 6

Figure 3: Telemetry monitoring and alarms

5.5 Maintenance and Administration

The Fairton water supply is owned and managed by Ashburton District Council. Ashburton Contracting Ltd (ACL) are contracted to operate and maintain the water supply. The personnel involved in the day-to-day management and operation of the water scheme are adequately trained and qualified, and ACL staff undertake on-going training.

Water samples are taken by regulatory staff and tested at the Ashburton District Council laboratory for bacteriological testing. The treatment processes and programmed monitoring are fully compliant with the DWSNZ requirements for a secure groundwater source.

6 History

A PHRMP was prepared for this scheme in 2008 with a focus on identification of the most significant risks relating to water quality and reliability of supply.

The primary risks in 2008 were those with respect to water quantity, power supply reliability and chemical contamination in the form of high nitrates. Following a major upgrade programme which took place in early 2010, the most significant risks have now been resolved.

6.1 Plant Upgrade

Water quantity was a concern due to nearby bores at similar depths running dry in the summer of 2005. Although the Fairton bore never ran dry, a new 101.2m deep bore (L37/1716) was drilled in June 2009 to provide a more reliable source of water.

The reservoir was upgraded to four 30m^3 tanks in 2010. The permanent hosing ban was lifted following the upgrade and water demand continues to be managed through the use of staged water restrictions in high demand periods.

Supply reliability was improved through the addition of a standby generator in 2008 and a second pressure booster pump to improve performance and to provide redundancy in 2010.

6.2 Water Quality

The deepening of the well also sought to improve water quality. The new bore allowed water to be drawn from deeper groundwater not as affected by the higher nitrate levels closer to the surface.

At the time of the previous PHRMP, manual treatment of the water only took place when testing indicated a problem. This was changed to a continuous chlorination process as part of the 2010 upgrade.

E.Coli testing on the new bore began in July 2010, and the old bore continues to be tested monthly. To date there have been no recorded detections of E.Coli in either well.

Nitrate results for the new bore are stable but consistently above 50% of the MAV. For this reason, Fairton has a Priority 2 Determinand assigned for nitrate.

7 Water Supply Distribution

7.1 Description of Storage

Four 30m^3 plastic storage tanks are located on site adjacent to the treatment building. The tanks are arranged in two rows of two tanks, and are connected such that the water inlet is high and the water outlet is low, to encourage mixing and to prevent short-circuiting of the flow.

The tanks are located within a locked compound to prevent casual access.

7.2 Description of Distribution

The trunk main from the treatment plant into Fairton is DN100 PVC. Other pipework in the town is predominantly DN100 PVC and DN50 PE.

There is no firefighting capability in the scheme.

7.3 Pump Systems

Pressure is maintained by two booster pumps and a pressure vessel. The booster pumps are fitted with variable speed drives so that pressure can be maintained as demand varies, particularly during periods of high demand.

7.4 Power Supply Reliability

Power supply to the site is usually reliable but storm and snow events may result in localised or widespread power outages in this area. A standby generator is on-site and is capable of powering the treatment equipment, booster pumps and bore pump as required.

7.5 Supply Pressure

Supply pressure is maintained at 400kPa. The pressure is alarmed with a low setpoint of 200kPa. In the peak summer months pressure drops to around 350kPa for the hours where hosing is permitted.

7.6 Backflow Prevention

Rural properties served by this supply could pose a backflow contamination risk. There is also the risk of backflow contamination from all other connections if pressure was to drop significantly.

All new connections are examined against the ADC backflow prevention policy.

7.7 Maintenance

The supply is maintained by Ashburton Contracting Ltd (ACL), who are contracted to operate and maintain all ADC water supplies.

ADC is implementing an Asset Management and Information System (AMIS) to assist with programming, monitoring and tracking regular maintenance and inspection/monitoring tasks. This will also allow regular condition assessments and signal areas at increased risk.

8 Critical Points for Hazard Management

Figure 4 below presents a schematic of the water supply critical points and barriers to contamination. Critical points, where hazards can be eliminated, minimised or isolated are indicated in blue. Barriers to contamination are indicated in red.

