

A photograph of several large, cylindrical water storage tanks situated on a grassy hillside. In the background, there is a view of the ocean and a forested coastline under a clear sky. A semi-transparent teal overlay covers the middle portion of the image, containing the title text.

# **WATER NEW ZEALAND COMPETENCY FRAMEWORK**

## **Small Water Suppliers**

**water**  
NEW ZEALAND



The New Zealand Water & Wastes Association Waioira Aotearoa

# Water New Zealand Competency Framework Small Water Suppliers

## ABOUT WATER NEW ZEALAND

Water New Zealand is a national not-for-profit sector organisation comprising approximately 1900 corporate and individual members in New Zealand and overseas.

Water New Zealand is the principal voice for the water sector, focusing on the sustainable management and promotion of the water environment and encompassing the three waters: drinking water, waste and stormwaters.

[www.waternz.org.nz](http://www.waternz.org.nz)

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The Water New Zealand Competency Framework is still in the development stage, and we are interested in your feedback as we develop it further. If you have any questions, queries or comments, please contact [training@waternz.org.nz](mailto:training@waternz.org.nz).

Further refinements of this framework will be issued on the Water New Zealand website.

[www.waternz.org.nz/competence](http://www.waternz.org.nz/competence)

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## Executive Summary

People with the right skills and capabilities is key to developing an effective, efficient, accountable and resilient three waters sector in New Zealand.

This document forms part of Water New Zealand's Competences Framework (the Framework) and should be read in conjunction with the [Water New Zealand Competences Framework Overview](#) document. The framework has been developed on a role-by-role basis, this document describes what **Small Water Suppliers**<sup>2</sup> should be **able to do** and what they **need to know** to competently undertake their work.

In using this document, Small Water Suppliers need to pay attention to the levels of autonomy, complexity of tasks and accountability that people who work on their water supply are required to have and adapt this framework to suit their own unique situation.

### *Small Water Suppliers*

These are the people who **own** and **operate** networked drinking water supplies that serve a population up to 500 people.

Small water suppliers are involved in creating, operating, monitoring and maintaining water treatment and distribution services.

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<sup>2</sup> Taumata Arowai define "Small Water Suppliers" as those whose supplies serve a population between 50 and 500 people, with the term "Very Small Water Supplier" used for those supplies that serve under 50 people. Although these two types of supplies have different compliance requirements, the bulk of what they need to know to deliver safe drinking to their water to their community is very similar. Therefore, in the context of the competency framework when the term "Small Water Supplier" is used it also includes those very small suppliers, unless noted otherwise.

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# What is the Water New Zealand Competency Framework?

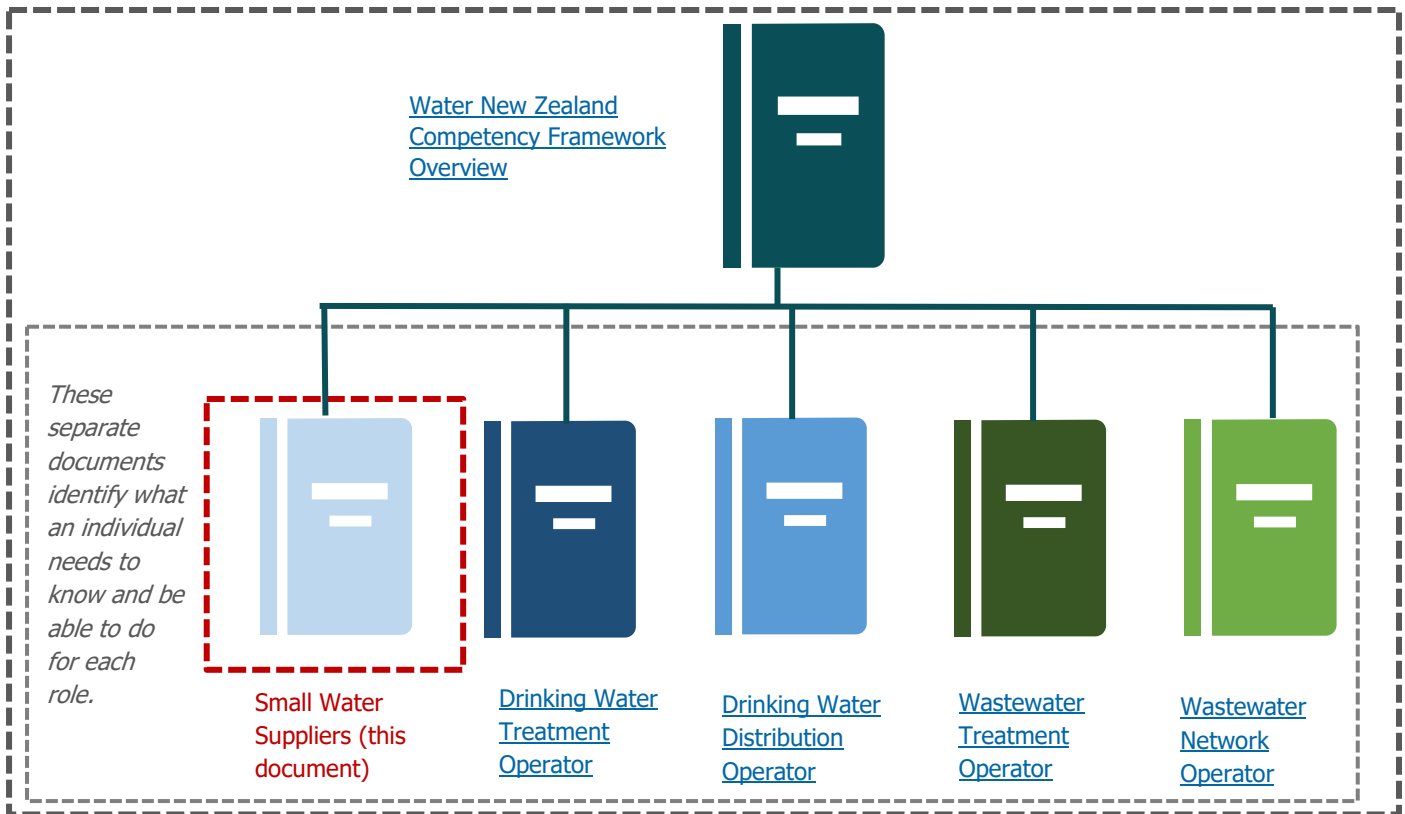
The Water New Zealand Competency Framework (the Framework) identifies what people:

- Need to be able to do, and
- Need to know

to protect the health of the public if they are involved in the supply of drinking water or wastewater services to the community.

For ease of use the competency framework is split into separate “job families” each with its own document, as shown in Figure 1. This document details what it is that **Small Water Suppliers**<sup>3</sup> need to know and be able to do and should be read in conjunction with the [Water New Zealand Competences Framework Overview](#) document.

Figure 1: Water New Zealand Competences Framework Suite of Documents



<sup>3</sup> Note that where a Small Supplier has elected to demonstrate compliance against a more complex rule than required for Taumata Arowai’s [Drinking Water Quality Assurance Rules](#), then this competency framework document will not be applicable for that situation. Instead, these Small Suppliers should adopt the Drinking Water Treatment and Distribution Operator documents identified in Figure 1 above. This is likely to be the case for suppliers that have unique characteristics in their water that require more complex treatment processes than is usually required for small water supplies.

## How do I use this document?

### **Small Water Suppliers need to adapt this framework for their own unique situation.**

The entire breadth of which knowledge and skills required by any Small Water Supplier is unique to each individual supply and will depend on factors such as:

- The type of source water used.
- The type of technology used to treat the water.
- Whether an Acceptable Solution has been adopted or not.
- The level of external support contracted to help you.
- The population<sup>4</sup> served by the supply.

It is important to bear in mind that no one person is expected to be competent in all the elements that this Framework details, rather you will need to consider your own circumstances and use this framework to identify what you need to know and be able to do.

One of the main purposes of a competence framework is to help people identify gaps in their capabilities. By comparing what you should know and be able to do with your current level of competence you will identify areas where training is required.

Many small supplies involve different people in the governance, management or operation of the supply. To help identify what parts of the competency framework might typically apply to the different roles, the header of each element indicates who might need to know about each element.

## Small Water Suppliers Profile

**Small Water Suppliers** own, manage and operate small scale drinking water supplies. They take source water, treat it and distribute it to a population of between 50 to 500 people. They fulfil a crucial role in ensuring that New Zealand communities, particularly in rural areas, are supplied with safe and sufficient water. To meet this public health responsibility, they need to:

- Be satisfied that the water supply has been designed and installed by appropriately qualified people, to the correct standards, with multiple barriers to prevent contamination.
- Operate and maintain the supply to prevent contamination.
- Understanding the types of events that can affect a water supply.
- Know what to do when something goes wrong.
- Plan for the ongoing management of the supply so that it continues to provide safe drinking water in the future.

