ONEWHERO WATER SUPPLY
WATER SAFETY PLAN

Organisation and Supply Details:	
Community Name	Onewhero (ONE004)
Supply owner/organisation name:	Waikato District Council
Prepared by:	Opus International Consultants and Waikato District Council staff
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Signed off by	Karl Pavlovich - Waters Manager

Contents

1. Introduction

This Water Safety Plan (WSP) has been developed to identify the public health risks for the Onewhero public water supply registered to the Waikato District Council (WDC). This WSP assesses risks from source to supply point and ranks risks according to their likelihood and consequence. Necessary improvements are identified and prioritised as part of a larger process which has considered the risks across all of the Waikato water supplies and prioritised the greatest risks for prioritised improvement. The improvements specific for Onewhero have been included in this plan.

2. Waikato district

Waikato District is located in the Waikato region and has a resident population of 63,381 which is relatively evenly mixed between urban and rural. The main urban populations are centred in the towns of Huntly, Ngaruawahia, Raglan, Te Kauwhata and Tuakau. The small community of Onewhero has a usual resident population of about 36.

WDC is responsible for the management and operation of the public water supply systems which include nearly 700km of reticulation, ten water treatment plants with a total capacity of 19,000 cubic metres per day and 30 reservoirs with a total capacity of 19,527 cubic metres. Council also has an agreement with Hamilton City Council to take up to 12,000 cubic metres per day and Te Kauwhata Water Association to take up to 4000 cubic metres per day for parts of the district. The supplies are managed by Council Operations staff with the assistance of specialist contractors as needed. Most residential properties are unmetered, with some rural properties metered and all commercial and industrial properties being metered with the majority of rural, commercial and industrial properties being metered. WDC operates a 24 hour call center for customer complaints about faults and a 24 hour operation on-call service to address issues as necessary.

3. Purpose of the WSP

This WSP assesses the current risks and preventive measures in place in the Onewhero water supply system. The residual risk is then assessed and a risk rank given. These are then prioritised for improvement. An improvement list and timeframe for implementation has been developed and is included

4. Objectives

The objective of this project is to:

- Ensure that the water supply assets that Waikato District Council is responsible for, are proactively managed from a health related risk point of view for its end users.
- Ensure the requirements of the Health Act 1956 and current amendments are met.

5. Scope

This WSP is for the Onewhero water supply (ONE004). WINZ registration refers to a bore at Onewhero, but water is provided to the supply by a spring. The registration information is below:

Table 1. Onewhero registration details

Component	Code	Name
Community	ONE004	Onewhero
Zone	ONE004ON	Onewhero
Plant	TP00754	Onewhero
Source	S01045	Onewhero Spring

The Onewhero water supply is currently ungraded.

6. Structure of the WSP

The risk assessments are undertaken in six sections based on the elements of the supply with a further section (other) to cover general aspects including staff training and monitoring

Relevant detail can also be found in the Waikato DC Annual Plan, Activity Management Plan for Water Supplies, the Onewhero Spring and Water Treatment Plant Operations and Maintenance Manual, and the Council Long Term Plan. These documents can be provided upon request.

7. Plan Review and Performance

This plan will be revised and submitted for approval before March 2023.

Assessment of the performance of the plan

Assessment of the performance of the plan will be undertaken annually. The assessment will consider any events, non-compliances, near misses and unexpected situations that have occurred, progress against the improvement schedule and any changes to any of the supply elements.

Reporting of the plan

A brief report on the performance of the plan, including information from the assessment of the plan will be provided by the Compliance and income Team Leader to the Waters Manager annually on the anniversary of finalisation of the plan.

8. Risk assessment method

The risk assessment methodology used to qualify risk is consistent with the AS/NZS 4360:2004 Risk Management Standards, WDC risk evaluation methods and the Ministry of Health, WSP Guides and

publication *A Framework on How to Prepare and Develop Water Safety Plans for Drinking-water Supplies*, Ministry of Health (2014).

Meetings were held with operational staff, compliance staff and management to establish the possible events and risks.

The WSP is the responsibility of the Waters Manager. Technical information is contributed by those who manage and operate the supply. The Waters Manager will ensure staff hold the most up to date and current copies. Tracking of versions and copies of the plan will be undertaken in line with Waikato District Councils Quality System

9. Consultation

On 6th October 2014 a site visit to the Onewhero water supply was carried out by Nick Hewer-Hewitt of Opus with Karl Pavlovich, Waikato District Council.

