

Water Services Act 2021: A Drinking Water Suppliers Guide to Compliance



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FOREWORD

This document has been prepared to assist Drinking Water Suppliers fulfil their obligations in achieving compliance with the Water Services Act 2021.

In this Guide you will find information on the legal and regulatory requirements of the Act, the pathways to compliance and how to consistently deliver reliable, safe drinking water to consumers. This Guide summarises a range of information available from Taumata Arowai, Water New Zealand, and from other sources provided in the references. It also provides a clear overview on how to meet the Drinking Water Standards 2022 and highlights situations where further advice will be required.

The information in this guide is necessarily general and should not be relied upon solely, as a basis for making business decisions. Your community needs and specific circumstances must be considered against the legislative framework, market conditions and other relevant laws before specific actions are taken.

To find out how our professionals can help you, please contact us via the details below.



Maria Johnson

Drinking Water
Services Leader

021 2888 782

maria.johnson@gwe.co.nz



Gareth Williams

Managing Director
Wastewater and Water Specialist

021 985 892

gareth.williams@gwe.co.nz



Colin Cranfield

Civil / Environmental Engineering
Services Leader

021 776 393

colin.cranfield@gwe.co.nz

INTRODUCTION

All drinking water suppliers, regardless of the size of their operation, must take every reasonable precaution to ensure the water supplied is safe for human consumption.

The new legislation called the Water Services Act 2021 has now been in effect since 15 November 2021. The primary purpose of this Act and its associated standards and rules is to ensure a safe supply of drinking water. These reforms have been introduced as a direct response to the Havelock North water contamination event which affected a large number of people in 2016.

The Act has created a new regime for managing and monitoring private and public drinking water supplies. The new requirements affect many communities and businesses that have their own drinking water supply.

The reform package has also created a new water services regulator called Taumata Arowai and sets out the methods by which Taumata Arowai must administer and monitor all drinking water supplies in NZ.

These guidelines are for any commercial or community facility that supplies people with drinking water, or prepares or processes food for commercial purposes, using water from a private supply. It does not include individual household supplies, which the Act does not apply to. Commercial and community facilities with a drinking water supply can include:

- Cafes, restaurants, hotels and mobile caterers.
- Childcare centres, schools, aged care facilities and hospitals.
- Food manufacturing premises.
- Caravan parks and camping grounds
- Guest houses and motels, backpacker, bed and breakfast and farm stay accommodation.
- Petrol stations and roadhouses.
- Community halls.
- Conference centres.
- Recreational and sporting facilities.
- Councils.



These guidelines aim to summarise key elements of the Act and associated standards and rules. The Act is available at:

<https://www.legislation.govt.nz/act/public/2021/0036/latest/LMS374564.html>

The new standards and rules are available on Taumata Arowai website at:

<https://www.taumataarowai.govt.nz/for-water-suppliers/new-compliance-rules-and-standards/>

The complete Water NZ Competency Framework for Small Water Supplies, which some of this information is extracted from can be found at:

https://www.waternz.org.nz/Article?Action=View&Article_id=2119

The new Acceptable Solutions are available on Taumata Arowai website at:

<https://www.taumataarowai.govt.nz/for-water-suppliers/new-compliance-rules-and-standards-2/>



General

If you supply drinking water to others, outside of your own home, you are a drinking water supplier and have a duty of care to ensure the water you supply is safe to drink, and to take any remedial action if it becomes unsafe.

Apart from civil action arising from the provision of unsafe drinking water, there are substantial penalties under various parts of the legislation. Taumata Arowai will be able to prosecute for breaches of the legislation. Prosecution will be more likely when wilful or reckless behaviour creates serious risk to public health.

The relevant New Zealand legislation includes:

The Health Act 1956

The Health Act used to set out duties for drinking water suppliers and defined a number of responsibilities to ensure Public Health. The Health Act was administered by the Ministry of Health. Part 2A of the Health Act, relating to Drinking Water and administered by Drinking Water Assessors, has been repealed and is therefore no longer relevant.

The Drinking Water Standards for New Zealand 2005, Revised 2018 (DWSNZ)

The DWSNZ provide requirements for drinking-water safety to comply with the Health Act. They specify the maximum amounts of substances or organisms or contaminants or residues that may be present in drinking-water, the criteria for demonstrating compliance with the standards and remedial action to be taken in the event of non-compliance with the different aspects of the standards. The DWSNZ is the practical guide to compliance with the Health Act and only remains effective until 14 November 2022 to allow for the transitional period.

The Water Services Act 2021

The Act provides a comprehensive set of regulatory tools that will be used to ensure that good outcomes are achieved for drinking water safety. Directions and compliance orders are intended to ensure that unacceptable risks to public health are resolved in a timely way.

“The Act imposes a duty of care on all drinking water suppliers to ensure the water they supply is safe to drink regardless of registration status, size, timeframes, etc.”

New Drinking Water Standards for New Zealand 2022

The DWSNZ set the Maximum Acceptable Values (MAVs) for a range of contaminants which can affect the safety and quality of drinking water. They are based on guideline values set by the World Health Organisation. These new DWSNZ have been largely carried over from the existing standards, however the Aesthetic Values have been separated and Taumata Arowai is consulting on the minor changes. The changes make the Aesthetic Values easier to use and more suitable for each supply type and size.

New Drinking Water Quality Assurance Rules 2022

The rules inform drinking water suppliers on what they need to do to demonstrate compliance with the DWSNZ. Taumata Arowai is currently preparing guidance to assist water suppliers to understand and interpret the rules. Some of the key differences from the old DWSNZ is that the new rules have:

- Different levels of complexity to match the complexity of supplies.
- A new format, grouping rules into modules to make it easier for suppliers to find the rules that apply to their supplies.
- A greater emphasis on testing to identify and reduce risks.
- New requirements for source water testing and distribution system monitoring.
- New rules for very small (<25 people), small (26-100 people), medium (101-500 people) and large (>500 people) supplies.
- Discontinued the DWSNZ secure bore water criteria. All water supplies need some form of treatment unless an exemption is granted by Taumata Arowai,
- A new chemical compliance section for large (>500 people) supplies.



New Drinking Water Acceptable Solutions

The rules provide drinking water suppliers with ready-made options to meet their compliance obligations under the Act. They apply to particular supply types and situations and must be implemented in their entirety. A supplier can choose to either develop a solution that complies with the rules or adopt one of the Acceptable Solutions:

- Drinking Water Acceptable Solution for Roof Water Supplies.
- Drinking Water Acceptable Solution for Spring and Bore Water Supplies.
- Drinking Water Acceptable Solution for Rural Agricultural Water Suppliers.
- More acceptable solutions will be developed to cover other types of supplies.