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<sup>4</sup> Taumata Arowai define "Small Water Suppliers" as those supplies that serve a population between 50 and 500 people, with the term "Very Small Water Supplier" used for those supplies that serve under 50 people. While these two types of supplies have different compliance requirements, in terms of the competency framework the term "Small Water Supplier" can be read as covering both small and very small supplies unless explicitly stated otherwise e.g. the section on chlorination is not applicable to very small supplies..

## Small Water Suppliers Roles

Typically, a small water supply has a number of people who work together as a team to deliver safe water. For the purposes of the competency framework the work required by the team has been split into separate roles, covering the **Governance, Management** and **Operation** of small water supplies. Due to the small scale of many supplies sometimes these roles might overlap or be fulfilled by the same person, or in other instances a supply might contract out some of the work required.



Figure 2: Typical Roles within a small water supplier

## Small Water Suppliers Elements of Competence

The table on the following page lists the elements of competence that are relevant to those who **Govern, Manage** and **Operate** small water supplies.

Each element of competence is then further drilled down to give context and to identify what a Small Water Supplier needs to know and be able to do.



Some elements of competence apply only to those people involved in operating small water supplies, whereas other elements are applicable for people who manage or are involved in the governance of the water supply. Sometimes an element is about something that everybody involved in a Small Water Supply needs to know about.

For easy reference, the roles indicated on the table are also indicated in the table for each element of competence.



## What do people involved in Small Water Supplies need to know and be able to do?

	Water NZ Competency Framework Link & Context	Elements of Competence	Small Water Supplier Roles			
			 Governance	 Management	 Operations	
Strategy & Planning	<b>Governance, Legislation and Regulatory Frameworks</b>					
	An understanding of the legal and regulatory frameworks that Small Water Suppliers operate within, and their obligations as both "owners" and "operators" of the supply, is required.	<a href="#">Governance, Legislation and Regulatory Frameworks</a>	✓	✓		
		<a href="#">Drinking Water Standards, Acceptable Solutions and Drinking Water Quality Assurance Rules.</a>	✓	✓	✓	
		<a href="#">The Principles of Safe Drinking Water</a>	✓	✓	✓	
		<a href="#">Te Mana o te Wai</a>	✓	✓	✓	
<b>Demand Analysis</b>						
Small Water Suppliers need to understand what their current and future demand for water will be to so they can continue supply enough water.	<a href="#">Water Demand</a>	✓	✓			
	<b>Asset Management Planning</b>					
Asset Management Decision Making	Small Water Suppliers need to identify what needs to be done to maintain their supply, and to make sure that there is enough money available to pay for it.	<a href="#">Asset Management Planning</a>	✓	✓		
		<a href="#">Financial Management</a>	✓	✓		
	<b>Operations and Maintenance Decision Making</b>					
	Operations and maintenance decisions made by Small Water Suppliers must reflect and support the principles of delivering safe drinking water.	<a href="#">Operation and Maintenance Procedures and Manuals</a>		✓	✓	
		<a href="#">Critical Control Points</a>		✓	✓	
<a href="#">Apply a knowledge of Science to Water Supplies</a>				✓		
<b>Technical Standards</b>						
The activities that Small Water Suppliers are responsible for must comply with relevant technical standards.	<a href="#">Technical Standards Related to Small Water Supplies</a>		✓	✓		
<b>Asset Creation and Acquisition</b>						
Small Water Suppliers need to make sure that any assets they build are fit for purpose.	<a href="#">Project and Construction Management</a>		✓			
<b>Maintenance Delivery</b>						
Small Water Suppliers need to be able to safely maintain the different types of equipment used in the delivery of both treatment and distribution aspects of the supply.	<a href="#">Drinking Water Hygiene Requirements</a>			✓		
	<a href="#">Maintenance and Repairs of Water Supply Equipment</a>		✓	✓		
	<a href="#">Calibration</a>			✓		
	<a href="#">Inventory Management</a>		✓	✓		
	<b>Asset Operations and Optimisation</b>					
Small Water Suppliers monitor, operate, control and optimise water treatment and distribution assets in a manner that ensures they meet their objectives, within appropriate design, maintenance and operational parameters.  The competences required by any Small Water Supplier will be dependent on the technologies used within each supply.	<a href="#">Source Water Abstraction</a>			✓		
	<a href="#">Operate Pre-Treatment Processes</a>			✓		
	<a href="#">Operate Filtration Processes</a>			✓		
	<a href="#">Operate a UV Disinfection Process</a>			✓		
	<a href="#">Operate a Chlorination Disinfection Process</a>			✓		
	<a href="#">Operate Aesthetic Treatment Processes</a>			✓		
	<a href="#">Operate Water Storage Assets</a>			✓		
	<a href="#">Operate Pumping Systems</a>			✓		
	<a href="#">Operate the Distribution System</a>			✓		
	<a href="#">Backflow Prevention</a>			✓		
	<a href="#">Operate Emergency Power System</a>			✓		
<b>Shutdown &amp; Outage Management</b>						
Small Water Suppliers need to be able to manage shutdowns and the restarting processes. These can occur in planned, or unplanned, and emergency situations.	<a href="#">Shutdown and Outage Management</a>		✓	✓		
<b>Fault &amp; Incident Response</b>						
Small water suppliers need to respond to failures and incidents in a systematic manner.	<a href="#">Protecting water from contamination</a>		✓	✓		
	<a href="#">Incident and Emergency Response Plan</a>		✓	✓		
<b>Data and Information Management</b>						
Small Water Suppliers need to keep records about their supply and this data to help with decision making and to provide information to the regulator.	<a href="#">Data and Records</a>	✓	✓	✓		
	<b>Risk Assessment and Management</b>					
Small Water Suppliers need to recognise, and be able to respond to, risks to the delivery of safe drinking water.	<a href="#">Water Safety Plans</a>	✓	✓	✓		
	<a href="#">Source Water Risk Management</a>	✓	✓			
	<a href="#">Health and Safety</a>	✓	✓	✓		
	<a href="#">Hazardous Substances Management</a>	✓	✓	✓		
	<a href="#">Auditing</a>	✓	✓	✓		
	<b>Asset Performance and Health Monitoring</b>					
Small Water Suppliers need to monitor the performance of their supply systems, review the results and problems they identify.	<a href="#">Monitoring and Testing</a>	✓	✓	✓		
	<a href="#">How to take a Sample</a>			✓		
	<a href="#">Resource Consent Compliance Monitoring and Reporting</a>	✓	✓	✓		
<b>Stakeholder Engagement</b>						
Small Water Suppliers need to be able to communicate with the community and other stakeholders like Taumata Arowai.	<a href="#">Communicating about the Water Supply</a>	✓	✓	✓		




<b>Element of Competence</b>	<b>Governance, Legislation and Regulatory Frameworks</b>	
<b>Context</b>	<p>Key legislation that Small Water Suppliers need to be aware of includes:</p> <ul style="list-style-type: none"> <li>▪ The <a href="#">Water Services Act 2021 (1)</a> – which covers the regulation of water services.</li> <li>▪ The <a href="#">Resource Management Act (2)</a> (RMA) which covers taking water and discharging wastes to the environment.</li> <li>▪ The <a href="#">Building Act (3)</a>, under which the <a href="#">building code compliance for water supplies</a> includes backflow requirements for water connections.</li> <li>▪ The <a href="#">Health and Safety at Work Act (4)</a> (HSWA) which covers health and safety requirements, along with the <a href="#">Health and Safety at Work (Hazardous Substances) Regulations (5)</a>.</li> <li>▪ The <a href="#">Construction Contracts Act (CCA) (6)</a> covers the contractual relationships you have when building new water infrastructure.</li> </ul>	
<b>Outcome</b>	The work undertaken by Small Water Suppliers meets all legal and regulatory requirements.	
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>
<b>What you need to do:</b>		<b>What you need to know:</b>
<ul style="list-style-type: none"> <li>▪ Govern and manage the Small Drinking Water Supply in a manner that ensures compliance with the: <ul style="list-style-type: none"> <li>- <a href="#">Water Services Act 2021</a></li> <li>- <a href="#">Resource Management Act</a></li> <li>- <a href="#">Building Act</a></li> <li>- <a href="#">Health and Safety at Work Act (HSWA)</a></li> <li>- <a href="#">Health and Safety at Work (Hazardous Substances) Regulations</a>.</li> <li>- <a href="#">Construction Contracts Act (CCA)</a></li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ The responsibilities of what Small Water Suppliers to meet legislative and regulatory requirements have been mapped in Table 1, with links to each element of the competency framework that go into more detail about what Small Water Suppliers need to know.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Those involved in the Governance of the Small Water Supply need to: <ul style="list-style-type: none"> <li>- Be clear about the purpose of any decisions they make.</li> <li>- Set a culture of drinking water safety.</li> <li>- Hold people to account for the work they need to do to delivery safe drinking water.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ The importance of holding management to account and how oversight and monitoring of management is a core function of the effective governance of a Small Water Supply.</li> </ul>