An inspection of the treatment plant was undertaken and operation of the plant was discussed with Karl. As part of the site visit, discussions covered the operation and performance limits of the plant, the critical points, the operation of treatment barriers, the risks that have been identified, how these risks are managed currently and the improvements that could be put in place. A further inspection was made of the reservoir and a drive through of parts of the community included.

The information provided during this consultation has been used to compile the risk tables. Subsequent to this consultation telephone discussions and email contact has been used to provide further information necessary for the preparation of this WSP. The WSP was then reviewed by all divisions of the water team and signed off by the Waters Manager.

10. Risk assessment criteria

Potential public health risks have been evaluated using the Likelihood and Consequence scales (based on the WDC Risk Management Framework) tabulated below to determine a risk level – low, moderate, high or extreme. The assessed risk level allows prioritisation of the associated improvement measures.

Table 2. Likelihood of Occurrence

Likelihood	Descriptor	Probability
Frequent	Will most certainly occur in the foreseeable future. Continuous or will happen frequently.	5
Often	Will possibly occur in the foreseeable future. 5- 12 times per year.	4
Likely	Good possibility of occurrence. 1 – 5 times per year.	3
Possible	Little chance it will occur in the foreseeable future. Once every 2 – 10 years	2
Rare	Occurrence is unlikely in the foreseeable future.	1

Table 3. Risk Consequence Criteria

Consequences	Descriptor	Probability
Catastrophic	Significant and prolonged effect on levels of service and business function/ Life threatening injuries or fatalities/ Significant and prolonged lack of resource capacity/ Major financial loss (>$1M in any 12 month period)/ Serious or sustained national media attention/ Significant environmental disaster or natural hazard causing wide spread environmental degradation/ damage.	5
Major	Major but short term effects to levels of service and business function/ Single life threatening injury or fatality/ Significant but short term lack of resource capacity/ Major financial loss ($150k to $1M in any 12 month period)/ Short term national media attention/ Major but localised environmental degradation/damage.	4
Moderate	Moderate short term effects to levels of service and business function/ Injury requiring moderate medical care/ Moderate & short term lack of resource capacity/ Moderate financial loss ($50k-$150k in any 12 month period)/ Moderate public interest/ Moderate localised environmental degradation/damage.	3
Minor	Minor effects to day to day business function/ Minor incident (no medical attention required)/ Uncertainty of resource capacity/ Minor financial loss ($10k-$50k in any 12 month period)/ Minimal public interest/ Minor localised environmental damage.	2
Insignificant	Negligible effects to day to day business function/ Regular health & safety monitoring required to avoid injury/ Negligible financial loss (<$10k in any 12 month period)/ Negligible localised environmental damage.	1

Table 4. Risk Level Allocation Table

	Consequence				
Likelihood	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Frequent (5)	5 (low)	10 (moderate)	15 (high)	20 (extreme)	25 (extreme)
Often (4)	4 (low)	8 (moderate)	12 (high)	16 (high)	20 (extreme)
Likely (3)	3 (low)	6 (moderate)	9 (moderate)	12 (high)	15 (high)
Possible (2)	2 (low)	4 (low)	6 (moderate)	8 (moderate)	10 (high)
Rare (1)	1 (low)	2 (low)	3 (low)	4 (moderate)	5 (high)

For further information on risk derivation refer to WDC Risk Management Framework.

11. Improvement cost benefit and prioritisation matrix

The following tables have been used to determine the cost benefit and prioritisation of any improvements. Required improvements are allocated risk benefit (A), ease of implementation (B) and cost of implementation (C) scores from the tables below. The scores are multiplied (AxBxC) to determine the cost benefit. The scores are included in the improvement schedule.

Table 5. Risk Benefit table

A	No	Risk Benefit
	1	No benefit
	2	Reduces risks consequence and/or likelihood for one risk area
	3	Reduces risks consequences and/or likelihood in more than one risk area
	4	Reduces risk from extreme or high to medium
	5	Reduces risk to low

Availability of physical resources and competency

Table 6. Ease of implementation table

B	No	Ease of implementation
	1	Physical resources or expertise exists but not available for more than two years
	2	Physical resources or expertise exists but not available for at least one year
	3	Physical resources and expertise does not exist within council but easily found
	4	Physical resources and expertise available within council
	5	Physical resources and expertise available within water services