Taumata Arowai, New Water Services Regulator:

- Administers the regulatory Framework set out in the Act.
- Has a dedicated focus on drinking water quality.
- Has powers to prosecute for breaches of the legislation and to use enforcement tools proportionate to the risk, scale, and complexity of the supply.
- Examples of actions: remove an operator, recover costs and expenses, appoint compliance officers, issue directions, take immediate action, take, and test samples, inspect records and documents, question suppliers, enters the supply to search and seize equipment, issue compliance orders, undertake remedial actions.

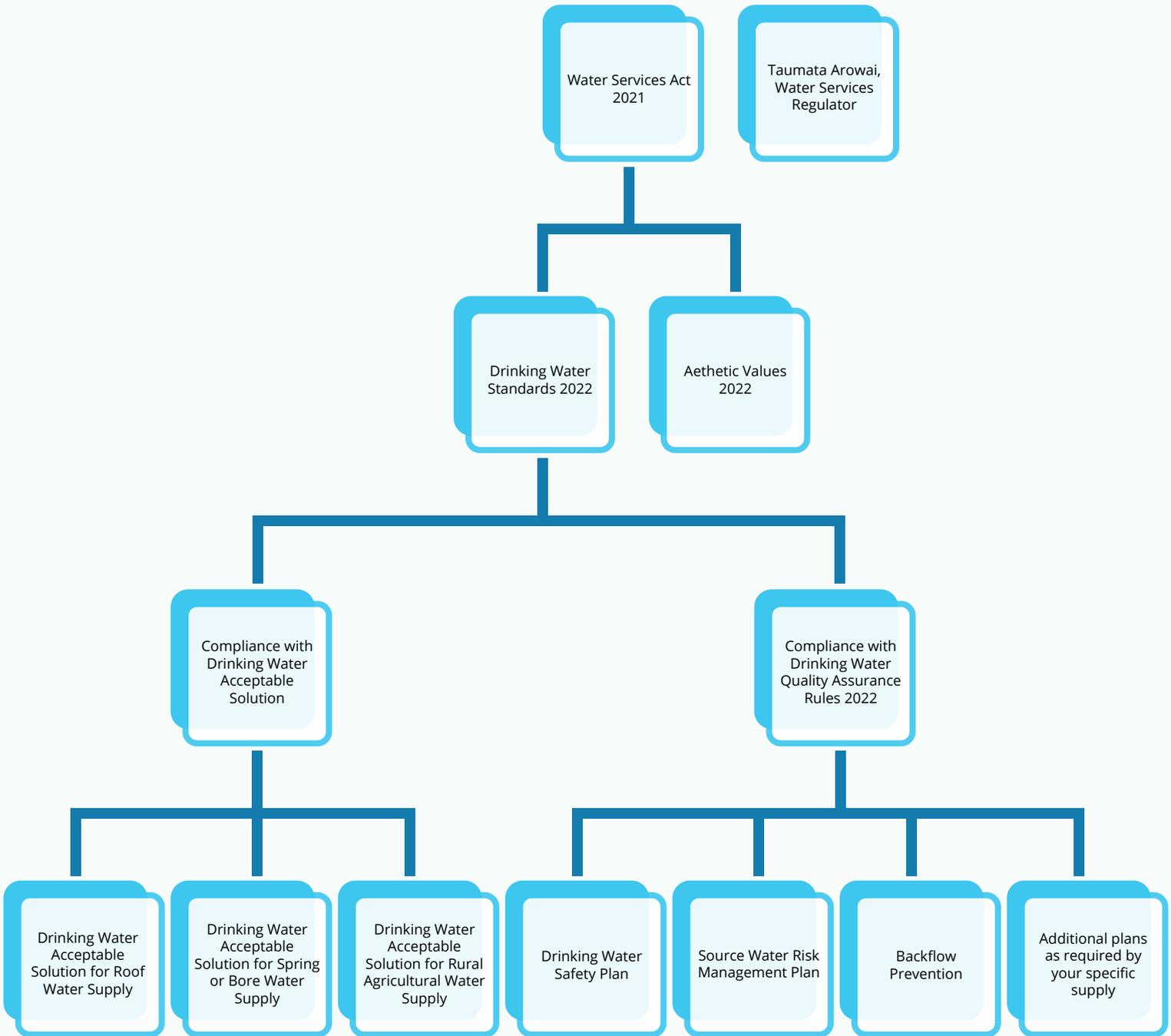
The compliance regulatory framework is illustrated in the following flowchart. There are two ways to demonstrate compliance with the Water Services Act 2021 and associated Drinking Water Standards and Aesthetic Values; you can either adopt an Acceptable Solution, or comply with the Quality Assurance Rules 2022, which involve as a minimum a Water Safety Plan and a Source Water Risk Management Plan, in addition

to additional manuals and plans detailed in the Rules for your particular supply types.

Regardless the compliance solution adopted, you will be required to register and communicate and report with Taumata Arowai as detailed in the Acceptable Solution or Rules, depending on the compliance option adopted.



Compliance Regulatory Framework



SECTION 2

INTERPRETATION AND KEY TERMS UNDER THE ACT

5 Interpretation

In this Act, unless the context otherwise requires,—

abstraction point means the location at which source water is abstracted for use in a drinking water supply; for example, the location at which water is abstracted from a river, stream, lake, or aquifer)

acceptable solution or verification method means a drinking water acceptable solution or verification method issued under [section 50](#)

agent includes a contractor

approved form means a form provided by Taumata Arowai

backflow means the unplanned reversal of flow of water or mixtures of water and contaminants into the water supply system

backflow prevention device means a device that prevents backflow

chief executive means the chief executive of Taumata Arowai

compliance, monitoring, and enforcement strategy means the compliance, monitoring, and enforcement strategy developed under [section 136](#)

compliance officer means a compliance officer appointed under [section 98](#)

compliance rules means compliance rules made under [section 49](#)

consumer means a person who consumes or uses drinking water supplied by a drinking water supplier

drinking water supplier means a person who supplies drinking water to it by [section 6](#) of the Local Government Act 2002

organisation means an organisation (Criminal Liability) Act 2002

General

This section is not intended to give a complete list of definitions of key terms under the Act, but rather provides a short list to help the reader understand the more important key terms in the context of this guide.

Drinking Water Supplier

- A. A person who supplies drinking water through a drinking water supply.
- B. Includes a person who ought reasonably to know that the water they are supplying is used as drinking water.
- C. Includes the owner and the operator of a drinking water supply.
- D. Includes a person described in paragraph (a), (b), or (c) who supplies drinking water to another drinking water supplier; but does not include a domestic self-supplier.