**Where to find more information:**

- 
- [Taumata Arowai](#) can provide more information on meeting your responsibilities under the [Water Services Act 2021](#).
  - Contact your Regional Council for more information about obtaining, and complying with, Resource Consents.
  - [Worksafe](#) can provide more information on health and safety or hazardous substances responsibilities
  - Contact your local Council for more information on meetings any responsibilities you have under the Building Act.
  - [MBIE](#) can provide more information on your responsibilities under the Construction Contracts Act if you need to build new water infrastructure.
-

Table 1: Legislation and regulatory requirements mapped to the Competency Framework

Legislation	Regulatory Requirement	What it is	What you need to do	What you need to know	Competency Framework Link
<b>Water Services Act</b>	Supply Registration	Legislative requirement to register supply with Taumata Arowai.	Register your water supply with Taumata Arowai.	Registration needs to be renewed every 12 months.	<a href="#">Communicating about the Water Supply</a>
	New Zealand Drinking Water Standards	Sets the maximum limit of substances that can be present in drinking water.	Make sure the results of your water testing meet the MAVs in the standards.	If your water doesn't meet the standards, you must take <b>immediate action</b> .	<a href="#">Drinking Water Standards, Acceptable Solutions and Drinking Water Quality Assurance Rules.</a>
	Drinking Water Aesthetic Values	Sets acceptable ranges for determinants that effect the smell or taste of water.	Compare the results of your water testing to the aesthetic values in the standards, Make sure your water is palatable to your consumers.	If you follow an "Acceptable Solution" then you will be deemed to comply.	
	Water Safety Plan	A risk-based assessment and plan that aims to ensure a safe supply of drinking-water.	Document how you take a multi-barrier approach to drinking water safety and implement this approach with your supply.	If you follow an "Acceptable Solution" then you do <b>not</b> need a Water Safety Plan.	<a href="#">Water Safety Plans</a>
	Source Water Risk Management Plan	A risk-based assessment and plan documenting how you address risks to your source water; this forms a part of your water safety plan.	Prepare and implement a Source Water Risk Management Plan as part of your water safety plan, that addresses risks to your source water.	The hazards and risks that might affect your drinking water source and how these are to be managed.	<a href="#">Source Water Risk Management</a>
	Drinking Water Quality Assurance Rules	Rules are set by Taumata Arowai that Suppliers need to demonstrate compliance with.	Monitor your supply for the parameters set out for your supply type and report your compliance to Taumata Arowai.	If you follow an "Acceptable Solution" then you do <b>not</b> need to do anything additional to show that your supply meets the Quality Assurance Rules.	<a href="#">Drinking Water Standards, Acceptable Solutions and Drinking Water Quality Assurance Rules.</a>
	Acceptable Solutions	For specific supply types, Small Water Supplies can choose to adopt an Acceptable Solution. This provides an approved method of achieving compliance with the Act, the Standards and Rules prepared by Taumata Arowai.	You must demonstrate that all the requirements set out in the acceptable solution for your particular type of supply have been met.	Adopting an Acceptable Solution is a way of ensuring that your water supply meets the requirements of the <a href="#">Water Services Act 2021</a> . Not all supply types have acceptable solutions.	
	Backflow Prevention	Reticulation networks must be protected from the risk of backflow.	Backflow protection must be installed and maintained wherever there is a risk to your reticulation network from backflow.	Backflow occurs when the downstream water pressure becomes greater than the reticulation pressure.	<a href="#">Backflow Prevention</a>
Water Quantity	Legislative requirement to ensure that the people connected to your supply have enough water.	You must provide a sufficient quantity of drinking water and respond appropriately when the supply is at imminent risk of running out of water.	How much water your supply is capable of delivering and the future demand for water.	<a href="#">Water Demand</a>	
<b>Building Act</b>	<a href="#">Building Code Acceptable Solutions and Verification Methods: G12 Water Supplies</a>	Any connection made to the water network need to ensure that water drawn from the water mains cannot backflow back into the network, risking contamination.	You can obtain information from your Building Consent Authority (e.g., Council) about what backflow prevention measures have been installed within any building connected to your supply.	The <a href="#">Building Code</a> requires backflow prevention at points of connection to the drinking water supply.	<a href="#">Backflow Prevention</a>
<b>Resource Management Act</b>	<a href="#">Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 (7)</a>	A resource consent is needed to take water from the environment for a drinking water supply. You need to comply with any consent conditions along with the measurement and reporting of water takes regulations.	You need to apply to your Regional Council for a water take consent and comply with any conditions that are set within the consent.	Your resource consent sets the rules that you must follow to minimise your impact on the wider environment.	<a href="#">Resource Consent Compliance Monitoring and Reporting</a>
<b>Health and Safety at Work Act</b>	<a href="#">Health and Safety at Work Act (4)</a>	Small Water Suppliers must ensure the health and safety of: - your workers - any other workers you influence or direct - any visitors to the site.	Within your Standard Operating Procedures, you need to: - Identify any health and safety hazards and risks related to the supply and equipment. - Tell workers what to do to manage those hazards and risks.	What activities and hazards you need to address from a health and safety perspectives and what needs to happen to keep workers and visitors safe.	<a href="#">Health and Safety</a>
<b>HSNO Act</b>	<a href="#">Health and Safety at Work (Hazardous Substances) Regulations 2017 (5)</a>	Sets out the rules for work-related activities involving hazardous substances. Hazardous substances used in water treatment processes have specific handling and storage requirements.	Within your Standard Operating Procedures, you need to ensure hazardous substances, such as chlorine, are handled and stored appropriately.	What hazards substances your supply uses and what you need to do make sure they are handled and stored safely. <a href="#">HSNO codes of practice</a> (HSNOCOP) provide useful guidance.	<a href="#">Hazardous Substances Management</a>
<b>Construction Contracts Act</b>	<a href="#">Construction Contracts Act (CCA) (6)</a>	Protects retention money held, ensures payments are balanced and provides a mechanism for disputes to be resolved.	Hold any retention money in trust. Pay your suppliers on time. Raise disputes in a timely manner.	There is a set process for responding to construction payment claims and there are also consequences under the Act of you do not pay the claimed amount on time.	<a href="#">Project and Construction Management</a>

Element of Competence	<b>Drinking Water Standards, Acceptable Solutions and Drinking Water Quality Assurance Rules.</b>		
<p><b>Context</b></p>	<p>All Water Supplies, regardless of their size, need to meet the New Zealand Drinking Water Standards and take all practicable steps to comply with <a href="#">Aesthetic Values</a>.</p> <p>Small Water Suppliers also need to either adopt an <a href="#">Acceptable Solution</a>, or alternatively have both a Water Safety Plan and comply with the Drinking Water Quality Assurance Rules. <a href="#">Acceptable Solutions</a> are a practical and cost-effective way for Small Water Suppliers for drinking water suppliers to meet their compliance obligations under the Water Services Act. However, they only apply to particular supply types and situations.</p> <div data-bbox="335 582 1372 1489"> <pre> graph TD     1[1 Register the supply with Taumata Arowai] --&gt; 2[2 Supply water that meets the Drinking Water Standards for New Zealand.]     2 --&gt; 3[3 Take all reasonably practical steps to comply with Aesthetic Values.]     3 -- OR --&gt; 4a[4 Comply with an Acceptable Solution.]     3 -- OR --&gt; 4b[4 Implement a Water Safety Plan.]     4b --&gt; 5[5 Make sure the supply complies with the Drinking Water Quality Assurance Rules.]                     </pre> </div>		
<p><b>Outcome</b></p>	<p>By supplying sufficient water that meets the drinking water standards, and following either an <a href="#">Acceptable Solution</a>, or by having a <a href="#">Water Safety Plan</a> and meeting the <a href="#">Drinking Water Quality Assurance Rules</a>, Small Water Suppliers can feel confident that the drinking water they supply will be safe to drink.</p>		
<p><b>Relevant Roles</b></p>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>
<p><b>What you need to do:</b></p>		<p><b>What you need to know:</b></p>	
<ul style="list-style-type: none"> <li>All Small Water Suppliers need to make sure that the water supply has been designed, and is operated, in a way that makes sure that the</li> </ul>		<ul style="list-style-type: none"> <li>The Drinking-water Standards apply to all supplies, regardless of the nature of the source water in use, and number of people served by the</li> </ul>	

Drinking Water Standards are met and the water is safe to drink.

supply. All consumers on a supply should receive water that meets these standards; and the standards must be met at all points within a distribution system. In particular the standards:

- Set the maximum acceptable values (MAVs) that define the quality specifications for all drinking water.
- Require suppliers to ensure that they take all reasonably practicable steps to ensure that they provide their consumers with aesthetically acceptable water, that is how the water tastes, it's odour, appearance or feel.