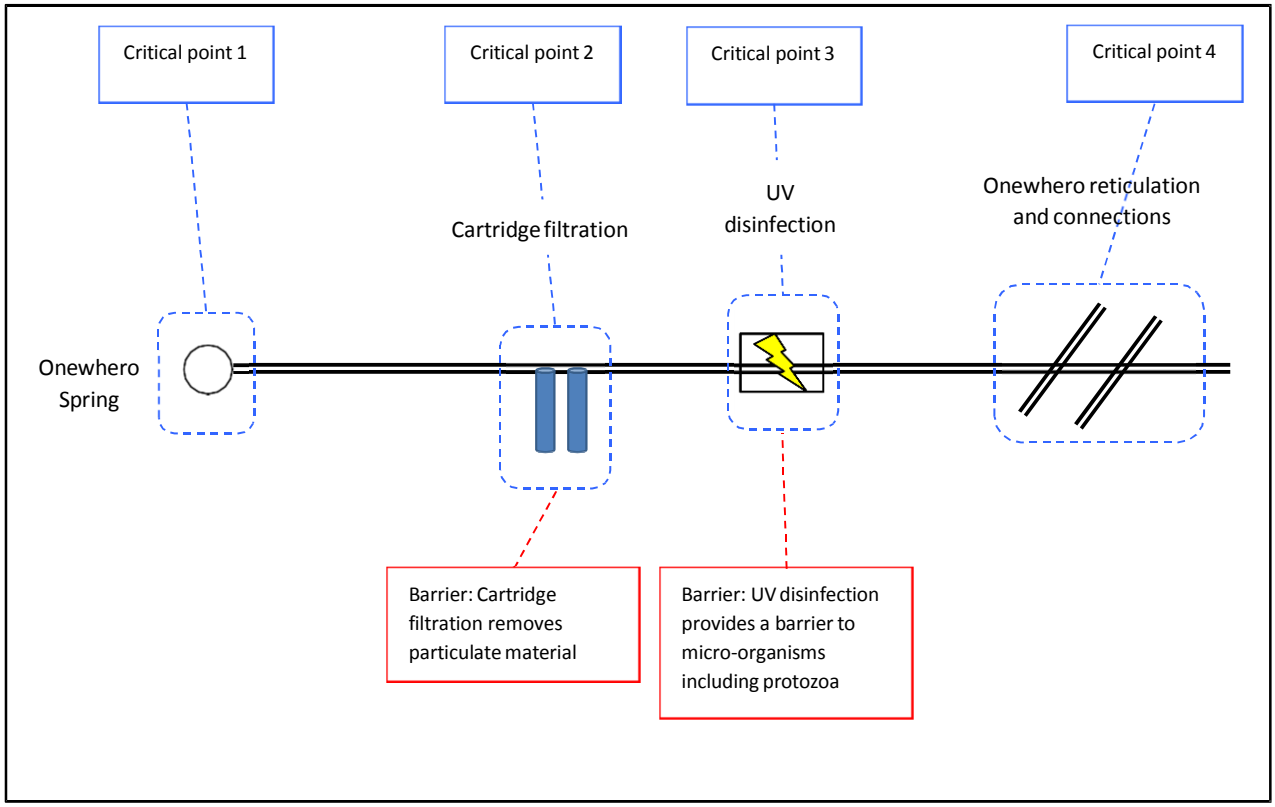
Staff time and capital costs

Table 7. Cost of implementation table

C	No	Cost
	1	Greater than $50,000
	2	$20,000 - $50,000
	3	$5,000 – $20,000
	4	$1,00 - $5,000
	5	Less than $1,00 or already funded project

12. Flow Chart/Schematic of the Supply

Figure 1. Supply schematic



13. Critical Points and Barriers to Contamination

Table 8. Critical points

Critical points where hazards can be eliminated, minimised or isolated include:

	Critical Point	Description
1.	Source water spring	*Failure of spring or spring pump may result in loss of supply. Spring water quality is subject to surface influence. Treatment shed is located on top of spring*
2.	Cartridge filters	*Failure will result in reduced particulate and protozoa removal*
3.	UV disinfection	*Failure will result in reduced microbiological disinfection*
4.	Distribution system connections	*Possible access point for contamination due to backflow, maintenance activities, and/or illegal connections*

Existing barriers to contamination include:

1. Cartridge Filtration

Cartridge filters remove particulate material and some micro-organisms providing a **partial barrier to particulate contamination**.

2. UV Disinfection

A UV disinfection reactor inactivates microbiological organisms. This provides **a barrier to microbial and protozoal contamination**.