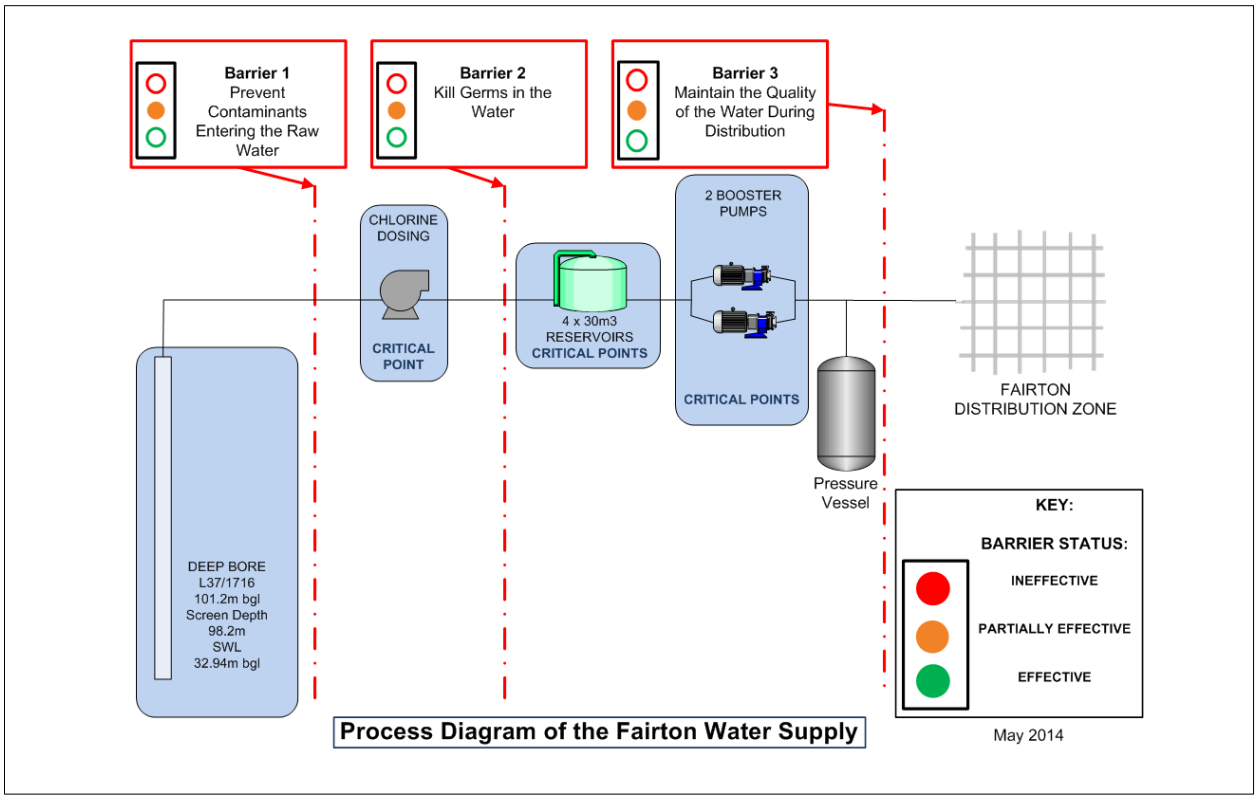

Figure 4: Fairton Water Critical Points and Barriers to Contamination

Critical points where hazards can be eliminated, minimised or isolated are tabulated below.

Critical Point	Description
Wellhead	*Possible point for microbiological contamination* *Possible point for loss of supply*
Chlorine Dosing	*Overdosing may exceed chemical MAV* *NOTE: Chlorination is not required for raw water disinfection as the source is secure groundwater*
Treated Water Storage	*Possible point for microbiological contamination* *Possible point for loss of supply*
Pump Station	*Possible point for loss of supply*
Reticulation	*Possible point for microbiological contamination* *Possible point for loss of supply*

9 Barriers to Contamination

The following section discusses what barriers are in place to reduce the risk to public health from the Fairton drinking water supply. A Framework on How to Prepare and Develop Water Safety Plans for Drinking-water Supplies by the Ministry of Health (2014) states the barriers should:

- Prevent contaminants entering the raw water
- Remove particles from the water
- Kill germs in the water
- Maintain the quality of the water during distribution

9.1 Stop Contamination of Raw Water

The water is sourced from deep groundwater assessed as being old groundwater and thus safe from microbiological contamination. The source is deemed "Secure" under Section 4.5 of the Drinking Water Standards for New Zealand (DWSNZ).

The abstraction bore is 101.2m deep, the depth minimises the risk from surface contamination. The well head is constructed to prevent ingress of contaminants. It is housed in a sealed, locked chamber. A backflow prevention system at the wellhead prevents any flow of water back into the source.

Chemical contamination of the water is possible, in particular through rising nitrate levels in Canterbury groundwater. ADC is active in working with Environment Canterbury to advocate for measures to reduce nitrate contamination of groundwater.

9.2 Remove Particles from the Water

The natural filtration provided by approximately 90m of overlaying gravels provides adequate filtration. Turbidity is generally under 0.5NTU, with rare spikes above this level.