- 
- Take all practical steps to ensure that the water they supply is considered aesthetically acceptable to the majority of their consumers as outlined in the aesthetic values published by Taumata Arowai.
- 
- Depending on the supply type, Small Water Suppliers may be able to adopt an [Acceptable Solution](#) to show compliance with the [Water Services Act 2021](#) and the [Drinking Water Quality Assurance Rules](#).
  - Drinking water needs to taste and smell acceptable to the community. Taumata Arowai have published Drinking Water Aesthetic Values, based on World Health Organisation values, to determine aesthetically acceptability.
- 
- By complying with an [Acceptable Solution](#) Small Water Suppliers will be deemed to comply with their requirements under the [Water Services Act 2021](#).
  - If you adopt an [Acceptable Solution](#) you will need to:
    - Register the supply with Taumata Arowai
    - Meet supply design, configuration and installation requirements
    - Have an Operations and Maintenance Manual, Standard Operating Procedures and Maintenance, Inspection and Calibration schedules
    - Monitor and test your supply
    - Have trained staff
    - Audit your system to check that it complies with the [Acceptable Solution](#).
- 
- Where Small Water Suppliers do not adopt an [Acceptable Solution](#), in order to meet the requirements of the [Water Services Act 2021](#) they will need to:
    - Have an effective and fully implemented Water Safety Plan.
    - Meet the [Drinking Water Quality Assurance Rules](#) set by Taumata Arowai for small water supplies.
    - Provide a sufficient quantity of drinking water, responding appropriately when the
  - The [Drinking Water Quality Assurance Rules](#) have rules that you need to demonstrate your system complies with including:
    - General (G) rules
    - Source water (S2) rules
    - Treatment systems (T2) rules, and
    - Distribution systems (T3) rules
  - Small Water Suppliers are required to report to Taumata Arowai on their compliance with the Rules.
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supply is at imminent risk of running out of water.

- Protect the supply against the risk of backflow.
- Have an Incident and Emergency Response Plan.

### Where to get more information:

- Refer to [Taumata Arowai](#) website for the latest versions of the:
    - Drinking Water Standards
    - Aesthetic Values
    - [Acceptable Solutions](#)
    - [Drinking Water Quality Assurance Rules](#)
  - The [Guidelines for Drinking-Water Quality Management in New Zealand \(8\)](#), complement the Drinking-Water Standards for New Zealand, and provides advice on how to meet the previous Drinking Water Standards. Note that at the time of writing these guidelines are still to be updated once the new Drinking Water Standards come into effect.
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<b>Element of Competence:</b>	<b>The Principles of Safe Drinking Water</b>		
<b>Context</b>	<p>There are six fundamental principles of safe drinking water in New Zealand (9) that are essential to the management of drinking water supply.</p> <p>Incorporating these principles into every aspect of drinking water supply will help make sure that your supply remains safe to drink.</p>		
<b>Outcome</b>	The vulnerability of the drinking water supply to contamination is reduced by ingraining the Principles of Drinking Water Safety into operation of the entire drinking water supply.		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>
<b>What you need to do:</b>	<b>What you need to know:</b>		




- Embrace a high standard of care in the work you undertake. Vigilance, diligence and competence are minimum requirements.
- Understand, manage and address risks to source water.
- Understand how the treatment processes provide multiple barriers to contamination and the importance of maintaining these barriers against failure.
- Monitor treatment processes for any changes and respond accordingly.
- Maintain a personal sense of responsibility and dedication to providing consumers with safe drinking-water.
- Understand the risks to the water supply, how these risks are managed, and the control measures that are used to ensure that management is occurring properly. This includes the requirement for operators to monitoring the performance of each barrier.



- The six fundamental principles of drinking water safety:
- Principle 1  
**A high standard of care must be embraced.**
  - Principle 2  
**Protection of source water is of paramount importance.**
  - Principle 3  
**Maintain multiple barriers against contamination.**
  - Principle 4  
**Change precedes contamination.**
  - Principle 5  
**Suppliers must own the safety of drinking-water.**
  - Principle 6  
**Apply a preventive risk management approach.**

### Where to find more information:

- Refer to Part 2, Paragraph 26, of the report published by the [Government Inquiry into the Havelock North Water Contamination Event](#) (10) for more information on these principles and the background on why they were developed.





<b>Element of Competence:</b>	<b>Te Mana o te Wai</b>		
<b>Context</b>	<p>Protecting freshwater protects the health and wellbeing of the community and wider environment. Founded in mātauranga Māori, Te Mana o Te Wai is a concept that encompasses this fundamental importance of water.</p> <p>Te Mana o te Wai is upheld by acknowledging the mana and mauri (lifeforce) of water. Under the <a href="#">Water Services Act 2021 (1)</a> all people involved in the water industry have a collective responsibility to give effect to Te Mana o te Wai; we need to make sure that water sources are not degraded and instead are enhanced and healthy.</p>		
<b>Outcome</b>	<p>Protecting Te Mana o te Wai provides for the mauri of the water. This includes providing for:</p> <ul style="list-style-type: none"> <li>▪ Te hauora o te taiao (health of the environment),</li> <li>▪ Te hauora o te wai (health of the waterbody) and,</li> <li>▪ Te hauora o te tangata (the health of the people).</li> </ul>		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ <b>Te Hauora o te Taiao:</b> Small Water Suppliers need to protect the health of the environment. You need to make sure that you hold any required resource consents and adhere to the conditions of those consents.</li> </ul>		<ul style="list-style-type: none"> <li>▪ The conditions of resource consents related to the operation of the Water Supply, will include requirements to protect the environment.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ <b>Te Hauora o te Wai:</b> Small Water Suppliers need to protect the health of the waterbody by ensuring the conditions of the resource consent to take water from the source are adhered to.</li> </ul>		<ul style="list-style-type: none"> <li>▪ This also aligns with the <a href="#">Principle of Safe Drinking Water</a> that identifies that protecting the water source is of paramount importance.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ <b>Te Hauora o te Tangata:</b> Small Water Suppliers need to protect the health of people by operating the Water Supply so that it meets: <ul style="list-style-type: none"> <li>- the Drinking Water Standards,</li> <li>- either the <a href="#">Acceptable Solution</a> or the <a href="#">Drinking Water Quality Assurance Rules</a> and reflects the Water Safety Plan for the supply, where this applies.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ Small Water Suppliers have a responsibility to protect the health of the people they supply.</li> </ul>	
<b>Where to get more information:</b>			
<ul style="list-style-type: none"> <li>▪ The meaning of Te Mana o te Wai is set out in the <a href="#">National Policy Statement for Freshwater Management (11)</a> (Freshwater NPS) which recognises Te Mana o te Wai as an integral part of freshwater management.</li> </ul>			

<b>Element of Competence:</b>	<b>Water Demand</b>		
<b>Context</b>	<p>The demand for water varies throughout the day and from season to season. In summer, water demand will usually increase at the same time as the capacity of your source water decreases.</p> <p>The most effective way to deal with variation in demand is to store treated water to provide for a buffer between the treatment plant and supply.</p>		
<b>Outcome</b>	<p>Small Water Suppliers manage water demand to ensure that sufficient water will be available for the community's needs. You understand what the current and future demand for water from your supply is likely to be and can continue to supply enough water to your community.</p> <p>Where consumption threatens to exceed supply, you need to put in place water conservation measures.</p>		
<b>Relevant Roles</b>	 Governance	 Management	
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Measure water usage. You need to be able to work out how much water you are currently supplying to your community, bearing in mind that water demand changes through the day and from season to season.</li> </ul>		<ul style="list-style-type: none"> <li>▪ The <a href="#">Water Services Act 2021</a> requires you to ensure that there is a sufficient quantity of drinking water to support the ordinary needs of consumers, with clear obligations to act where supply is interrupted or restricted for any reason.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Forecast how much water you expect your water supply will need in the future. If your forecast shows that your supply will soon need more water than it is capable of supplying, you will need to address this.</li> </ul>		<ul style="list-style-type: none"> <li>▪ How much water your supply is capable of supplying, and when this amount might be exceeded. This is particularly important if you might need to put in place water conservation measures, or if more people want to join the water supply.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Determine how efficient your water supply is. Your supply can lose water either from leakage or unauthorised use. It can help to benchmark your usage data against other supplies to help assess how efficient your supply is.</li> </ul>		<ul style="list-style-type: none"> <li>▪ How much water you supply to their community and the impact of peak day and diurnal water consumption patterns.</li> <li>▪ How to find and fix leaks.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Adopt water conservation measures such as:               <ul style="list-style-type: none"> <li>- Finding and fixing leaks in the distribution network</li> <li>- Fixing storage tank leaks and malfunctioning float valves.</li> <li>- Restricting water use for non-essential uses in times of high demand.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ When to instigate water restrictions, including any requirements within your water take resource consent.</li> <li>▪ How water pressure impacts on consumption and leakage.</li> </ul>	

- Actively manage pressure within the distribution network.