Drinking Water Supply

- A. Means the infrastructure and processes used to abstract, store, treat, transmit, or transport drinking water for supply to consumers.

B. Includes:

- i. The point of supply.
- ii. Any end-point treatment device.
- iii. Any backflow prevention device.

But,

Does not include a temporary drinking water supply provided for under section 33 or 34 of the Act (certain temporary supplies in limited circumstances).

Supply Size

- A very small supply serves less than 25 people.
- A small supply serves 26-100 people.
- A medium supply serves 101-500 people.
- A large supply serves more than 500 people.



Water Supply Categories

- Very Small Communities.
- Networked Drinking Water Supplies.
- Self-Supplied Buildings.
- Water Carrier Services.
- Water Carrier Supplies.
- Community Drinking Water Stations.
- Varying Population Water Supplies.
- Temporary Drinking Water Supplies.

Drinking Water Supply Owners and Operator

“Operator” means:

- The person who operates the supply or supervises its operation or aspects of its operation.
- Includes an organisation or individual involved in the operation of a drinking water supply if the organisation or individual is authorised or included on a register.

“Owner” means the person who has effective control of the drinking water supply:

- Owns drinking water infrastructure.
- Has a long-term control of the land on which the drinking water infrastructure is based.
- Directs or has control over decisions about the funding or maintenance of the drinking water infrastructure.
- Collects fees, levies, or other charges from consumers in relation to the infrastructure.
- Controls how the management of the supply is resourced (e.g., power to subcontract work).



COMPLIANCE TIMELINE



General

“The Act came into effect and became law on 15 November 2021. Taumata Arowai took over from the Ministry of Health as regulator of drinking water for Aotearoa. All statutory timeframes are from that date.”

- Registered supplies (regardless of size) have 1 year to confirm their registration and comply with the Act.
- Unregistered supplies have up to 4 years to register and 7 years to comply with the Act.
- Any new supply requires immediate registration and compliance with the Act.

Registration needs to be renewed annually to confirm any change of details of the supply, such as contacts, quantity supplied, new sources, treatment, etc.

Registration, communication, and notifications with Taumata Arowai are via Hinekōrako, the new online service portal.

Large supplies (serving more than 500 people) and already registered smaller supplies (serving less than 500 people) will have received an email from Taumata Arowai with registration details by 15 February 2022. These supplies need to confirm their registration and details and start using Hinekōrako for communications, reporting and notifications.

Unregistered supplies and new supplies will need to create their account and registration in Hinekōrako (on-line portal with Taumata Arowai) directly. More information will be released by Taumata Arowai to assist with the process.

Some suppliers may apply for chlorination exemptions from 1 March 2022 if they believe their network is very small or safe without disinfectant residual.

SECTION 4

DRINKING WATER SAFETY PLAN



General

The Act requires all suppliers to develop a Drinking Water Safety Plan (WSP) as part of demonstrating compliance within the timeline detailed in Section 3.

“The WSP is every supplier’s plan for providing safe water to its consumers and covers compliance with the DWSNZ 2022, Drinking Water Aesthetic Values 2022, and Drinking Water Quality Assurance Rules 2022. The only exemption from preparing a WSP is if a supply decides to, and is able to, adopt an Acceptable Solution. This is covered in detail in Section 5.”

Depending on your experience, you may need to engage external technical specialists to help support the development of your WSP. You will then need to make sure the WSP is put into practice; that is making sure that everybody involved with the operations and maintenance of the supply has been trained and is aware of any WSP requirements.

While Taumata Arowai does not approve WSP's they can audit your supply to make sure that you are implementing the WSP.

A drinking water supply system includes everything from the collection of the source water to the point of use. Keeping the supply safe involves:

- Understanding hazards to your water source(s).
- Treating the water to remove or control any contamination.
- Making sure the water is stored and distributed safely.
- Monitoring the quality of the water and the integrity of the water supply system.
- Planning on how to respond to problems in the water supply system.

The WSP covers every aspect of providing safe drinking-water, identifying the events that could cause water to become unsafe to drink (including not enough water) and developing plans to manage these. The WSP covers the three parts of the supply:

- Catchment and intake / source.
- Treatment.
- Storage and distribution.

The WSP helps identify whether any of the following four barriers to contamination are missing:

- Minimizing contamination of the source water.
- Removing particles from the water (where many of the pathogens hide).
- Killing or inactivating pathogens.
- Preventing recontamination after treatment.

Other key aspects of the WSP include:

- Developing a plan to achieve compliance.
- Barriers to contamination and Critical Control Points.
- Improvement Schedule.
- Contingency Plans.

Your plan should be kept in a central place that is easily accessible to staff. Every supplier needs to produce a WSP unless an Acceptable Solution is adopted. These aspects are covered in more detail in the following sections.

Multiple Barriers: a helpful approach

“Using multiple barriers (or control measures) against contaminants is a helpful approach because if one barrier fails, the remaining barriers will reduce the likelihood of contaminants passing through the system and causing harm to consumers.”

Barriers include:

- Ensuring a clean catchment for your supply. For rainwater tanks, this means keeping roofs and gutters clean.
- For groundwater sources and surface water catchments, it means good land management in the surrounding area.
- Regular maintenance of the supply system (tanks, pumps, plumbing and other elements).
- Adequate treatment (such as filtration and/or disinfection).

Source Water Risk Management Plan

A Source Water Risk Management Plan forms part of your WSP. Source water is the natural fresh surface and groundwater that gets abstracted and then treated for drinking water. Protection of your source water is of paramount importance to the safety of drinking water. Source water risk management involves mitigating the chance of any water contamination occurring to your source water in the first place and where contamination has already occurred it involves you managing the impact of the contamination on your supply to prevent any further harm.

As a water supplier you need to be aware of risks to your source water and put in place treatment processes and operational responses for these risks. It is unlikely that you will have control over what happens within your source water catchment.

Because of this, your local council has a legislative requirement under the Water Services Act to help you with source water risk management. They must inform you about the risks and hazards that apply to your supply, and they must understand actions to address those risks on your behalf.

Document how you are managing, controlling, or eliminating source water risks as part of your approach in your source water risk management plan. And, if an adverse event in the supply catchment occurs which threatens the safety of the drinking water supply, you must be able to implement the mitigation measures for the supply.



SECTION 5

DRINKING WATER ACCEPTABLE SOLUTIONS



Photo source: Filtec Ltd.