9.3 Kill Germs in the Water

Disinfection is provided through the continuous automatic dosing of sodium hypochlorite. The dosing is linked to the flow rate through the treatment plant.

There is no protozoa removal/inactivation process. This is not required for compliance with the DWSNZ as the water is considered secure groundwater.

9.4 Maintain the Quality of Water during Distribution

Disinfection

A chlorine residual is maintained in the reticulation to provide protection in the case of bacterial contamination after treatment. The FAC levels in the water are tested by ADC staff weekly post-treatment

and monthly at one of two locations in the distribution zone. The ACL Plant Operator also carries out testing of FAC in the distribution zone.

Reservoirs

Each row of tanks has high level inlets and low level outlets to promote circulation to ensure that water does not remain in the tank for long periods. The reservoirs are covered with screw lid access hatches to prevent unauthorised access, ingress of rainwater or contaminants. The air vents have rodent protection.

Pumpstation

Pressure is maintained in the network by two pumps (providing redundancy), reducing the risk of backflow contaminating the reticulation. New connections are fitted with a backflow prevention device.

General

Maintenance procedures and hygiene practices, alongside trained and experienced operators, reduce the contamination risks associated with working on water mains. The shed housing the treatment equipment and pump station is clean and locked. The area surrounding the shed, reservoir and bore is fenced and locked.