### Where to get more information:

- The document [Sustainable Management of Small Drinking Water Supplies \(12\)](#), published by the Ministry of Health covers demand management. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.
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<b>Element of Competence:</b>	<b>Asset Management Planning</b>	
<b>Context</b>	<p>Assets are any piece of equipment or infrastructure used to deliver the water supply system, such as the pipes or pumps.</p> <p>Asset management relates to the maintenance, repair and replacement of all of the parts of these assets (components) that make up the water supply system. If you fail to replace assets as they wear out the performance of the water supply is put at risk, threatening the public's health.</p>	
<b>Outcome</b>	<p>Small Water Suppliers need know what assets make up your water supply and understand how long parts are expected to last. Maintaining them and planning for their replacement, or upgrades, maintain, will help to ensure that the supply can continue to supply safe drinking water.</p>	
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>
<b>What you need to do:</b>	<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Keep an inventory of all of your assets, recording crucial information that will help you manage them. Ideally you need to record:                             <ul style="list-style-type: none"> <li>- An asset description (make, model, size, design capacity) of each asset</li> <li>- The condition of each asset</li> <li>- The age / year constructed of each asset.</li> <li>- How long each asset, or a component of an asset, is expected to last.</li> <li>- Its approximate replacement cost</li> <li>- Any information that helps with re-ordering parts, such as the suppliers' contact details.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ The factors that will affect the cost to run the water supply, including what is required to operate, maintain and replace assets.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Identify and locate all of your water supplies assets. You will need to make sure that as-built records are kept of all assets that are installed within your supply.</li> </ul>	<ul style="list-style-type: none"> <li>▪ This is particularly important for any assets that are hard to locate once they are installed, such as any pipes.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Repair equipment as it gets worn, and replace it, before it fails, or before it starts costing more money to maintain than it costs to replace.</li> <li>▪ You will need to calculate your expected operating and maintenance costs and monitor actual costs as they occur.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Who makes the decisions about when money is to be spent.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Plan for the eventual replacement of your assets and any parts of these assets</li> </ul>	<ul style="list-style-type: none"> <li>▪ How to assess the "whole of life" costs when making spending decisions. Sometimes</li> </ul>	

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(components) which might require more regular replacement. Your planning needs to include what the expected replacement costs might be.

equipment that is cheap to buy may work out to be more expensive in the long run because it needs to be replaced more frequently, or because it uses more electricity meaning it is more expensive to operate.

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- Determine what strategy to use for funding these future costs and ensure that you collect sufficient income to cover the cost of running the supply.
  - How the water supply is funded. Typically, this can be done in a number of ways, including:
    - User pays based on actual water use from water meter readings.
    - Flat fee for each individual connection.
    - A mix of a flat fee and a usage charge.



### Where to get more information:

- The document [Sustainable Management of Small Drinking Water Supplies](#), (12) published by the Ministry of Health covers asset management. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.

<b>Element of Competence:</b>	<b>Financial Management</b>		
<b>Context</b>	Small water suppliers need earn enough money to allow them to continuously provide safe drinking water. This means that you need to know the amount of money required to operate, maintain and renew your assets, and make sure that the supply earns enough money to cover its costs. Insufficient money spent on operations can lead to problems such as failing provide safe water.		
<b>Outcome</b>	Small water suppliers need to have sufficient funds to continue to operate and safely supply drinking water now and into the future. Your supply needs to have sufficient income to cover all of the expected costs.  For most small water supplies this will involve charging your customers either a fixed amount, or a variable charge dependent on their water use.		
<b>Relevant Roles</b>	 Governance	 Management	
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>Estimate your operating expenses for the upcoming year.</li> </ul>		<ul style="list-style-type: none"> <li>To estimate the supplies' operating costs, you need to know:                             <ul style="list-style-type: none"> <li>How much it will cost to install infrastructure.</li> <li>The materials and supplies are needed to keep the system operating.</li> <li>What the regular maintenance and repair costs are.</li> <li>How much you will need to spend on getting water tested.</li> <li>What you will likely need to spend on staff/operator training.</li> <li>Your insurance costs; and</li> <li>debt servicing costs</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>Estimate your revenue for the coming year.</li> </ul>		<ul style="list-style-type: none"> <li>What funding your supply is likely to receive, typically this will come from the people you supply your water to, either a flat fee per connection, or a consumption charge based on water usage.</li> </ul>	
<ul style="list-style-type: none"> <li>Work out how much you need to set aside to cover the replacement of assets when they reach the end of their life.</li> </ul>		<ul style="list-style-type: none"> <li>The expected service life of your assets and when they will likely need to be replaced. Because assets like pumps and pipes last a long time, you need to make sure that you will have enough money available to replace these items when they reach the end of their service life.</li> </ul>	

### Where to get more information:

- The document [Sustainable Management of Small Drinking Water Supplies \(12\)](#), published by the Ministry of Health covers financial management. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.
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<b>Element of Competence:</b>	<b>Operation and Maintenance Procedures and Manuals</b>		
<b>Context</b>	<p>You need to document the maintenance and operational procedures that your supply requires in a manual so everybody involved in operating and maintaining your water supply can understand:</p> <ul style="list-style-type: none"> <li>▪ how the small water supply system was designed to be run</li> <li>▪ what is required to maintain and operate the supply.</li> <li>▪ how to troubleshoot possible problems</li> </ul>	<p><b>Note:</b></p> <p>If you have adopted an <b>Acceptable Solution</b> that solution will dictate what Standard Operating Procedures (SOPs) you need along with required maintenance, inspection and calibration schedules and frequencies.</p>	
<b>Outcome</b>	The small water supply has a documented, and up-to-date, Operations and Maintenance Manual.		
<b>Relevant Roles</b>		 Management	 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Make sure that your water supply has an Operations and Maintenance Manual that has all of the information that anybody involved in the operation or maintenance of the supply would need to know. The manual should include: <ul style="list-style-type: none"> <li>- A description of the supply and the key processes used to treat the water.</li> <li>- Process and Instrumentation diagrams. These need to cover all of the treatment processes and any inter-pipework and valves used to isolate plant.</li> <li>- Standard Operating Procedures that cover: <ul style="list-style-type: none"> <li>○ how to operate each key component</li> <li>○ critical control points</li> <li>○ required regular maintenance tasks,</li> <li>○ inspection expectations,</li> <li>○ calibration requirements for sensors and analysers,</li> <li>○ hazard identification and health and safety requirements</li> </ul> </li> <li>- Schedules of tasks, inspections and calibrations</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ How the individual assets and treatment processes have been designed to work. The engineer who designed your treatment system should be able to help you document this and supply you with the required P&amp;ID's.</li> <li>▪ The replacement schedules for key equipment.</li> <li>▪ What Standard Operating Procedures are needed to keep each process operating safely.</li> <li>▪ What critical control points exist for the water supply, and what needs to happen when a control point action points are reached. Refer to the <a href="#">Critical Control Points</a> element of competence for more information.</li> <li>▪ What the maintenance requirement and expected frequencies are for key equipment.</li> <li>▪ What might go wrong when operating or maintaining your small water supply and what to do to fix it.</li> <li>▪ What health and safety hazards workers involved in the operations and maintenance of the small water supply might face and what needs to happen to keep them safe.</li> </ul>	



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- A troubleshooting section that covers possible problems and issues that operators might face in the future and how these can be resolved.
  - Key contacts, including how equipment suppliers, key contractors and operations and maintenance workers.
    - o A map of the water supply system, showing the location and extent of the reticulation network.
  - What instruments need to be calibrated and how to go about this.

### Where to get more information:

- The [Handbook for Preparing a Water Safety Plan \(13\)](#), published by the Ministry of Health, includes more information about Operational procedures documentation.
  - The [Operation and Maintenance of a Small Water Supply \(14\)](#), published by the Ministry of Health, includes more information about Operational procedures documentation. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.
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Element of Competence:	Critical Control Points		
<p><b>Context</b></p>	<p>A Critical Control Point (CCP) is a measure that can be operated as a process control for a water quality hazard. They are particularly important for managing microbiological hazards and being able to supply a sufficient quantity of water. CCPs help to ensure the safety of drinking water from the source to the tap.</p> <p>A few of the parameters monitored by Small Water Suppliers will have been identified as CCPs within the Water Safety Plan.</p>	<p><b>Note:</b></p> <p>If you have adopted an <b>Acceptable Solution</b> this element of competence is <b>not</b> required. The design, monitoring and emergency management of your supply already incorporates the philosophy of Critical Control Points.</p>	
<p><b>Outcome</b></p>	<p>CCPs are monitored regularly (ideally continuously) to ensure that barriers are effective. Appropriate actions to optimise the system, or to bring the system back into control, are undertaken when action limits are reached.</p> <p>Incident and emergency plans are activated when critical limits for individual parameters are reached.</p>		
<p><b>Relevant Roles</b></p>		 <p>Management</p>	 <p>Operations</p>
<p><b>What you need to do:</b></p>		<p><b>What you need to know:</b></p>	
<ul style="list-style-type: none"> <li>▪ Undertake operational monitoring and inspections of the Critical Control Points.</li> </ul>		<ul style="list-style-type: none"> <li>▪ What the Critical Control Points (CCPs) for the water supply are. CCPs are documented within the Water Safety Plan for each drinking water supply. For each of the Critical Control Points this will include:                             <ul style="list-style-type: none"> <li>- Process control summary.</li> <li>- A monitoring procedure for each control point.</li> <li>- Defined target, action and critical limits.</li> <li>- Predefined corrective actions.</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>▪ Undertake corrective actions when routine monitoring, and inspections indicate that a CCP is deviating from its expected performance and is reaching its action limit. This may include:                             <ul style="list-style-type: none"> <li>- adjustments or process control changes,</li> <li>- communicating and notifying others of the issue,</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ The defined values documented in the CCP for target, action and critical limits.</li> <li>▪ The corrective actions listed in the Operations and Maintenance Manual which are considered to be necessary when the control limit is reached.</li> </ul>	

- additional monitoring and inspection to confirm that the corrective action has been effective.