General

“If your existing supply fits the requirements of an Acceptable Solution or you choose to adopt an Acceptable Solution for a new supply, there is no need to have a WSP or comply with the Drinking Water Quality Assurance Rules 2022. These requirements are all covered in a very bespoke way in the Acceptable Solution you choose for your supply.”

Acceptable Solutions provide drinking water suppliers with a ready-made option to meet their compliance obligations under the Act. They apply to particular supply types and situations and must be implemented in their entirety.

Each Acceptable Solution requires:

- Operations and Maintenance (O&M) Manual and Standard Operating Procedures (SOPs).
- Maintenance, inspection, calibration.
- Monitoring and testing.

- Incident Management.
- Training.
- Auditing.

You may require technical support to prepare the suite of documentation required for an Acceptable Solution and for managing its installation and commissioning.

The three available Acceptable Solutions are for the following source water / supplies:

- Rural Agricultural water supplies – where water is provided at a restricted volume (trickle feed) to a supply storage tank on a consumer’s property.
- Roof water supply – where water is supplied to a building or group of buildings which share the same water source.
- Spring or bore water supplies – where drinking water is supplied from a bore or spring.

To be able to adopt an Acceptable Solution, the source water must meet the criteria set out in the Acceptable Solution, so it is suitable for the proposed treatment, which consists of cartridge filtration followed by UV disinfection.

Chlorination is only required by the spring or bore water supply Acceptable Solution, in addition to the prescribed process. Chlorination is not required for the rural agricultural water supplies because treatment is provided at the point of supply or house.

Therefore disinfection occurs with the UV treatment but disinfection residual is unnecessary when there is no network downstream of the point of disinfection and for roof water supplies.

Water quality testing and backflow prevention must be carried out as set out in the Acceptable Solution adopted. The maximum population is 500 people, except for the rural agricultural supply where treatment is provided at each house.





General

“The Act requires all suppliers to develop a Source Water Risk Management Plan as part of demonstrating compliance with the DWSNZ 2022, Drinking Water Aesthetic Values 2022, and Drinking Water Quality Assurance Rules 2022. This can be done as part of the WSP as detailed in Section 5 above and is not required if the supply adopts an Acceptable Solution.”

Sources of Water

Rainwater

In this guide the term rainwater is used to describe the water that falls on your roof when it rains. It does not include rainfall that is collected from the ground, which is usually called stormwater.

Surface Water

Surface water includes water from rivers, streams, dams and springs. Livestock, animals, and humans can contaminate surface water with disease-causing microorganisms. Industrial, agricultural, or other runoff can also contaminate surface water with chemicals.

Groundwater

Groundwater includes water from bores, or wells. Groundwater can be high quality if the source is well maintained and protected.

Tankered Water

Tankered water is used when your tank needs topping up. Tankered water must be drinking water quality and obtained from a registered drinking water carrier.

Source Water Risk Management

Always use the best quality water source available. Regardless of the source, carry out regular inspections to identify and remove contamination and to check the cleanliness of the system.

When managing risks to your source water, consider the following aspects to minimise water quality problems:

Rainwater

- Regularly clean the roof and gutters collecting rainwater to remove leaves, bird droppings and

other organic matter. These can be a source of disease-causing microorganisms. They can also cause taste and odour problems or be a source of nutrients to promote the growth of microorganisms.

- After a dry spell, divert water from the first rainfall using a first flush or bypass device. This reduces the amount of contaminants entering the tank. Check the inlet screen/first flush diverter is not blocked.
- Remove overhanging tree branches that may drop leaves into gutters.
- Paint or remove any lead flashings used in the roof construction.
- Examine tank roofs, inspection hatches and inlets/outlets to ensure they are sealed and will prevent the entry of animals that could be the cause of contamination.
- Install screens on roof gutters to prevent the entry of leaf debris and small animals. Check the screens regularly to prevent tanks becoming breeding sites for mosquitos.
- Tanks should be examined for build-up of sediments every two to three years or if sediments are seen in the water supply. Any build up needs to be removed as sediments can be a source of contamination, taste and odours. Sediment can be removed by siphoning the tank without emptying it, or by completely emptying the tank for a thorough clean.
- Regularly inspect in ground tanks to ensure they do not become contaminated. Water that has flowed over or through surrounding soil or ponded on the lid must not be allowed to enter the tank. Tanks must be kept in good condition. Lids and inspection openings must be sealed. Any nearby septic systems must be maintained and working effectively. Septic effluent must not be allowed to enter drinking water tanks due to the risk of contamination with disease causing microorganisms.

- If the water supply has not been used for 24 hours or more and water has been stagnant in copper or old lead pipes, metals can leach into the water. It is recommended that these pipes be flushed for a few minutes until fresh water flows through from the tank. Any flushed water can be used safely on the garden.

Surface Water

- Make sure that surface water sources are fenced against livestock, protected from septic tank overflows and spills of domestic, agricultural, or industrial chemicals.
- Check upstream for contamination sources. Local and regional councils can provide you with information about activities higher up in a stream's catchment that may affect the quality of its water.
- Check that the intake is clean, making sure that any debris is removed, and parts are not corroding.
- Check there are no cracks in or degradation of the structure and that water is not seeping or bypassing the intake structure.
- Check for algae blooms.
- Operate and maintain any valves or mechanical equipment that may be used (pumps, etc.).
- Filter and disinfect the water as detailed in the following sections.



Ground Water

- A groundwater source should be uphill and away from any wastewater disposal system such as a septic tank and trenches.
- Avoid contamination with surface water (open wells) or where water flows freely from the surface down into the groundwater. Check any openings into the bore head are sealed and watertight.
- Inspect the area around a groundwater supply regularly and protect it from surface contaminants. Bore heads should be raised above ground level to avoid floodwaters and surface runoff contaminating the source.
- Only extract groundwater from a place where subsurface contaminants are unlikely. Avoid sites with unknown contaminants, including heavy industry and intensive agricultural areas.
- Check that the fence around the bore is secure and that the backflow prevention device is still working.
- Maintain your bore infrastructure and pump by engaging with a well driller and pump mechanic.

Tankered Water

- When water is added to an empty rainwater tank, it may resuspend the sludge at the bottom of the tank creating taste and dirty water problems. Ideally tanks should be cleaned prior to delivery of water.

As part of the preparation of your source water risk management plan, you should put in place procedures, processes or systems to manage:

- Shutdowns and outage management, when your source water intake requires maintenance, or when there is a potential issue with the source water.
- Fault and incident response, when there is a problem with your source water abstraction system so you can follow your plan to resolve the issue as quickly as possible.
- Inventory management, if a component of the source water abstraction system breaks down, so you can quickly access spare parts to repair the system.