10 Photographs of supply elements

Photo 1: Treatment Plant Shed

Photo 2: Wellhead Chamber

Photo 3: Wellhead

Photo 4: Chlorine Tank

Photo 5: Booster Pumps

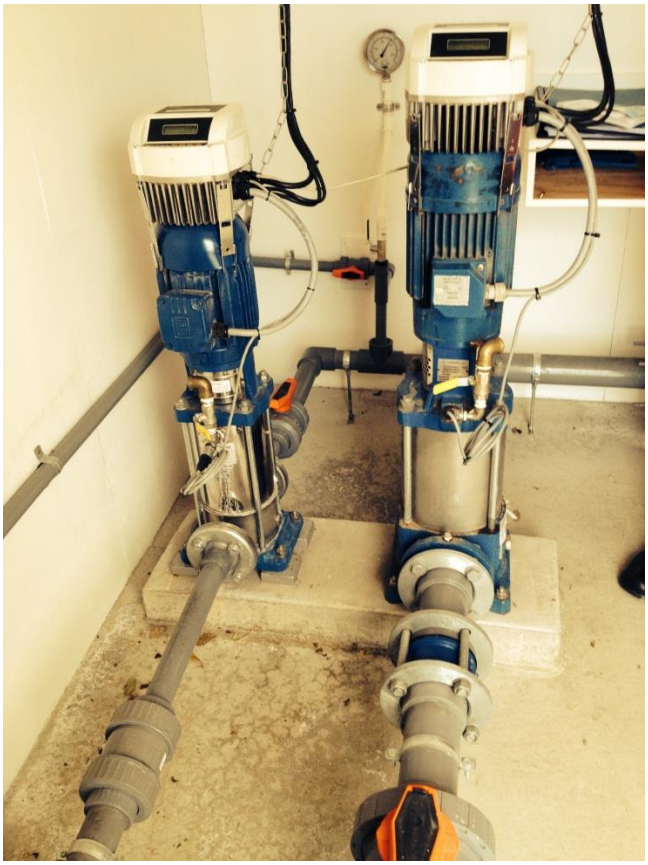

Photo 6: Four 30m^3 Supply Reservoirs

Photo 7: Pressure Tank

Photo 7: Fairton Generator

11 Risk Tables

11.1 Risk Assessment Worksheet – Bore and Source Abstraction

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
B1	Microbiological contamination of source water	Aquifer at risk from livestock, septic tanks, agricultural activities, surface runoff, etc.	Water abstracted from 98.2-101.2m below ground surface. Supply is from deep bore which is confirmed to be a secure source under Section 4.5 of NZDWS, therefore contamination is unlikely. Regular E. coli sampling. Protected wellhead to prevent contamination from surface run-off.	Yes				
B2	Chemical contamination of source water - general	Contaminated source water - agrichemicals, surface runoff, chemical spills	Water abstracted from deep groundwater, not influenced by surface contamination. Wellhead constructed to DWSNZ standards. Wellhead is secured from casual access. Annual basic water chemistry testing undertaken.	Partial	Unusual	Medium	Medium	Use the Ministry of Health 'Priority 2 Determinand Identification Guide September 2012' to determine if there are any other chemical risks, e.g. disinfection by-products.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
B3	Contamination of source water	Contaminant entry via well head e.g. vandalism, flooding	The borehead is sealed at the surface and within a covered, locked enclosure and locked compound.	Yes				
B4	Chemical contamination of source water – nitrates	Changing nitrate levels in the groundwater	Regular monitoring of nitrate-nitrogen at the plant and in the distribution zone. Depth of groundwater means that changes are slow and can be planned for.	Yes				
B5	Contamination of source water	Catastrophic failure, e.g. seismic activity disrupting the aquifer confinement or wellhead protection	Inspection of facilities following a significant earthquake. Annual water chemistry profiles to determine that the water quality is relatively unchanged over time. Monthly monitoring of nitrate-nitrogen both in abstracted water and in distribution zone. Monthly E. coli sampling of source water.	Partial	Unusual	Medium	Medium	Investigate resilience of plant to natural hazards. Develop Emergency Response Plan and implement if water supply cannot be maintained from this source.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
B6	Insufficient water available	Drought conditions will lead to lower groundwater levels	Monitoring resource consent applications nearby for possible impacts on the bore. New bores must be approved by ECan, therefore effects on ground water are assessed before new supplies are approved. Bore water levels are monitored through telemetry and alarmed. On-site storage to buffer short-term dips in groundwater levels, allowing time to put alternatives in place. Application of water restrictions to manage demand. Alternative source (old, shallow bore); however this is not secure groundwater.	Partial	Quite Common	Medium	High	The existing pump could be lowered. However, either capital investment in a higher capacity pump would be required, or the capacity would reduce from around $350m^3$/day to around $210m^3$/day. This will require water use restrictions to manage.
B7	Insufficient water available	Power supply interruption	Generator provides a permanent source of backup power should power failure occur.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
B8	Insufficient water available	Peak day demand exceeds pumping capacity	Staged water restrictions implemented based on water usage trends. Storage contains 120m^3 of water to buffer short-term peaks in demand.	Yes				
B9	Insufficient water available	Damage to well head structure – vandalism	Well head structure and compound are secured against unauthorised access and are not situated in a location prone to vandalism.	Yes				
B10	Insufficient water available	Bore pump failure	The bore pump is on telemetry so any failure will be immediately investigated and remedied. There are four reservoirs that have enough storage for alternatives to be put in place. Water tankers are available for use as an alternative water supply.	Partial	Rare	Medium	Medium	Regularly check bore pump records for any anomalies that may indicate a potential pump fault.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
B11	Insufficient water available	Catastrophic failure, e.g. seismic activity damaging equipment	Wellhead and associated equipment inspected following a significant earthquake. Pump status monitored and alarmed through the telemetry system.	Partial	Unusual	Medium	Medium	Investigate resilience of plant to natural hazards. Develop Emergency Response Plan and implement if water supply cannot be maintained.
B12	Insufficient water available	Drought, low river levels.	Intake water level monitoring. Demand management when intake level is low.	Partial	Unusual	Medium	Medium	Review need for increased demand management.

11.2 Risk Assessment Worksheet – Treatment

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T1	Inadequate disinfection (not enough free available chlorine)	Dosing pump malfunction, control system malfunction, SCADA malfunction or inaccuracy	The bore has secure groundwater status. Disinfection is therefore not required as a primary means of treatment. The chlorination process is aimed at disinfection in the reticulation network. Routine plant checks and inspections. Standby power generation is onsite. Regular manual E. coli, FAC, pH and turbidity monitoring. A sample tap is available for testing on the pump station output.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T2	Inadequate disinfection (not enough free available chlorine)	Incorrect dose rate or solution strength too high/low. Chlorine solution runs out	Secure groundwater (see T1). Routine checks and inspections. Sodium hypochlorite solution supplied by regular and reputable supplier. Chlorine solution is diluted to reduce rate of decay while in storage. 2 x 500L containers of chlorine solution.. Instructions for refilling the chlorine solution are on site. Regular manual E. coli, FAC, pH and turbidity monitoring.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T3	Inadequate disinfection (not enough free available chlorine)	High chlorine demand as a result of high turbidity	Secure groundwater (see T1) Regular manual E. coli, FAC, pH and turbidity monitoring. The deep groundwater is not subject to significant fluctuations in turbidity.	Yes				
T4	Inadequate disinfection	Short-circuiting through reservoir reducing contact time	Secure groundwater (see T1) High level inlets, low level outlet to promote circulation. Reservoirs essentially joined in a series to increase contact time. Regular manual E. coli, FAC, pH and turbidity monitoring.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T5	Over-chlorination (too much free available chlorine)	Dosing pump, control system or SCADA malfunction or inaccuracy	Routine plant checks and inspections. Regular manual E. coli, FAC, pH and turbidity monitoring. The dosing pump only turns on when the bore pump is on.	Partial	Unlikely	Negligible	Low	Considering installing telemetry alarms for chlorine dosing pump faults and chlorine dosing pump power failure. Consider installing chlorine residual high/low alarms.
T6	Over-chlorination (too much free available chlorine)	Incorrect dose rate or solution strength too high	Sodium hypochlorite solution delivered by regular and reputable supplier. Regular manual E. coli, FAC, pH and turbidity monitoring. Experienced and trained operators. Instructions for refilling the chlorine solution are on site Calibration device for the dosing pump installed.	Partial	Unlikely	Negligible	Low	Consider installing chlorine residual high/low alarms.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T7	Failure to remove other chemical contaminants from raw water	Treatment system inadequate	No known chemical contaminants in source water other than nitrate. Water chemistry profile carried out regularly. Monthly monitoring for nitrate – results all well under MAV.	Yes				
T8	Inadequate protozoa removal/inactivation	Treatment system inadequate	The supply bore has secure ground water status under Section 4.5 of DWSNZ, therefore treatment is not required.	Yes				
T9	Insufficient water available	Inadequate treatment plant capacity	Treatment capacity adequate for existing peak daily volume with reservoir storage to meet peak instantaneous flow rate.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk Event**
T10	Insufficient water available	Damage to plant by natural hazard	Storage on-site in the event of damage to treatment plant. Contingency plans in place for alternative supply (e.g. tankers) if necessary.	Partial	Rare	Medium	Medium	Investigate resilience of plant to natural hazards. Develop Emergency Response Plan and implement if water supply cannot be maintained.