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|--|---|
| <ul style="list-style-type: none"> <li>▪ Activate incident and emergency response procedures when critical limits for a CCP is reached or because the corrective action at the trigger level has not improved the performance of the CCP.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Incident and Emergency response procedures.</li> <li>▪ The health-based targets, or maximum acceptable values (MAV) in the Drinking Water Standards, for any parameter being monitored. The CCP trigger and critical limits should always ensure that alarms and corrective actions are undertaken before MAVs are reached to ensure that the supply of non-compliant water is prevented.</li> </ul> |
| <ul style="list-style-type: none"> <li>▪ Review into the underlying cause of why the corrective action, or incident and emergency response procedures, were needed.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Reviews should include:           <ul style="list-style-type: none"> <li>- The effectiveness of the monitoring and inspection plan,</li> <li>- The effectiveness of the corrective action was,</li> <li>- identifying whether the Operations and Maintenance Manual or the Water Safety Plan needs to be updated as a result.</li> </ul> </li> </ul>   |

### Where to get more information:

- The [Handbook for Preparing a Water Safety Plan \(13\)](#), published by the Ministry of Health, includes more information about Critical Control Points.
- The [Optimisation of Small Water Supplies document](#) (15), published by the Ministry of Health, includes more information about using Critical Control Points. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.

<b>Element of Competence:</b>	<b>Apply a knowledge of Science to Water Supplies</b>		
<b>Context</b>	The science that underpins the water supply must be understood by those responsible for operating them.		
<b>Outcome</b>	Decisions made in the day-to-day operations and maintenance of the Water Supply are made through an understanding of the scientific principles on which the treatment process is based		
<b>Relevant Roles</b>			 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>Perform mathematical calculations used in the water industry, for example to calculate:                             <ul style="list-style-type: none"> <li>- volumes,</li> <li>- levels,</li> <li>- pressures,</li> <li>- flow rates; and</li> <li>- chemical concentrations</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>How to select and use appropriate equipment to measure performance of different parameters.</li> </ul>	
<ul style="list-style-type: none"> <li>Use your understanding of chemistry to operate and control chemical methods of water treatment.</li> </ul>		<ul style="list-style-type: none"> <li>The chemistry of drinking water supplies and chemicals of public health significance that may be found in drinking water supplies. Small Water Suppliers may also need to know about pH and its adjustment, along with plumbosolvency.</li> <li>The basic principles of how chlorination works including, chlorine demand, free available chlorine and disinfection by-products.</li> <li>The risks involved with chlorination including what will happen if it is mixed inappropriately, and the impact of decomposition related to the storage of chlorine.</li> </ul>	
<ul style="list-style-type: none"> <li>Use your understanding of physics to operate and control the hydraulics at the Water Treatment Plant and any physical methods of treatment.</li> </ul>		<ul style="list-style-type: none"> <li>The basic principles of physics which impact on water treatment including understanding hydraulics, pressure and head, water hammer, surges and head loss.</li> <li>The basic principles of how filtration of water works.</li> </ul>	
<ul style="list-style-type: none"> <li>Use your understanding of microbiology to reduce the risk of contamination</li> </ul>		<ul style="list-style-type: none"> <li>The microbiology of drinking water and the relationship between drinking water and public health. Small Water Suppliers need to</li> </ul>	

- Take water samples to monitor for the presence of indicator micro-organisms.

understand the characteristics of microbiological risks such as bacteria, viruses, protozoa, cyanobacteria and cyanotoxins, how these microbiological risks are detected and what treatment processes are used to reduce microbiological risks to the drinking water supply.

### Where to find more information:


- The [Optimisation of Small Water Supplies document](#) (15), published by the Ministry of Health, includes more information about the different parameters you need to know about when operating a Small Water Supply. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.

<b>Element of Competence:</b>	<b>Technical Standards Related to Small Water Supplies</b>		
<b>Context</b>	There is a wide range of technical standards available that can be used to help operate and maintain a Water Treatment Plant.		
<b>Outcome</b>	Water Treatment Plants are operated and maintained following best practice that has been documented within Technical Standards and Guidelines.		
<b>Relevant Roles</b>		 Management	 Operations
<b>What you need to do:</b>	<b>What you need to know:</b>		

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| <ul style="list-style-type: none"> <li>Follow the appropriate technical standards that relate to the design, installation, configuration, operation and maintenance of the Water Treatment Plant.</li> </ul> | <ul style="list-style-type: none"> <li><a href="#">Acceptable Solutions</a> and Drinking Water Quality Compliance Rules include treatment standards that your supply will need to verify that it meets.</li> <li>Which of the technical standards are relevant to your supply. Operations and maintenance standards will be identified in the Operations and Maintenance manuals.</li> <li>Where to find the technical standards, e.g., through a subscription to NZ Standards.</li> </ul> |
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**Where to get more information:**

- The [Drinking Water standards, guidelines, rules](#), [Acceptable Solutions](#) and publications produced by Taumata Arowai.
- Technical documents, guidelines and publications developed by industry groups like [Water New Zealand](#).
- New Zealand Standards and Guidelines published by [NZ Standards](#), or by government organisations like [Worksafe](#).
- International standards and guidelines e.g., those published by [International Organisation for Standardization \(ISO\)](#) or the [American Water Works Association \(AWWA\)](#)


<b>Element of Competence:</b>	<b>Project and Construction Management</b>		
<b>Context</b>	When developing new water supplies, or installing new assets within an existing water supply, Small Water Suppliers will need to plan and manage the design and construction of the project to make sure that the completed project meets your requirements.		
<b>Outcome</b>	<p>Projects, and contracts, to build a new water supply, or to upgrade aspects of an existing supply, result in a system that:</p> <ul style="list-style-type: none"> <li>▪ Performs in the way that was intended, meeting all the appropriate standards</li> <li>▪ Is finished within time.</li> <li>▪ Is built within budget.</li> </ul>		
<b>Relevant Roles</b>		 Management	
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Before a new water supply can be designed you will likely need a new, or updated, resource consent.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Resource Consent is required from the regional council to allow you to abstract water. A planner can help you obtain this consent.</li> <li>▪ The resource consent will have limits on the water take that the designer will need to account for in their design.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Depending on who owns the land where your assets need to be located you may need to arrange for easements, or purchase land for your project.</li> </ul>		<ul style="list-style-type: none"> <li>▪ A lawyer can help you to obtain easements over other peoples' land.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Engage and co-ordinate design consultants for multidisciplinary activities to ensure that all parts of the project will meet your requirements.</li> </ul> <p>Make sure that the people you use to design and construct your new supply have the appropriate qualifications and experience.</p>		<ul style="list-style-type: none"> <li>▪ Depending on your project requirements you may need to engage the following multidisciplinary consultants to design a new supply:               <ul style="list-style-type: none"> <li>- A project manager</li> <li>- A process engineer</li> <li>- A civil engineer</li> <li>- A structural engineer</li> <li>- A geotechnical engineer</li> <li>- An electrical engineer</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>▪ Obtain a building consent, if and where this is required.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Not all work requires a building consent. Early discussions with your Building Consent Authority (Council) will help you determine what, if any, consents are required.</li> </ul>	



- 
- Engage contractor(s) and suppliers to deliver the different elements of the project, and make sure the contractual obligations of the various parties are being upheld.
  - NZS3910:2013 Conditions of contract for building and civil engineering construction provides standardised contract conditions.
  - To be sure that you are getting a competitive price for your project you should ask for tenders from experienced providers.
- 
- Before construction starts you will need to make sure that any existing services are located.
  - Services such as before you dig, can be used to locate other services.
  - If your work involves installing assets in the road reserve, then you will need permission from the road controlling authority before you can proceed.
- 
- During construction you will need to monitor the work to:
    - confirm that what is installed matches the design and meets the required specification.
    - keep track of costs incurred so you know whether you are within your budget.
    - Make sure that work is carried out safely
  - Payments to contractors will need to meet the requirements of the Construction Contracts Act.
  - Small Water Suppliers are a PCBU under the Health and Safety at Work Act.
- 
- New assets will need to be safely commissioned to confirm that they operate as they were designed to before coming into service.
  - The original design specification
  - How to disinfect new assets before bringing them into service to make sure the water supply remains uncontaminated.