WATER TREATMENT



General

“A drinking water supply must be treated according to its type and size as per the Drinking Water Quality Assurance Rules 2022, unless an Acceptable Solution is adopted. The criteria to adopt an Acceptable Solution are detailed in Acceptable Solution section of the Guideline.”

There is no preferred way to compliance; your supply may be able to adopt an Acceptable Solution but you can choose to comply with the Drinking Water Quality Assurance Rules 2022 (the Rules) and implement a site specific solution. Alternatively, your supply may not meet the specific criteria of an Acceptable Solution, and therefore you have only one compliance option available.

The Rules cover a range of treatment processes depending on the contaminants that require control. It is best to get professional advice on the design and

selection of a water treatment system for your particular supply.

The Rules require all source waters to be tested for a range of contaminants (Nitrate, Iron, Manganese, Boron, arsenic, etc).

The most common treatment methods are discussed below:

Pre-Treatment

Sometimes source water requires pre-treatment to stabilize the incoming water to the treatment plant to a level where the subsequent treatment processes are effective. Pre-treatment of water is used to reduce, and/or stabilise variations in the microbial, natural organic matter and particulate load. It can also be used to control algae in the raw water. Pre-treatment of surface water includes processes such as bankside filtration,

infiltration galleries, pre-sedimentation, off-river storage, roughing filters, screens and micro-strainers.

Pre-treatment processes must be regularly inspected, maintained and monitored. Any sensors used to monitor the pre-treatment process need to be calibrated and like any process or source management, a plan must be in place for shutdowns, incidents and spare parts management.

Filtration

Depending on the type of filter used, filtration can remove particles (e.g., sediment, chemicals, algal toxins and microorganisms). Filters are commonly installed in line with the plumbing system between the water source and the other treatment steps.

If the source water appears cloudy or dirty then it will require filtration before it can be disinfected, as particles and dirt in the water make disinfection less effective.



Turbidity in water can be measured as Nephelometric Turbidity Units (NTU). If the water is filtered as a pre-treatment for disinfection, then the filtered water should be 1 NTU or less.

Filters must be regularly maintained and replaced to be effective. If not, bacteria can grow on them and then be released into the filtered water. The manufacturer's operating and maintenance instructions must be carefully followed.

For water supplies with a lot of suspended particles, it may also be necessary to use a coagulation treatment

process before filtering the water. Coagulation chemicals make small particles in the water clump together into larger ones, making filtration more effective. The Rules make sure that a filtration system is used:

- if your water supply turbidity is likely to be high.
- if there is a risk of contamination with sewage or farm runoff that would contain *Cryptosporidium* and *Giardia*.
- if it contains chemicals, or
- if it comes from a source with blue-green algae.

A number of factors determine a filter's ability to remove specific types of contaminants, including the material the filter is made from, the filter grade and the flow rate of the water through the filter. The Rules prescribe the appropriate filtration for the type and complexity of the supply. Some of the different filtration methods available are outlined below.

Cartridge filters – usually have a plastic housing that contains a membrane or media through which the water is passed. Depending on the type used, cartridge filters can remove particles of a range of sizes, from suspended dirt through to microorganisms.

Filters containing sand or silica media – also remove particles, but generally not chemicals and algal toxins. Depending on the media used they may remove microorganisms.

Ceramic filters – have a core of ceramic material of small pore size, through which the water is passed. They can remove bacteria and parasites from water, but only certain types with an extremely small pore size will remove viruses. The core needs to be cleaned regularly. Ceramic filters are not used for removing chemicals.

Activated carbon filters – help control taste and odour problems and remove algal toxins. They are not usually used for removing bacteria, parasites or viruses (although some may be effective for this). The carbon needs to be replaced regularly, as it becomes saturated with contaminants.

Resin-based ion exchange filters – help to soften the water by removing hardness or other dissolved salts. They do not remove microorganisms. The resin must be replaced or regenerated as it becomes exhausted or clogged.

Reverse osmosis filtrations – removes most contaminants including minerals, microorganisms, and sediments.

Disinfection

Disinfection is the single process that has had the greatest impact on drinking water safety. Disinfection is generally the last step of water treatment and will kill most bacterial pathogens and greatly reduce the numbers of viral and most protozoan pathogens. Disinfection will not remove chemical contamination.

Chlorine disinfection

Chlorine is often used to disinfect water because it is accessible, economical and can treat large volumes of water. It controls many microorganisms but is not very effective in controlling parasites such as *Giardia* and *Cryptosporidium*. These parasites are most likely to be present in surface water and shallow groundwater supplies that are at risk of contamination with sewage discharges (including septic tank discharges), livestock access, or livestock runoff.

Chlorine can be manually dosed directly into the tank, which is a good method for emergency disinfection. However, for regular treatment it is better to use an automated system to maintain a suitable level of chlorine at the point of injection.

There are a number of different ways to chlorinate drinking water:

- Adding sodium hypochlorite liquid using a small dosing pump, or by electrolysing a salt solution.
- Adding calcium hypochlorite powder or tablets dissolved into liquid which is then added to the water using a small dosing pump.
- Chlorine can be added as a liquified gas.

These are all hazardous substances, and there are specific chemical handling and delivery procedures that you need to follow. Refer to the Health and Safety at Work (Hazardous Substances) Regulations 2017 and/or Hazardous Substances and New Organisms Act 1996 (HSNO) for further detail.

Chlorine dissipates from water quite rapidly, and more quickly as the temperature increases. Regular monitoring of chlorine is recommended to check the level of disinfectant in the system or the amount of Free Available Chlorine (FAC).

Filtration is often necessary before chlorination of surface water supplies and some groundwater supplies (dirt and other suspended particles can prevent effective disinfection). There are specific monitoring requirements depending on whether you follow an Acceptable Solution or whether you need to meet the Drinking Water Quality Assurance Rules.

Typically, you will need to monitor incoming turbidity levels, chlorine contact time, FAC and pH of the treated water to make sure the chlorine disinfection system operates as it was designed to. You need to know the trigger points and action levels to respond to for each of the parameters monitored, the dose of chlorine required to leave sufficient FAC for your supply, how pH, temperature, incoming water quality and contact time impact on the effectiveness of the disinfection, as well as how to avoid disinfection by-product formation.

When the water supply has not been used for some time, such as more than one week, you should check the chlorine level and flush the pipes for a few minutes until fresh water flows through from the tank.