11.3 Risk Assessment Worksheet – Storage and Distribution

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
S1	Introduction of contaminants into the distribution system	Deliberate or accidental contamination via storage tanks	Storage tanks covered and within a fenced and locked compound. Chlorine residual is maintained in the reservoirs. Air vents have rodent protection.	Yes				
S2	Introduction of contaminants into the distribution system	Backflow	All new connections have backflow preventers, of the type indicated by the backflow prevention policy. Pressure maintained at 400kPa, with redundancy. A chlorine residual is maintained in the distribution zone. Pressure maintained with only minor fluctuations. Two pressure booster pumps to provide redundancy.	Partial	Unlikely	Medium	Medium	Adopt and implement a backflow prevention policy for customer connections.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
S3	Introduction of contaminants into the distribution system	Operation and maintenance activities	Contractor has documented practices and procedures for working on water supplies. Contractor is experienced in working with water supplies. Chlorine residual is maintained in the distribution zone.	Yes				
S4	Introduction of contaminants into the distribution system	Pipe materials, age and condition, plumbosolvency	Consumers are notified of plumbosolvency twice per year as required by DWSNZ.	Partial	Unusual	Medium	Medium	Review and maintain Activity Management Plans and associated asset renewal programmes to minimise failures. Undertake a criticality analysis of the network to assist renewals planning.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
S5	Introduction of contaminants into the distribution system	Damage to distribution system by natural hazards	Pressure maintained will help prevent ingress of foreign material. PVC and PE pipe is more resilient against seismic activity. Damaged sections of reticulation can be isolated.	Partial	Rare	Medium	Medium	Develop Emergency Response Plan.
S6	Insufficient water available	Pump or power failure	There are two pressure booster pumps, providing redundancy. Alarms for pump faults are monitored on the telemetry system. Standby generator on-site, tested regularly, and alarms indicating power or generator failure.	Yes				
S7	Insufficient water available	Lack of storage	120m^3 of on-site storage, enough for daily water needs (not including garden irrigation). Staged water restrictions to manage demand.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Measures in Place to Control Risk Event**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
S8	Insufficient water available	Damage to storage or distribution systems, e.g. reservoir failure, water main failure, earthquake damage	Each of the rows in the reservoir can be isolated. Reservoir level is monitored and alarmed on the telemetry system. Damaged sections of the reticulation can be isolated. Ability to tanker water in to meet demand. ADC approval is required for third parties to work in the road corridor.	Partial	Unusual	Medium	Medium	Implement and use Asset Management System (AMS) for programming and monitoring regular maintenance and inspection/monitoring tasks. Undertake a criticality analysis of the network to assist renewals planning. Investigate resilience of plant to natural hazards. Develop Emergency Response Plan and implement if water supply/quality cannot be maintained.