The process control summaries for identified Critical Control Points (Critical Points) are stored in Council's Promapp process management online repository.

14. Supply Description

The Onewhero water supply consists of a single spring and a small treatment plant before supply to the Onewhero community.

The Onewhero water supply spring and treatment plant is located at 283 Kaipo Flat Road. Water is pumped from a springbox, located directly under the treatment shed. Soda ash is dosed to correct and lift the pH. Water is pumped through 2 x cartridge filters installed in series. The cartridges each have a pore size of 1µm. The water is then disinfected using ultraviolet light (UV).

After treatment the water is pumped directly into the reticulation. Pump activity at the treatment plant is continuously monitored and this is transmitted by telemetry to the site control SCADA system.

Pumping is initiated by pressure switches that detect low pressure in the reticulation and turn the pumps on. Soda ash dosing and UV only operate when the system is pumping.

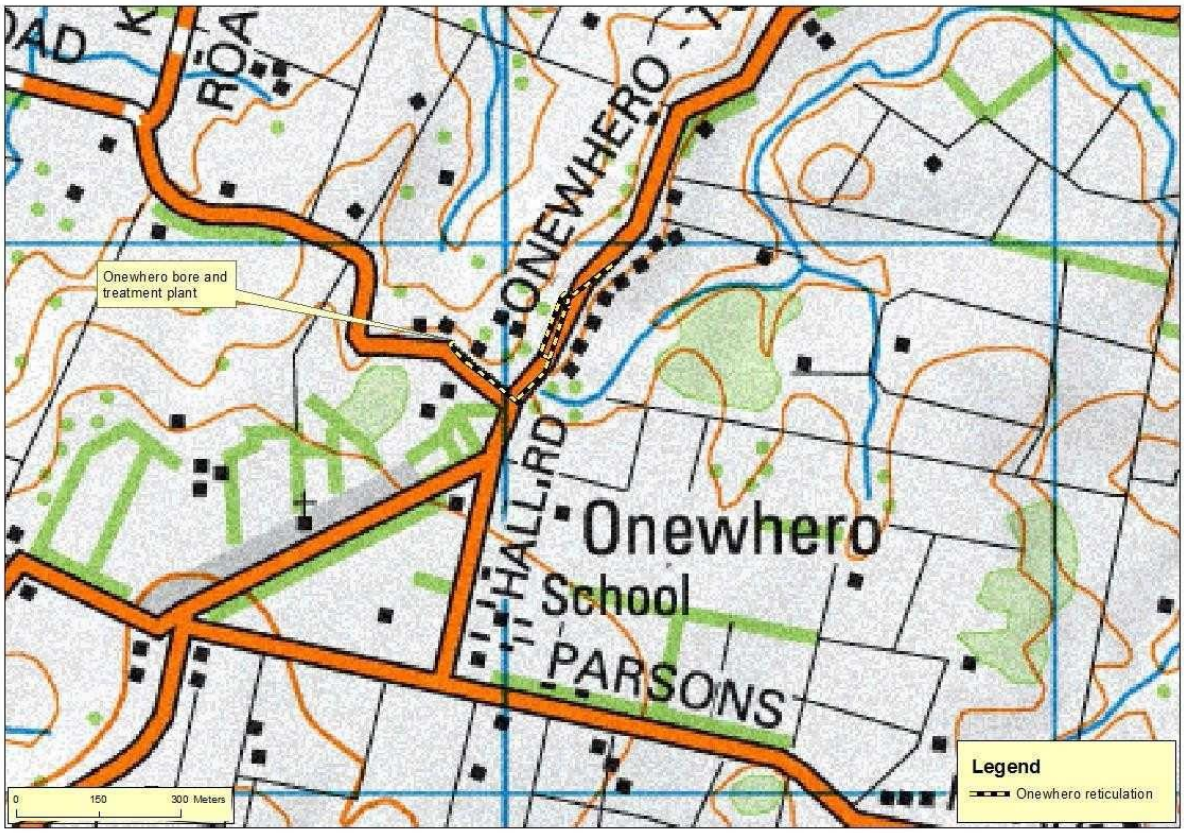
A catchment risk assessment has been completed for the Onewhero supply. It recommended 4-log protozoa treatment under section 10 of the DWSNZ

15. Supply Management

The following people are responsible for the operation of the supply:

Waters Manager	Karl Pavlovich
Treatment & Services Team Leader	Mark Curtis
Treatment Supervisor	David Kennington
Compliance and Income Team Leader	Jaime Wara

Figure 2. Location of Onewhero Spring



16. Photographs of Onewhero Water Supply

The following photos were taken on a site visit to the Onewhero drinking water supply by Opus staff on the 05 September 2014.