Regular operational inspections and maintenance are important to check on levels of chlorine product, accept delivery of chlorine, refill the disinfection system, check and maintain the condition of tanks, dosing lines and pumps. In addition, any sensors used in the chlorination system (dose controller's and pH probe) will need to be calibrated or replaced (as required).

As with all treatment systems, a plan must be in place for shutdowns, incidents and spare parts management.

Ultraviolet light disinfection

Another common and effective form of disinfection is UV light, which kills many kinds of microorganisms, including the parasites *Giardia* and *Cryptosporidium*. Filtration to remove suspended particles often needs to occur before the water reaches the UV disinfection unit – because UV light cannot penetrate dirt or cloudy water. UV requires a reliable power supply, and the UV lamp should be changed regularly. For best results, you should use UV disinfection either at the point of use, or in combination with chlorination.

UV disinfection systems need to be designed and installed by a water treatment professional. They also need regular and careful maintenance to ensure they remain effective. It is particularly important that the UV lamps are regularly inspected to ensure the light is working and the quartz sleeve is cleaned to remove any build-up of scum.

There are two main types of UV units:

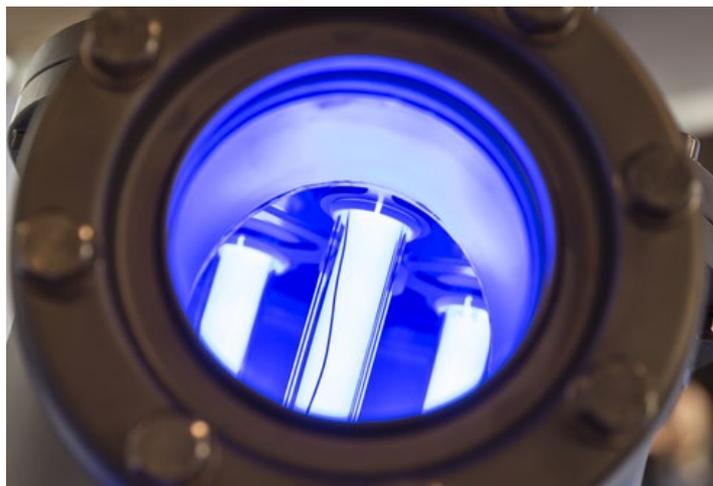
- A chamber that water flows through, which contains a quartz sleeve that a UV lamp sits inside. The lamp emits light, disinfecting the water; or
- A quartz sleeve that water flows through with lamps mounted in air. The lamps which emit light, disinfect the water.
- A sensor in the UV unit will measure the UV intensity. A control system is used to close a solenoid valve in the event of an alarm / UV system failure, which prevents water from passing through the unit and reaching consumers.

There are specific monitoring requirements depending on whether you follow an Acceptable Solution or whether you need to meet the Drinking Water Quality Assurance Rules, detailed as follows:

- Typically, you will need to monitor the flow, turbidity and UVT upstream or downstream of the UV unit, as well as the UV lamp hours used and UV intensity.

- The UV disinfection process relies on the UVI sensor reading correctly. Calibration / verification, or replacing the sensor at intervals recommended by the manufacturer will give certainty that the sensor readings are accurate

As with all treatment systems, a plan must be in place for shutdowns, incidents and spare parts management.



Emergency Water Treatment

Unusual events can contaminate water supplies that are normally clean. These events might include:

- Natural events such as heavy rain or faecal contamination (animal droppings or septic tank overflow).
- Water that has been treated being re-contaminated, e.g., by dead animals in a storage tank.
- Disinfection or pump system failure due to power outage.

If you suspect your water has been contaminated, it can be boiled before being used for drinking or food preparation or manually disinfected with chlorine. Boiling and chlorine will not remove chemical contaminants. Therefore, if chemical contamination is suspected then an alternative drinking water supply (such as bottled water) should be provided until the normal water supply is proven to be safe.

In case of an emergency, you have the duty of care as the water supplier to take immediate remedial action and notify your consumers and Taumata Arowai that the water may become unsafe to drink.

Treatment Requirements for Small Supplies

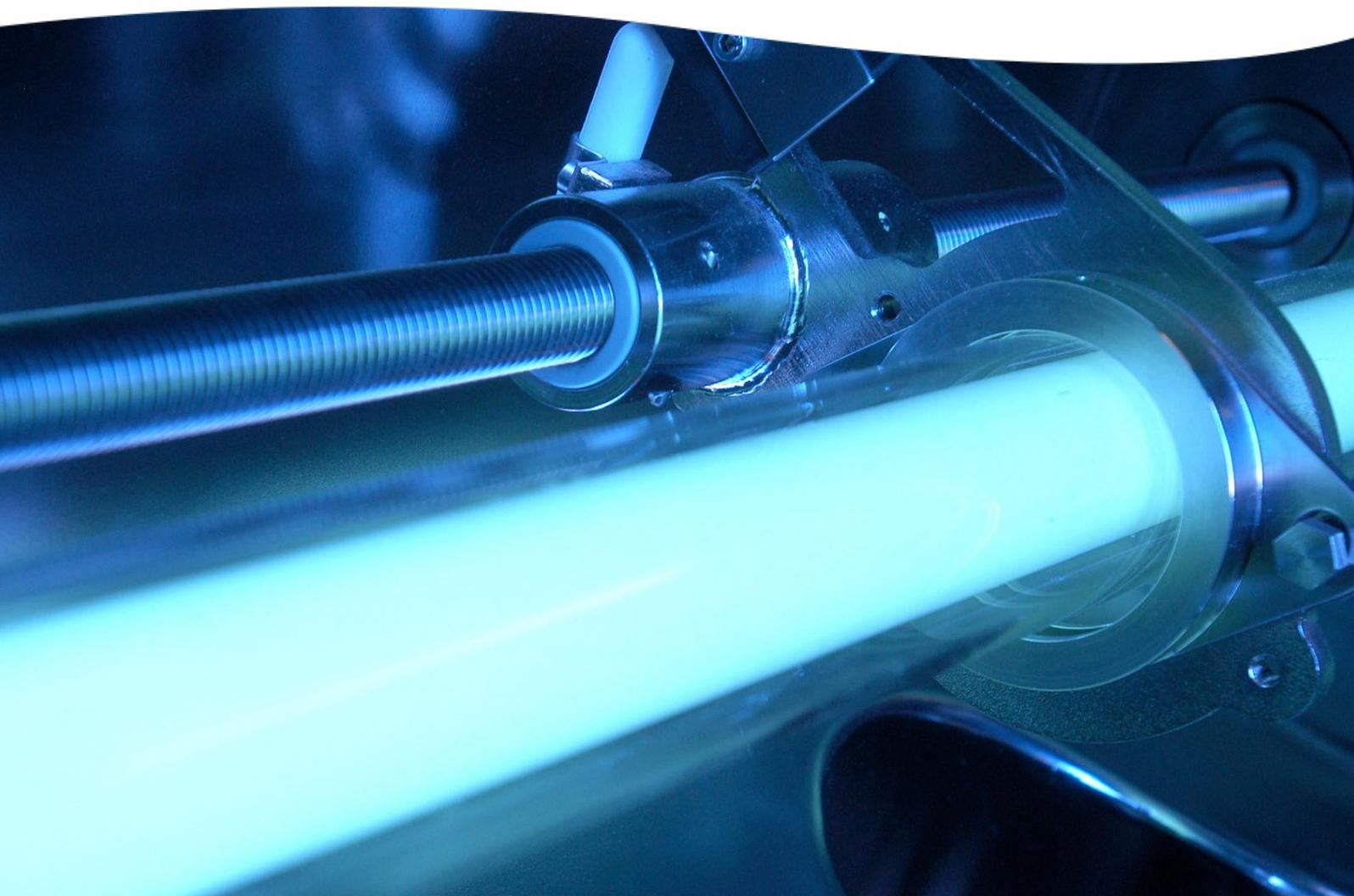
The Rules set out the minimum compliance requirements for treatment for your specific supply type and size. The basic requirements are summarised below:

- Very small and small supplies (<100 people) require cartridge filtration followed by UV disinfection. In addition, surface waters must have, upstream, either a filtration system that can be backwashed or a selective abstraction or sedimentation process.
- Medium supplies (101-500) require media, membrane or cartridge filtration process (with turbidity limits), UV disinfection and chlorination.

Treatment Requirements for Large Supplies

Large supplies require drinking water to demonstrate compliance with bacterial, protozoa, chemical and cyanotoxin rules to show that treatment barriers are effective.

These Rules are similar to the previous DWSNZ, provide flexibility in the disinfection method chosen and require some continuous monitoring. For further details, it is recommended to read Section 10.9 of the Rules.





General

“Water that comes into contact with materials such as gutters, storage tanks, rainwater tanks, pipes and plumbing fittings may contaminate water in certain situations. All plumbing materials used in the water supply should be approved for use with drinking water and certified to appropriate NZ Standards (AS/NZS 2020:2018). Tanks, hoses and fittings should be made of, or lined with, a material that will not contaminate the drinking water.”

In addition, the distribution system requires some monitoring and testing for key parameters, disinfection by-products and plumbosolvent metals. It also requires a backflow prevention programme, as well as monitoring and testing of devices as stated in the Rules and Acceptable Solutions.

As detailed in your WSP (refer to Section 5) or O&M Manual in case an Acceptable Solution is adopted, preventative measures should be taken to ensure your treated water does not become contaminated.

These measures should be developed when preparing your Operations and Maintenance Manual.

Storage Tanks

Storing water helps to:

- Buffer the demand of water against the ability for the system to supply it.
- Maintain uniform pressures in the distribution network.
- Provide a reserve for emergencies that might impact on the supply.

Because water quality can degrade if it is stored too long, the water level in a tank needs to be able to drop to help mix and turn over the water, without dropping below the minimum operating level of emergency storage (firefighting, etc.).

Therefore you will need to monitor the tank storage water levels and volumes and know the alarms and action levels to respond to for these parameters. More specifically, you will likely need to monitor:

- The set points, or pump start and stop levels used to fill the tank.
- Low level, high level and hatch alarms.
- The minimum water level in the tank that will allow enough water storage for your supply in an emergency situation.
- How frequently the tank volume should be turned over to maintain water quality.
- The usual amount of water turnover in the tank.

Operational inspections and preventative measures for your storage tanks include:

- Installing screens, with a maximum 1 mm mesh, on tank inlets and overflows to prevent the entry of leaf debris, mosquitoes and small animals. Check the screens regularly.
- Ensuring tanks are covered and made lightproof to minimise algal growth.
- Ensuring tanks are adequately ventilated, with at least two vents, preferably on opposite sides of the tank.
- Ensuring in-ground tanks are properly sealed and designed to prevent the entry of any surface runoff, groundwater or soil. Tanks should not be buried in contaminated ground or near underground chemical storage tanks. In-ground tanks should be away from any septic tank or areas where the septic tank discharges.
- Ensuring the draw-off point for taking water from the tank is at least 150-200 mm above the base of the tank as significant concentrations of contaminants can be found in tank sediments.
- Examining tanks for build-up of sediments every two years, or earlier if sediments are seen in the water flow. Any build-up of sediments needs to be removed as sediments can be a source of contamination and taste and odour issues. Sediments can be removed by siphoning the tank

without emptying it, or by completely emptying the tank for a thorough clean.

- If the water supply has not been used for some time, it is recommended that the pipes are flushed until fresh water flows through from the tank. The flushed water can be used safely on the garden.
- If more than one storage tank is used, consider connecting them in series. Passing the water through multiple tanks may improve the microbial quality of the water.



Tanks should be well maintained and cleaned at least every two years to remove the sediment that builds up on the bottom. Tanks built from different materials need to be treated differently during maintenance and cleaning. For example, plastic tanks need to be anchored when empty, concrete tanks should not be allowed to dry out in case of cracking, in-ground tanks need to be cleaned and refilled quickly in case of tank displacement from the ground. Make sure you follow any manufacturer's instructions when maintaining or cleaning your tank.

Do-it-yourself tank cleaning presents a number of risks including working and using disinfectants in confined spaces, and access into and out of the tank. Professional tank cleaners are available in most areas. It is important to be aware of any Health and Safety requirements associated with confined spaces when cleaning tanks or engaging someone to clean your tank.

Sensors, such as those measuring the water level, will need to be either calibrated or regularly replaced.

As for the treatment system, a plan needs to be in place for shutdown, outage management, as well as fault and incident response.

Distribution Systems

The distribution system takes the treated water and delivers it to your consumers. Drinking water distribution systems need to be operated in a coordinated way so that adequate pressure, residual disinfectant and flows are maintained, and pressure surges, contamination and leakages are avoided.

Preventative measures for your distribution system include:

- Water from any overflow pipes should not be allowed to pool or stagnate.
- Buried pipes should be installed away from, and shallower than, septic tanks or wastewater pipe work.
- Pipes that are not self-draining (e.g., half syphon downpipes) should be drained every six months.