11.4 Risk Assessment Worksheet – Other

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Additional Measures to Control Risk**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
O1	Incorrect water quality data used for supply management (failure to identify inadequate water quality)	Inappropriate/ inadequate/ incorrect sampling and reporting	Council have a sampling calendar for sampling compliance. Staff are trained to take samples and alternate personnel are available to cover for absences. Results are reported through the WINZ system to the Drinking Water Assessor. Sampling locations are clearly labelled. Annual IANZ accreditation for Council laboratory.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Additional Measures to Control Risk**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
O2	System does not perform as intended	Incorrect operation, inadequate maintenance.	Operators have sound knowledge of systems. There is an Operation and Maintenance manual. Key operation instructions are displayed permanently on site. An operations log is kept on site Plant records are copied and filed.	Partial	Unusual	Negligible	Low	Review and maintain activity management plans and associated asset renewal programmes to plan for regular maintenance and inspection/monitoring tasks. Ensure all plant records – including manuals, drawings, procedure instructions and emergency response plan are up to date and available at the plant. Council to place a requirement in the service provider to ensure Operation and Maintenance Procedure Manual is up to date and available at the plant.

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Additional Measures to Control Risk**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
O3	System does not perform as intended	Inadequate skills or training.	Staff are skilled and experienced.	Partial	Unusual	Negligible	Low	Council to place a requirement on the service provider to provide staff with relevant training and skills.
O4	System damaged or contaminated by construction/ maintenance work	Inadequate controls on construction and maintenance work	All maintenance is undertaken by contractor's trained/authorised staff. Construction work is appropriately supervised. Carriageway Access Request (CAR) and Before You Dig used to permit maintenance and construction works.	Yes				

List what could happen that may cause drinking-water to become unsafe (deterioration in water quality)			*Is this under control?*		*If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness.*			*What improvements could be made?*
Ref	**Risk Event**	**Potential Cause of Risk Event**	**Additional Measures to Control Risk**	**Controlled Yes/ No/ Partial**	**Likelihood of Risk Event**	**Consequences of Risk Event**	**Risk Level**	**Additional Measures to Control Risk**
O5	Inability to access site for operation/ maintenance/ emergency works	Flood, slip, bridge washout, snow fall or other hazard preventing vehicular access	Access roads are in good condition and are not generally vulnerable to natural hazards. Operations staff are equipped with suitable 4WD vehicles and given training in these use of these.	Yes				

12 Improvement Schedule

The Improvement Schedule is presented in two sections:

Part I: Major Projects and Capital Works

These projects will generally provide the greatest benefits in terms of addressing public health risks but typically require high levels of funding that may not be realistic for the community involved. It is noted that Council operate a targeted rating system such that costs associated with each water supply are borne by those ratepayers with connections to the supply. In many instances, major projects (e.g. new water source, additional treatment process) will require specific investigation and evaluation of options prior to confirmation of a suitable improvement solution. The Improvement Schedule may present a timetable for progressing such investigations, with the intention of incorporating specific upgrade projects in future versions of the WSP.

Part II: Management and Operational Improvements

These improvements will generally not provide the same degree of risk reduction as the proposed capital works upgrades but collectively they contribute to providing and maintaining effective barriers to contamination and can often be undertaken within existing operational budgets. These works are prioritised on the basis of the risk level identified and budget/resource availability.

Prioritisation

The priority for implementation is initially based on the identified risk level as follows:

Extreme risk	=	Priority 1
Very High risk	=	Priority 2
High risk	=	Priority 3
Medium risk	=	Priority 4
Low risk	=	Priority 5

Priorities have then been modified (generally elevated) where improvement items are related or need to be sequenced together.

Responsibility

The responsibility for implementation of specific improvement items is identified.

AM	=	Assets Manager
ACL	=	Ashburton Contracting Limited

Timeframes

The proposed timeframe for implementation reflects the assessed priority, anticipated funding arrangements and availability of resources. Some lower priority, low cost improvements may be completed at an earlier date where staff resources are available.

Compliance Timeframe

The Fairton water supply falls in the category of a Small drinking water supply under the Health Act. This requires that all practicable steps are taken to comply with the Drinking Water Standards by 1 July 2015.

As Fairton has been granted secure groundwater status under Section 4.5 of DWSNZ, and E. coli and nitrate sampling is being carried out according to the DWSNZ requirements with no transgressions recorded, the Fairton water supply is already compliant with the DWSNZ.

13.1 Part I: Major Projects and Capital Works

Fairton Water Supply Improvement Schedule					Part I: Major Projects and Capital Works		
Priority	**Risk Level**	**Water Supply Area**	**Reference to Risk Tables**	**Details of Proposed Works**	**Person Responsible**	**Expected Cost**	**Intended date of Completion**
Given the recent upgrade no major projects or capital works are anticipated at this stage.							