Figure 3. Spring abstraction and pumps

Figure 4. Cartridge Filters

Figure 5. UV Units

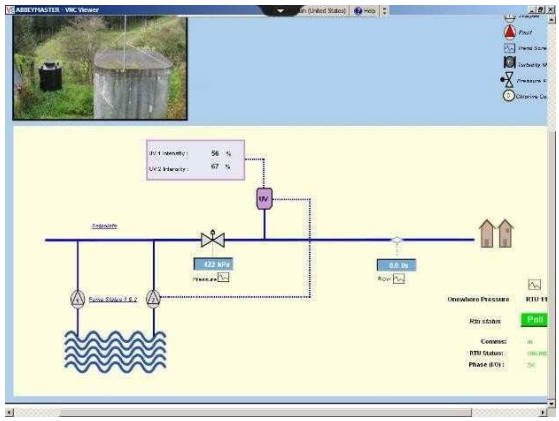


Figure 6. SCADA OIU

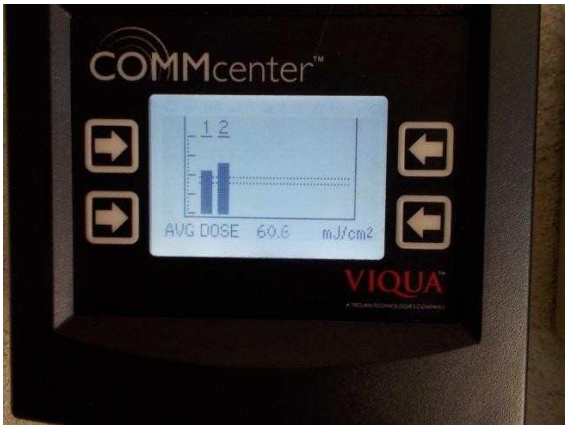


Figure 7. UV Dose

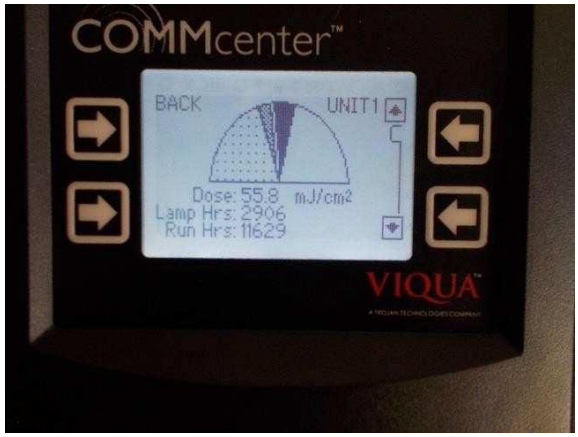


Figure 8. UV Hours

17. Risk Tables

WM – Waters Manager TL – Treatment & Services Team Leader TS - Treatment Supervisor

CITL – Compliance and Income team Leader TPO – Plant Operator

Table 9. Risk Tables

1. Catchment and Abstraction

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Microbiological Contamination	1.1	Contamination of groundwater and/or ingress of surface water.	Moderate (likely x moderate)	High raw water E. coli results Turbidity monitoring of raw water every 2 days Consumer complaint of poor quality water Illness in community	Cartridge filtration and UV disinfection treatment process	Yes	Moderate (possible x moderate)	None required	TL TPO
Chemical Contamination	1.2	Naturally occurring chemical contaminants	Moderate (likely x moderate)	High chemical levels identified in routine sampling.	None	No	Moderate (likely x moderate)	Implement a 5 yearly assessment of chemical contaminants in the source water	CITL
Loss of Supply	1.3	Lowering of water table from excessive abstraction	Moderate (likely x minor)	Low water level in spring box.	Abstraction is minimal and groundwater supply has historically had good volumes	Yes	Low (rare x moderate)	None required	TL TPO