### Where to get more information:

- Refer to the document [Managing Projects for Small Drinking-water Supplies \(16\)](#) published by the Ministry of Health for more information. However, it is important to note that parts of this document are out of date. In particular, readers need to be aware that it was written before the Water Services Act, the Health and Safety at Work Act, the Construction Contracts Act, and amendments to the Building Act, along with any associated regulations came into being.
  - Refer to [NZS3910:2013 Conditions of contract for building and civil engineering construction \(17\)](#), if you are using an Engineer to manage your contract.
  - Refer to [NZS3915:2005 Conditions of contract for building and civil engineering construction \(18\)](#), if no person has been appointed to act as Engineer to the contract.
  - Refer to [NZS3916:2013 Conditions of contract for building and civil engineering - Design and construct \(19\)](#), if your contractor is responsible for design as well as construction.
  - Refer to the [Construction Contracts Act \(6\)](#) for more information about how to process payment claims and your retention money responsibilities.
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<b>Element of Competence:</b>	<b>Drinking Water Hygiene Requirements</b>		
<b>Context</b>	Small Water Suppliers need to understand potential sources of contamination and the steps that they are required to take to ensure that the water supply does not become contaminated.		
<b>Outcome</b>	Contamination of the water supply is prevented by requiring hygienic work practices for workers and materials that come into contact with water.		
<b>Relevant Roles</b>			 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>Disinfect tools, equipment, fittings and materials used in maintenance with chlorine and correctly dispose of the chlorine solution.</li> </ul>		<ul style="list-style-type: none"> <li>Chlorine/disinfection procedures, both for the water itself and other hygiene purposes i.e., how chlorine is used to wash boots, clean tools and in repairs, and the correct disposal of chlorine solution.</li> <li>Sampling and audit processes for the work that they are undertaking.</li> </ul>	
<ul style="list-style-type: none"> <li>Keep Personal Protective Equipment (PPE) and boots clean.</li> </ul>		<ul style="list-style-type: none"> <li>About the potential for contamination from workers Personal Protective Equipment (PPE) and the need for clean equipment and boots.</li> </ul>	
<ul style="list-style-type: none"> <li>Keep all fittings carried in vehicles or stored at site boxed, capped or sealed with plastic wrapping. These items should not be uncovered until immediately before use.</li> </ul>		<ul style="list-style-type: none"> <li>What hygiene procedures to follow to prevent the pollution or contamination of drinking water.</li> </ul>	
<ul style="list-style-type: none"> <li>Maintain personal hygiene and have current vaccinations and pass health screening requirements for waterborne illnesses.</li> </ul>		<ul style="list-style-type: none"> <li>The importance of personal hygiene.</li> <li>The potential for, and implications of, contamination of the water supply from waterborne microorganisms.</li> </ul>	
<ul style="list-style-type: none"> <li>Follow the <a href="#">Incident and Emergency Response Plan</a> associated with the water treatment plant after any contamination incidents.</li> </ul>		<ul style="list-style-type: none"> <li>The potential for, and implications of, contamination of the water supply from items such as fuel and chemical contamination. Small Water Suppliers need to know what procedures to follow after a contamination incident.</li> </ul>	
<b>Where to get more information:</b>			
<ul style="list-style-type: none"> <li>The <a href="#">Water New Zealand Good Practice Guide – Hygiene Practices to Prevent Water Supply Contamination (18)</a> provides best practice guidance.</li> </ul>			



Element of Competence:	Maintenance and Repairs of Water Supply Equipment		
<p><b>Context</b></p>	<p>The equipment used within the water supply deteriorates with age and use. It needs to be maintained so that it continues to work efficiently and reliably. If you don't maintain, or replace, assets at the right time might result in an unexpected failure, which could mean the community is supplied with unsafe drinking water.</p> <p>Maintenance can either be planned (routine or scheduled) or unplanned (reactive).</p>	<p><b>Note:</b></p> <p>If you are following an <b>Acceptable Solution</b> you will need to follow a specific maintenance, inspection and calibration schedule at a mandated minimum frequency.</p>	
<p><b>Outcome</b></p>	<p>Maintenance of the equipment at the Water Treatment Plant is safely completed, within the timeframes that are identified in the Operations and Maintenance Manual for the work in question.</p> <p>Maintenance tasks and costs are recorded so that better decisions can be made about maintaining each item and identifying when they need to be replaced</p>		
<p><b>Relevant Roles</b></p>		 <p>Management</p>	 <p>Operations</p>
<p><b>What you need to do:</b></p>		<p><b>What you need to know:</b></p>	
<ul style="list-style-type: none"> <li>▪ Perform planned maintenance on the equipment at the Water Treatment Plant in accordance with the Standard Operating Procedures in the Operations and Maintenance Manual. This will require Small Water Suppliers to:                             <ul style="list-style-type: none"> <li>- Identify any environmental, <a href="#">safety</a> and water quality hazards and how they are to be mitigated.</li> <li>- Complete the maintenance task in question as recorded in maintenance procedures.</li> <li>- Identify any distribution network impacts on the work and inform the appropriate people e.g., if there is to be a supply interruption.</li> <li>- Ensure materials, pipes and fittings are clear of any contaminants before installing.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ How to identify any environmental, <a href="#">safety</a> and water quality hazards, and appropriate mitigation methods.</li> <li>▪ How to safely <a href="#">shut down and isolate equipment</a> before performing maintenance.</li> <li>▪ The <a href="#">hygiene requirements and procedures</a>.</li> <li>▪ The requirements for documenting the work that has been completed.</li> <li>▪ The maintenance and asset replacement strategies for the water supply assets so that people who work on the assets are aware of what should be maintained and what should be replaced.</li> <li>▪ That routine (planned) maintenance comprises the periodic inspections and tests performed on equipment at regular intervals. Included are daily, weekly, monthly, quarterly etc., inspections during which minor routine maintenance tasks are carried out, e.g., cleaning, lubrication, vibration tests, adjustments replacements and calibrations.</li> </ul>	

- 
- Sterilise fittings and repair materials.
  - Check that the completed maintenance and repairs meets the specification detailed in the maintenance procedure before returning the equipment to service.
  - Document what work has been undertaken, including identifying any costs (including time) and spare parts used.
- 
- That scheduled (planned) maintenance is also carried out on a time basis but is based on wear and the expected life cycle of the equipment's individual components. It involves the systematic and periodic removal from service of a piece of equipment for the replacement of parts, reconditioning or overhaul
- 
- Respond to reactive (unplanned) water supply maintenance / repair emergencies i.e. repairing equipment that has broken down or abandoning it and replacing it with new equipment.
  - How the equipment typically operates. You need to observe the equipment while it is in use so that you can recognize unusual sounds, vibrations or leaks that indicate that reactive maintenance is necessary.
  - That reactive (unplanned) maintenance amounts to That differentiating between planned and unplanned maintenance is important because an increasing incidence of unplanned maintenance might indicate that the assets at the treatment plant are deteriorating and becoming unreliable.

### Where to get more information:

- The [Operation and Maintenance of a small drinking water supply](#) (14) document published by the Ministry of Health provides some helpful guidance. However, note that this document was published before a number of legislative and regulatory changes impacting the water industry were made and some parts of the document are no longer up to date.

<b>Element of Competence</b>	<b>Calibration</b>		
<b>Context</b>	The instruments used to monitor processes or control equipment in water treatment processes need to be calibrated to give you confidence that the water supply is operating as it is supposed to, and that the barriers against contamination are working.		
<b>Outcome</b>	The instruments used to monitor the water treatment processes are calibrated so you can be confident that they are reading correctly and therefore, the water you supply will be safe to drink.		
<b>Relevant Roles</b>			 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Calibrate your sensors and analysers according to the manufacturers' specification, and in line with the calibration schedule in the Operations and Maintenance Manual for the supply. Typical instruments that need to be calibrated for in a Small Water Supply include:                             <ul style="list-style-type: none"> <li>- Differential pressure meters</li> <li>- Level transmitters</li> <li>- Turbidity meters</li> <li>- Dose pump controls</li> <li>- UVI / UVT meters</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ The calibration procedures will be based on the manufacturers specification and documented within the Operations and Maintenance Manual for the supply.</li> <li>▪ Calibrations should only be undertaken by people who have been trained how to calibrate each particular instrument,</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Keep records of all calibrations so that you know when a sensor was last calibrated and when it needs to be calibrated next.</li> </ul>		<ul style="list-style-type: none"> <li>▪ There are specific calibration schedule timeframes that you must adhere to. What you need to do will depend on whether you follow an <a href="#">Acceptable Solution</a> or whether you need to meet the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Monitor your key instrument checks to identify issues with their performance e.g., flat lining.</li> </ul>		<ul style="list-style-type: none"> <li>▪ What the relevant sensors and analysers are measuring and what a "normal" reading for your site should be.</li> <li>▪ You need to know what the limitations of the sensors are e.g., their accuracy and sensitivity.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Follow the Incident and Emergency Management Plan associated with the water supply for when monitoring equipment is unavailable or incorrect.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Understand what the impact on the water supply will be if these are unavailable or incorrect.</li> </ul>	
<b>Where to find more information:</b>			
<ul style="list-style-type: none"> <li>▪ Refer to the document <a href="#">Optimisation of Small Drinking Water Supplies</a> (15), published by the Ministry of Health for more information about what instruments need calibration.</li> </ul>			