12.2 Part II: Minor Projects and Operational Improvements

Fairton Water Supply Improvement Schedule					Part II: Minor Projects and Operational Improvements		
Priority	**Risk Level**	**Water Supply Area**	**Reference to Risk Tables**	**Details of Proposed Works**	**Person Responsible**	**Expected Cost**	**Intended date of Completion**
4	Medium	Source	B2	Use the Ministry of Health 'Priority 2 Determinand Identification Guide September 2012' to determine if there are any other chemical risks, e.g. disinfection by-products.	AM	Staff time	Ongoing
4	Medium	Source, treatment, distribution	B5, B11, T10, S8	Investigate resilience of plant to natural hazards.	AM	Staff time	~~1/12/2015~~ 1/12/2017
4	Medium	Source, treatment, distribution	B5, B11, T10, S8	Develop and adopt an Emergency Response Plan.	AM	$5,000 + staff time	1/7/2018
4	Medium	Source	B12	Review need for increased demand management.	AM	Staff time	~~1/12/2015~~ 1/12/2016
3	High	Source	B6	Manage demand through implementing and enforcing water restrictions.	AM	Advertising costs + staff time	Ongoing

Fairton Water Supply Improvement Schedule					Part II: Minor Projects and Operational Improvements		
Priority	**Risk Level**	**Water Supply Area**	**Reference to Risk Tables**	**Details of Proposed Works**	**Person Responsible**	**Expected Cost**	**Intended date of Completion**
3	High	Source	B6	Consider replacing and/or lower pump to allow a greater water level above the pump and prevent cut-outs.	AM	$50,000	~~2016-17~~ Completed 20/10/2015* *Pump replaced following failure of old pump (20/08/2015). New pump is a higher capacity unit and was installed 12m lower than the old pump.
5	Low	Treatment	T5	Consider installing telemetry alarms for chlorine dosing pump faults and chlorine dosing pump power failure.	AM	$1,000 + Staff time	~~1/7/2016~~ 1/7/2017
5	Low	Treatment	T5, T6	Consider installing a level sensor and low level alarm on the chlorine solution.	AM	$2,000 + Staff time	~~1/7/2016~~ 1/7/2017
5	Low	Distribution	S2	Formally adopt backflow prevention policy for customer connections. Audit existing premises for risky activities.	AM	$15,000 + staff time	~~1/7/2016~~ 1/7/2017* * Backflow Policy formally adopted 13/8/2015. Target date for Audit completion 1/7/2017

Fairton Water Supply Improvement Schedule					Part II: Minor Projects and Operational Improvements		
Priority	**Risk Level**	**Water Supply Area**	**Reference to Risk Tables**	**Details of Proposed Works**	**Person Responsible**	**Expected Cost**	**Intended date of Completion**
4	Medium	Distribution	S4, O2	Review and maintain Activity Management Plans and associated asset renewal programmes to minimise failures.	AM	Staff time	Ongoing
4	Medium	Distribution	S4, S8	Undertake a criticality analysis of the network to assist renewals planning.	AM	Staff time	1/7/2018
4	Medium	Distribution	S8	Implement and use Asset Management System (AMS) for programming and monitoring regular maintenance and inspection/monitoring tasks.	AM	Unspecified amount + staff time	1/7/2018
4	Medium	Other	O2	Ensure all plant records – including manuals, drawings, procedure instructions and emergency response plan are up to date and available at the plant.	ACL	Staff time	~~1/12/2015~~ 1/12/2016
5	Low	Other	O2	Council to place a requirement in the service provider to ensure Operation and Maintenance Procedure Manual is up to date and available at the plant.	AM	Staff time	~~1/7/2016~~ 1/7/2017* * Provisional completion date. Exact date will be dependent on timing of new service provider tender process.

Fairton Water Supply Improvement Schedule					Part II: Minor Projects and Operational Improvements		
Priority	**Risk Level**	**Water Supply Area**	**Reference to Risk Tables**	**Details of Proposed Works**	**Person Responsible**	**Expected Cost**	**Intended date of Completion**
5	Low	Other	O3	Council to place a requirement on the service provider to provide staff with relevant training and skills.	AM	Staff time	~~1/7/2016~~ 1/7/2017* * Provisional completion date. Exact date will be dependent on timing of new service provider tender process.

13 Contingency Plan

The following contingency plan outlines appropriate responses to a range of potential situations where risk control measures fail to prevent a hazard event that may result in a situation of acute risk to public health.

The occurrence of a hazard, or risk event, may be indicated by monitoring systems, observed by ADC or ACL staff or reported by the public. Consumer complaints of illness or water quality issues may also indicate that a risk event has occurred.

The contingency actions identified are intended to provide a general guide and may need to be adapted to suit specific hazard situations.