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Microbiological contamination	1.4	Vandalism to spring upstream of treatment shed	Moderate (likely x moderate)	High *E. coli* readings Turbidity monitoring of raw water every 2 days Obvious signs of damage around the treatment shed Consumer complaint of no water	Remote community and locals have a high awareness of antisocial behaviour within community Regular physical inspections Cartridge filtration and UV disinfection treatment process	Yes	Moderate (Possible x moderate)	None required	TL TPO
Loss of Supply	1.5	Failure of pump due to power failure	Moderate (likely x moderate)	Low pump pressure alarm via SCADA Consumer complaint of no water	Online telemetered pressure monitoring	No	Moderate (likely x moderate)	Investigate installing elevated treated water storage to provide a gravity feed supply	TS TPO
Loss of Supply	1.6	Failure of pump/s due to mechanical failure	Moderate (likely x moderate)	Low pump pressure alarm via SCADA Consumer complaint of no water	Duty/Standby pumps installed Regular maintenance of the pumps Remote SCADA monitoring and alarms	Yes	Low (rare x moderate)	None required	TS TPO

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Loss of Supply	1.7	Spring box structure fails	Moderate (likely x moderate)	High turbidity in water Pump failure Consumer complaint of poor quality or no water Collapsed treatment shed	Regular physical inspection	No	Moderate (likely x moderate)	Investigate online turbidity monitoring of raw water Develop boil water protocol	TL TPO

2. Cartridge Filtration

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Particles not removed	2.1	Source water turbidity continually blinds filters	Moderate (likely x moderate)	High differential pressure Filter elements need to be replaced constantly	Spring water is known to have very low turbidity Frequency of cartridge replacement is recorded Differential pressure across the cartridges is monitored	Partially	Moderate (Possible x moderate)	Investigate online turbidity monitoring of raw water	TL
Particles not removed	2.2	Damage to the seal or filter casing.	Moderate (Likely x moderate)	Water leaking from filter housing High turbidity in water leaving the filter.	Staff are trained in correct procedure for replacing cartridges Regular physical inspections (every 2 days)	Yes	Moderate (possible x moderate)	None required	TS
Particles not removed	2.3	Failure of cartridge	Moderate (Likely x moderate)	High turbidity in water leaving the filter Sudden change in pressure differential across filters Low UV Intensity alarm	Pressure differential across the filters is checked when operator visits plant UV system is alarmed	Yes	Moderate (possible x moderate)	None required	TPO

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Microbiological contamination	2.4	Contamination occurs during change of cartridge	Moderate (likely x moderate)	High turbidity in water leaving the filter.	Staff are trained in correct procedure for replacing cartridges	Yes	Low (possible x minor)	None required	TS TPO

3. Ultraviolet Light Disinfection

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Inadequate Disinfection	3.1	UV intensity insufficient due to build-up of deposits on sleeve or lamp failure	High (often x major)	E. coli detected in water or illness in the community Consumer complaints Visible build-up of deposits on sleeve UV Intensity and/or lamp life alarm	Operators clean sleeve at regular maintenance intervals Operators replace lamps regularly UV unit has low intensity alarms	Yes	Moderate (likely x moderate)	None required	TL TPO
Inadequate Disinfection	3.2	Flow rate through UV unit too rapid for effective treatment	High (often x moderate)	Flow rate through plant greater than UV unit rated maximum flow	UV reactors have approved flow restrictors installed	Yes	Low (possible x minor)	None required	TL TPO

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Inadequate Disinfection	3.3	Excessive turbidity in water decreases the effectiveness of the treatment	High (likely x major)	High turbidity levels detected in post filtration water E. coli detected in water or illness in the community Consumer complaints UV low intensity alarm	Source water spring provides water with very low turbidity Routine turbidity testing (every 2nd day) Cartridge filtration prior to the UV disinfection unit removes turbidity UV units have low intensity alarms	Yes	Moderate (possible x major)	None required	TL TPO
Inadequate Disinfection	3.4	Power failure resulting in UV unit being unable to operate	High (often x major)	Notice of power failure Extended pump inactivity Low pump pressure alarm	None	No	High (often x major)	Develop boil water protocol	TL CITL TPO

4. pH Correction

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
pH Adjustment too high or Low	4.1	Dosing system failure	Low (often x insignificant)	pH of the treated water is outside required parameters	pH is checked routinely (every 2 days) pH adjustment is not critical	Yes	Low (often x insignificant)	None required	TL TPO
pH Adjustment too high or Low	4.2	Soda Ash supply exhausted	Low (often x insignificant)	pH of the treated water is outside required parameters	Soda ash levels are checked routinely (every 2 days) pH adjustment is not critical	Yes	Low (often x insignificant)	None required	TL TPO