If you use another water supply on your property that is not drinking water, then you should make sure the pipes are clearly distinguishable. This is to prevent interconnections between the two supplies that may result in people consuming water that is not drinking water quality.

You will also need to monitor residual disinfection levels and water quality determinants within the distribution network as stated in the Rules or Acceptable Solution adopted.



Water quality complaints shall be recorded and analysed as they can indicate a problem in distinct parts of your distribution system, such as the pipes or pumps.

Sudden increase in demand or high demand in the middle of the night, can indicate a leakage, or alternatively illegal connections, posing a risk to your supply including backflow.

Where any new, or repaired, distribution system pipes, fittings and new connections to customers get installed, this must be done according to the designer's or manufacturer's instructions and by a qualified person. Regular cleaning, (e.g. flushing, scouring or pigging the mains) is important if your distribution system is prone to collecting sediments, biofilm growth or has a history of dirty water complaints, or odours.

When there is a problem with the distribution system, you will need to follow your incident and emergency plan to resolve the issue as soon as possible (e.g. pipe burst, or leakage) and communicate with customers about any impact.

Backflow Prevention

Backflow, from a customer's property back into the distribution system, is a public health risk. It can occur when the pressure in the distribution system drops below the pressure in the customer's property.

The Water Services Act requires drinking water suppliers to protect their drinking water supplies from the risk of backflow i.e reversal of flow due to a negative pressure gradient in the network creating an opportunity where external, untreated water can enter the network.

Backflow prevention devices help to prevent the reversal of flow from occurring. They must be appropriately selected, installed and tested to successfully protect the drinking water distribution system from backflow contamination.

Testable backflow devices are usually installed on higher risk connections, with untestable backflow devices usually installed on lower risk residential connections.

If water is extracted from bores, or you supply water carriers, you will also need to address these unique backflow risks.

Backflow prevention must be put in place as stated in the Rules or Acceptable Solution adopted. New customers also need to be assessed for their backflow risk before connecting them to the system.

More specifically, you need to:

- Determine if a connection is a low, medium or high risk for backflow.
- Determine what type of backflow preventer is suitable for certain customers (e.g. water meters

with built-in dual check valves would be suitable for residential customers, whereas testable backflow prevention devices may be required for high risk industrial customers).

- Regularly review the risk of backflow on the distribution system.
- Keep records about backflow risk and inspections of systems from the properties / connections that you supply water to.
- Carry out appropriate maintenance, replacement and calibration and keep records.

As with all systems and processes, a plan needs to be in place for shutdown & outage management and for fault & incident response.



SECTION 9

MONITORING, REPORTING AND NOTIFICATIONS



Routine Monitoring

“Monitoring is an essential part of the multiple barrier approach to good drinking water management. The results of monitoring indicate whether your barriers to contamination are working properly.”

The monitoring and reporting must be done as stated in the Rules or Acceptable Solution adopted and include sampling at the source, treatment and in the distribution system for a range of parameters.

Water samples should be tested by a laboratory registered in Hinekōrako, the Taumata Arowai online portal. Reporting on routine monitoring should be done in the format and frequency stated in the Rules or Acceptable Solution adopted.

Notifications

The Act contains many requirements for drinking water suppliers to notify Taumata Arowai. These notifications are required as follows:

- Drinking water safety issue.
- Non-compliant laboratory result.
- Ability to maintain sufficient supply at imminent risk.
- Restriction or interruption of supply.
- Notification of other supplier or unregistered supply.
- Unplanned supply.
- Intention to cease ownership, limit or reduce supply.
- Change of registration information.

There are currently no notifiable risks and hazards; however, these are required to be managed as part of your supply Water Safety Plan.

50% Maximum Acceptable Value (MAV) exceedance notifications are no longer required, as it was in the previous DWSNZ.

Notifications can be done through Hinekōrako if your supply account has been set up, or via the online forms in Taumata Arowai website.

Taumata Arowai will assess each notification based on five decision making criteria to help determine whether they will respond and how they will respond. These criteria are:

- Implications for Te Mana o te Wai.
- The risk of harm caused by the event.
- The water supplier's capability to resolve the event.
- The environmental risk of the event.
- Whether a response is an effective use of their resources.

Taumata Arowai will acknowledge the receipt of a notification and, following assessment, provide an update. It may only be able to provide a confirmation that they are not taking action.



Emergency Warnings

Drinking water suppliers have a responsibility to make sure the water they provide is safe. If for any reason, you think it might not be, you need to:

- Take immediate action to protect public health.
- Keep your consumers informed.
- Notify Taumata Arowai through Hinekōrako or use the online form on their website.
- Call Taumata Arowai if there is an immediate risk of serious illness, injury or death arising from your drinking water supply and the situation cannot be immediately controlled.
- Investigate the source or cause of the problem.
- Take remedial action to rectify the problem.
- Identify and implement measures required to ensure that the problem does not reoccur.
- Take all practicable steps, to the satisfaction of Taumata Arowai to advise affected consumers and drinking water suppliers that drinking water is or may be unsafe and what measures should be taken to protect public health (for example boiling).

The methods by which the warnings / notifications are done should be defined in your contingency plan (developed as part of your WSP); it can be a combination of physical warning signs, social media posts, phone calls or anything that is the most suited to your particular supply type and consumers.

REFERENCES

Water Services Act 2021

<https://www.legislation.govt.nz/act/public/2021/0036/latest/LMS374564.html>

The new standards and rules on Taumata Arowai website at

<https://www.taumataarowai.govt.nz/for-water-suppliers/new-compliance-rules-and-standards/>

The new Acceptable SOLUTIONS on Taumata Arowai website at

<https://www.taumataarowai.govt.nz/for-water-suppliers/new-compliance-rules-and-standards-2/>

Victoria (AUS) Guidelines for private drinking water supplies at commercial and community facilities

https://content.health.vic.gov.au/sites/default/files/migrated/files/collections/policies-and-guidelines/1/1_guidelines_report---pdf.pdf

New South Wales (AUS) Private Water Supply Guidelines

<https://www.health.nsw.gov.au/environment/water/Publications/private-water-supply-guidelines.pdf>

DISCLAIMER

This guide has been prepared for information only for the specific objectives described herein. The sources of information include the NZ Government website, Taumata Arowai website, The Water NZ Competency Framework, as well as the Victoria and New South Wales, Australia guidelines for private drinking water supplies.

It is not to be relied upon or used out of context by any other party for any other objective without reference to GWE Consulting Ltd. The reliance by other parties on the information or opinions contained in the report shall, without prior review and agreement in writing, be at such parties' sole risk.

This guide has been last updated with the latest information on 4 August 2022.