13.1 Severe Microbiological Contamination of Source Water

Indicators	A contamination event in the catchment may be observed by or reported to ADC staff Reported illness among consumers Positive E. coli monitoring results
Actions	Issue "Boil Water' notice Advise Drinking Water Assessor (DWA) Inspect catchment and intake to identify source of contamination and rectify problem as quickly as possible Consider provision of emergency treatment or alternative water supply (e.g. reinstate decommissioned bore or use tankers) Disinfect contaminated reservoirs and flush mains Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.2 Chemical Contamination of Source Water

Indicators	A contamination event in the catchment may be observed by or reported to ADC staff Reported water quality concerns from consumers (taste, odour, colour) Illness among consumers
Actions	Advise Drinking Water Assessor (DWA) Assess situation and advise customers regarding use/treatment/disposal of contaminated water Arrange emergency water supply if necessary Inspect catchment and intake to identify source of contamination and rectify problem as quickly as possible Flush contaminated reservoirs and mains Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.3 Insufficient Source Water Available

Indicators	Observed or reported low ground water levels
Actions	Advise customers to conserve water Implement demand management strategies as required Arrange emergency water supply if necessary Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.4 Insufficient Water Available due to Leakage

Indicators	Observed or reported reduction in pressure or water availability
Actions	Advise customers to conserve water Implement demand management strategies as required Arrange emergency water supply if necessary Investigate system leakages Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.5 E. coli Transgression in Water Leaving Treatment Plant

Indicators	E. coli transgression reported following routine monitoring
Actions	Follow transgression response procedure in DWSNZ Advise Drinking Water Assessor (DWA) Commence daily E. coli testing at Water Treatment Plant Use an enumeration test method Sample in distribution system Investigate cause, inspect plant and source Take remedial action Continue to sample for E. coli until three consecutive samples are free of E. coli If E. coli is found in repeat samples consult with DWA, intensify remedial action, increase disinfection, consider 'Boil Water' notice, consider alternative supply
Responsibility	Assets Manager

13.6 Over-Chlorination

Indicators	Monitoring shows high FAC SCADA alarm reports high FAC
Actions	Assess potential hazard to consumers and advise accordingly Inspect treatment plant to identify cause of problem and rectify as quickly as possible Flush system if necessary Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.7 Inadequate Disinfection

Indicators	Monitoring shows low or no FAC SCADA alarm reports low FAC
Actions	Inspect treatment plant to identify cause of contamination and rectify problem as quickly as possible Assess the situation and consider issuing a precautionary boil water notice if deemed appropriate Notify DWA of situation and actions taken Consider provision of emergency treatment equipment or alternative water supply (e.g. tankers) Disinfect contaminated reservoirs and flush mains Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.8 E. coli Transgression in Water in the Distribution Zone

Indicators	E. coli transgression reported following routine monitoring
Actions	Follow transgression response procedure in DWSNZ (Figure 4.2 in 2008 version), and ADC response procedures Advise Drinking Water Assessor (DWA) Inspect plant/source Collect sample at plant for E. coli test, enumerate E. coli Resample distribution at original and adjacent sites Investigate cause and undertake remedial action If E. coli < 10 per 100mL consult DWA, resample distribution zone and enumerate for E. coli for three days, continue investigation of fault If E. coli > 10 per 100mL consult DWA, consider 'Boil Water' notice, continue investigation of cause, begin disinfection, consider flushing contaminated water to waste, intensify action, consider providing alternative supply Continue until fault is corrected and E. coli is absent for three consecutive days and DWA is satisfied that there is no remaining contamination
Responsibility	Assets Manager

13.9 Chemical Contamination of Water in Distribution Zone

Indicators:	Chemical contaminant in distribution zone (including over-chlorination)
Actions:	Advise Drinking Water Assessor (DWA) Assess situation and advise customers regarding use/treatment/disposal of contaminated water Arrange emergency water supply (tankers) if necessary Inspect catchment and intake to identify source of contamination and rectify problem as quickly as possible Flush contaminated reservoirs and mains If necessary Keep customers informed and advise once regular service is restored
Responsibility:	Assets Manager

13.10 Insufficient Water Available in the Distribution Zone

Indicators	Low pressure and flow in the distribution
Actions	Advise customers to conserve water Implement demand management strategies as required Arrange emergency water supply if necessary Keep customers informed and advise once regular service is restored
Responsibility	Assets Manager

13.11 Insufficient Water Available due to Unplanned Shutdown

Indicators	Unplanned shutdown will be reported to ADC staff by contractor
Actions	Keep customers informed and advise once regular service is restored Arrange emergency water supply if necessary
Responsibility	ACL and Assets Manager