5. Reticulation

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Loss of Supply	5.1	Pipe failure.	Moderate (likely x moderate)	Complaints from consumers about loss of supply Change in flow or pressure in reticulation Delivery pump runs continuously Low pump pressure	Reticulation is in relatively good condition Failures, maintenance and renewals are recorded in council asset management system SCADA system monitors pump operations	Yes	Moderate (likely x minor)	None required	TL TPO
Microbiological Contamination	5.2	Inadequate controls on maintenance and construction work.	Moderate (likely x moderate)	*E. coli* present in reticulation system Illness in community Consumer complaints	Contractors are required to have appropriate reticulation qualifications and to undertake maintenance and construction work in a sanitary manner	Yes	Moderate (likely x minor)	None required	TL CITL TPO

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Chemical or Microbiological Contamination	5.3	Backflow from consumer connections	Moderate (likely x moderate)	Illness in community Contaminants present in the reticulation Taste or odour complaints from consumers	Non-testable devices are installed at all new connections There are no industrial/commercial connections to the supply System is a pumped pressure system	Yes	Moderate (likely x moderate)	None required	TL CITL
Loss of Supply	5.4	Excessive demand in network or inadequate system capacity.	Moderate (possible x moderate)	Complaints from consumers about low pressure or loss of supply Change in flow or pressure in reticulation	Community size is stable and demand has not significantly increased for many years Online pressure monitoring through SCADA	Yes	Low (possible x minor)	None required	TL
Inadequate Supply	5.5	Poor planning of maintenance and construction work leaves consumers without water supply	Moderate (likely x moderate)	No supply or reduced pressure in areas where upgrading is undertaken Scheduled maintenance or renewals	24 hours' notice is given for planned shutdowns of network. Customer service is kept informed Temporary alternative supply provided if shut down exceeds 8 hours	Yes	Low (possible x minor)	None required	TL

6. Other

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Sampling Failure	6.1	Inadequate sampling programme or sample collection error	High (often x moderate)	DWSNZ compliance failure due to days of week, days between samples, insufficient samples, information gaps, positive results or sampling error	Sampling programme prepared and checked against standards Dedicated sampling and analysis team are appropriately trained .	Yes	Moderate (likely x minor)	None required	TL CITL
Unrecognised Contamination	6.2	Inadequate sampling programme, sample collection error or response to transgression	High (often x moderate)	Gaps in records from weekly testing regime.	Sampling programme prepared and checked against standards Relevant staff well trained and qualified	Yes	Moderate (possible x moderate)	None required	TL CITL
Failure of Supply due to Inadequate Maintenance.	6.3	Supply equipment fails due to inadequate asset information and inadequate maintenance planning.	High (frequent x moderate)	Unexpected plant equipment failure.	Information on the supply assets is held by Council Maintenance is planned and undertaken by competent staff Specialist maintenance is contracted out as required	Yes	Moderate (possible x moderate)	None required	TL CITL

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Failure of Supply due to lack of Spare Parts	6.4	Inadequate spare parts held or spare parts unavailable.	High (frequent x moderate)	Plant is out of operation due to not having spare parts available.	Spare parts are held for some things and replacement spares parts are usually available overnight.	Yes	Moderate (possible x moderate)	None required	TL
Failure of Supply due to Inadequate Operating Procedures	6.5	Insufficient, inadequate out of date or incorrect manual of operational procedures.	High (frequent x moderate)	Operational manuals not used Operational Manuals not up to date.	Plant has operations and maintenance manuals Plant operators have a good knowledge of plant operation	Yes	Low (rare x moderate)	None required	TL
Complaints of Poor Taste or Odour in Water	6.6	Poor aesthetic quality of water not identified	Moderate (likely x minor)	Taste and odour complaints Aesthetic sampling identifies determinands which exceed the NZDWS Guideline Values for aesthetic determinands	Complaints investigated Aesthetic quality of water has been assessed and is acceptable	Yes	Moderate (likely x minor)	None required	TL CITL

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Operator Error or Mismanagement	6.7	Inadequate training, professional development and up-skilling of operators	High (often x major)	Poor operation of plant Plant compliance failure Loss of supply Poor score on question about level of supervision in supply grading	Operators hold relevant NZ certificate and/or Diploma qualifications On-going training and up-skilling is provided for operators	Yes	Moderate (possible x moderate)	None required	TL TPO
Total Plant Failure	6.8	Catastrophic natural disaster or failure including earthquake, flooding, volcanic eruption	High (rare x catastrophic)	Major natural disaster occurs Intense sustained weather Land slide, flooding, volcanic eruption Total plant failure is evident Warnings from Govt agencies incl Met Office, Niwa, Civil Defence, Regional Council or Police	Prior warning from Govt agencies incl Met Office, Niwa, Civil Defence, Regional Council or Police Robust secure plant structures and buildings System and people backups Business continuity plan in place and exercised	Yes	Moderate (rare x major)	None required	TL CITL

Event	No	Cause	Risk Without Preventative Measures	Indicators	Preventative Measures in Place	Risk Managed	Residual Risk	Additional Measures That Could be put in Place	Resp
Loss of Supply	6.9	Failure of plant due to power outage	High (likely x major)	No flow to treatment plant	A portable generator could be installed within two days	No	High (likely x major)	Investigate installing elevated treated water storage to provide a gravity feed supply Develop boil water protocol	TL CITL

18. Improvement schedule

The following improvements are either existing projects or new projects that are designed to reduce risk in the water supply, by doing this Waikato District Council is aiming to improve public health and ensure that statutory requirements of the Health Act 1956 and subsequent amendments are met. Improvement timelines will be enacted as per the improvement schedule adopted by The Waikato District Council Asset Management Plan 2017.

No	Improvement	Related risk	Risk benefit	Ease of implementation	Cost of implementation	Cost benefit	Project cost	Responsibility
IMP001	Investigate installing elevated treated water storage to provide a gravity feed supply	1.5 Failure of pumps due to power failure 6.9 Power failure	3	4	4	48	$5000	TL
IMP002	Implement a 5 yearly assessment of chemical contaminants in the source water	1.2 Naturally occurring chemical contaminants	5	5	4	100	$1000	CITL
IMP003	Investigate installing online raw water turbidity monitoring	1.7 Springbox structure fails 2.1 Source Water blinds filters	3	5	4	60	Staff time	TL TS
IMP004	Develop boil water protocol	1.7 Springbox structure fails 3.4 Power Failure in UV 6.9 Power failure	5	5	4	100	Staff time	CITL

19. Contingency plan

Onewhero Water Supply Contingency Plan	
Type of Event	***Required Contingency Action***
Severe microbiological contamination of source water (such that treatment is ineffective) **Indicators: A contamination event in the catchment may be observed by or reported to WDC staff. May also be indicated by reported illness among consumers or positive E coli monitoring results.**	**Issue "Boil Water' notice** **Advise Drinking Water Assessor (DWA)** **Inspect spring catchment and treatment shed surrounds to identify source of contamination and rectify problem as quickly as possible** **Consider provision of emergency treatment or alternative water supply (e.g. bottled or tankered water)** **Disinfect and flush contaminated mains** **Keep customers informed and advise once regular service is restored**
Chemical contamination of source water **Indicators: A contamination event in the catchment may be observed by or reported to WDC staff. May also be indicated by reported water quality concerns from consumers (taste, odour, colour) or illness among consumers.**	**Advise Drinking Water Assessor (DWA)** **Assess situation and advise customers regarding use/treatment/disposal of contaminated water** **Arrange emergency water supply (bottled or tankered water) if necessary** **Inspect spring catchment and treatment shed surrounds to identify source of contamination and rectify problem as quickly as possible** **Disinfect and flush contaminated mains** **Keep customers informed and advise once regular service is restored**
Insufficient water available for abstraction from ground water source. **Indicators: Observed or reported low ground water levels. Reduced flows/pressure from spring pump.**	**Advise customers to conserve water** **Implement demand management strategies as required** **Arrange emergency water supply (bottled or tankered water) if necessary** **Keep customers informed and advise once regular service is restored**
***E. coli* transgression in water leaving treatment plant or distribution zone**	**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**

Onewhero Water Supply Contingency Plan	
Type of Event	***Required Contingency Action***
Indicators: *E. coli* transgression reported following routine monitoring.	**Investigate cause, inspect plant and source** **Take remedial action e.g. super chlorination, flushing etc.** **Continue to sample for *E. coli* until 3 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**
Loss of power supply to treatment plant	**Determine likely length of power outage** **If it is possible that power outage will exceed 24 hours, implement demand management and locate a portable generator at the treatment plant to provide power if outage continues**
Natural disaster including earthquake and flood	**Refer to Council Emergency Management Plan and Business Continuity Plan**