Element of Competence	Inventory Management		
<b>Context</b>	<p>Water treatment systems can fail if there are no spare parts available to undertake required maintenance or to repair the equipment used in the process. Holding spare parts for items that fail frequently, or our vital to the supply, has the benefit of allowing repairs to be undertaken immediately, instead of time being spent going to the market to search for the appropriate part.</p> <p>Water Treatment plants also require sufficient levels of chemicals (consumables) to be available for treatment processes. These need to be delivered to the site at the right time, and consumed on a “first in, first out” basis.</p>		
<b>Outcome</b>	<ul style="list-style-type: none"> <li>▪ If a component of the water supply system breaks down, you can quickly access spare parts to repair it.</li> <li>▪ When consumables start to run low, more stock arrives before you run out.</li> </ul>		
<b>Relevant Roles</b>		 Management	 Operations

What you need to do:	What you need to know:
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- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Identify what spare parts are needed to maintain and repair equipment.</li> <li>▪ Monitor the level of parts held in stock.</li> <li>▪ Proactively order adequate quantities of parts and consumables from the supplier.</li> <li>▪ Use the oldest stock first, discard any expired stock.</li> <li>▪ Follow the <a href="#">Water New Zealand Good Practice guides</a> when ordering chemical supplies, paying regard to the chemical specification, quality control, and certification requirements.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Your O&amp;M Manual will indicate what spare parts you need to keep in hand.</li> <li>▪ The supplier who can supply the parts you need.</li> <li>▪ Purchase dates of spare parts, their shelf life and/or expiry date.</li> <li>▪ You must reject any chemicals supplied which do not meet the specified standard.</li> </ul> |
|--|--|






**Where to find more information:**

- The document [Supply of Chlorine for use in Drinking Water Treatment](#) (19) provides more information on accepting, and storing chlorine products for water treatment.

Element of Competence	Source Water Abstraction		
<b>Context</b>	<p>Small drinking water suppliers in New Zealand source their water from:</p> <ul style="list-style-type: none"> <li>▪ Surface water (rivers, streams, dams, springs)</li> <li>▪ Groundwater (bores)</li> <li>▪ Rooftops</li> </ul> <p>How much water you can take can be affected by the quantity and quality of the source water. Preventing hazards from entering your source water is one of the multiple barriers you need to have in place to prevent contamination of your drinking water supply.</p>		<p>Both <b>Acceptable Solutions</b> and the <b>Operational Compliance Rules</b> require small water suppliers to monitor the quality of your source water.</p>
<b>Outcome</b>	<p>Sufficient water is taken from the source to supply the community. Raw water quality is monitored, anything that risks the safety of your drinking water supply is identified and responded to.</p>		
<b>Relevant Roles</b>			 Operations

### Hazards

Your O&M manual will identify what hazards will be present when you do work on your source water abstraction. Typically to keep yourself, and the water supply, safe you will need to:

-  Wear Personal Protective Equipment (**PPE**).  
-  Follow **Hygiene procedures**.
-  If you use a pump to take water from your source, make sure that the **pump is powered off** for any maintenance (locked and tagged out) to prevent any electrical shocks.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to monitor your source water to make sure that it is still safe for your supply and that your treatment processes are capable of operating as they have been designed. Typically, you will need to monitor the following parameters related to source water:               <ul style="list-style-type: none"> <li>- Potential chemical contaminants.</li> <li>- Potential biological contaminants.</li> <li>- Potential cyanobacteria and cyanotoxins (surface water only)</li> <li>- The amount of water being taken.</li> <li>- Turbidity, pH and conductivity (ground and surface water only)</li> <li>- Potential radiological contaminants (groundwater only)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ There are specific source water quality monitoring requirements that you must adhere to. What you need to do will depend on whether you follow an <a href="#">Acceptable Solution</a> or whether you need to meet the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> <li>▪ Your Source Management Plan may require you to monitor for additional contaminants beyond what the <a href="#">Acceptable Solution</a> or <a href="#">Drinking Water Quality Assurance Rules</a> require.</li> <li>▪ Your resource consent will limit the amount of water you can take.</li> <li>▪ You need to know the alarms and the action levels where you need to respond, for each of the parameters you monitor.</li> </ul>

### Operational Inspections

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>You need to regularly visit the water source intake location to inspect the assets used to abstract the water. The types of inspections you need to undertake will depend on your type of source water. Typically, you will need to:</li> </ul>	<ul style="list-style-type: none"> <li>Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the manufacturers’ recommendation.</li> <li><a href="#">Acceptable Solutions</a> include the requirement to inspect source water assets.</li> </ul>
<b>Groundwater Sources</b>	
<ul style="list-style-type: none"> <li>Check that the fence around the bore is secure.</li> <li>Check that any openings into the bore head are sealed and watertight.</li> <li>Check that your backflow prevention device is still working.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the <a href="#">Acceptable Solution</a> for Spring and Bore Water Supplies details on fencing and bore head requirements for small water supplies.</li> <li>Refer to the Backflow Prevention element of competence for more information on backflow prevention devices.</li> </ul>
<b>Surface water sources</b>	
<ul style="list-style-type: none"> <li>Check that the intake is clean, making sure that any debris is removed, and parts are not corroding.</li> <li>Check there are no cracks in the structure and that water is not seeping or bypassing the intake structure.</li> <li>Check there is no erosion occurring beneath the structure.</li> <li>Check for algae blooms</li> </ul>	<ul style="list-style-type: none"> <li>Source water sources can be impacted by river flows or well levels at different times of year impact of upstream abstraction changes in quality and quantity due to weather and how long these changes last the type of upstream activities and why they present risks the type of geology and flow patterns of the river.</li> </ul>
<b>Rainwater sources</b>	
<ul style="list-style-type: none"> <li>Check the inlet screen/first flush diverter is not blocked.</li> <li>Check that any air vent screens are secure.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Operate Water Storage Assets element of competence for more information on water storage tanks.</li> </ul>
<b>Maintenance</b>	
What you need to do	What you need to know
<ul style="list-style-type: none"> <li>You need to maintain your source water abstraction system, exactly what you need to do will depend on your type of source water:</li> </ul>	<ul style="list-style-type: none"> <li>Your O&amp;M manual will have SOPs that you must follow to maintain the system, these will be based on the manufacturers’ recommendation will the particular equipment that you use.</li> </ul>
<b>Groundwater Sources</b>	
<ul style="list-style-type: none"> <li>Work together with a well driller to clean or replace bore casing and screen.</li> <li>Engage a pump mechanic to maintain the bore pump.</li> <li>Maintain the Backflow Prevention Device</li> </ul>	<ul style="list-style-type: none"> <li>Bore casings and screens do not usually require regular maintenance, however they can get clogged. If you suspect that there is a problem, you will need to work together with a well driller to address the issue.</li> <li>Refer to the <a href="#">Operate Pumping Systems</a> element of competence for more information on pumps.</li> </ul>

- Refer to the Backflow Prevention element of competence for more information on backflow prevention devices.

**Surface water sources**

- Clean/unblock the intake screens, or infiltration galleries.
- Operate any valves/penstocks to make sure they are not seized.
- Maintain any mechanical equipment that may be used, e.g., air blowers or pumps.
- That droughts or storms can impact on the source water intake equipment

**Rainwater sources**

- Clean gutters
- Clean screens/first flush diverters
- Clean tank
- Refer to the [Operate Water Storage Assets](#) element of competence for more information on water storage tanks.

**Calibration**

**What you need to do:** **What you need to know:**

- You will need to organise for the flow meter measuring your water take to be verified to make sure that it is measuring the amount of water you are taking correctly.
- Only people who are approved by the Regional Council who issued your Resource Consent can verify flow meters<sup>5</sup>.
- Not applicable for roof water sources.

**Shutdown and Outage Management**

**What you need to do:** **What you need to know:**

- Shutdown the source water intake when it requires maintenance, or when there is a potential issue with the source water.
- Bring the source water back into operation following an automatic, or manual shutdown.
- Your O&M manual will have SOPs that you must follow to manually shutdown and restart taking source water. These will be based on the designers’ or manufacturers’ recommendation.

**Fault and Incident Response**

**What you need to do:** **What you need to know:**

- When there is a problem with your source water abstraction system you need to follow your incident and emergency response plan to resolve the issue as soon as possible.
- Faults or incidents that might be caused by the assets that take the water (e.g., inlet headworks), or by an upstream issue that subsequently impacts the source water itself.
- Your Incident and Emergency response plan must cover how you will respond to faults and incidents. Refer to the element of competence for Incident and Emergency Response Plan for more information.

<sup>5</sup> [Resource Management \(Measurement and Reporting of Water Takes\) Regulations 2010](#)



## Inventory Management

### What you need to do:


- If a component of the source water abstraction system breaks down, you need to be able to quickly access spare parts to repair the system. What you need to do will depend on your type of system.

### What you need to know:

- That your O&M Manual will indicate what spare parts you need to keep in hand.
- The supplier who can supply the parts you need.
- Purchase dates of spare parts, their shelf life and/or expiry date.




## Where to find help

- The Ministry of Health document [Design and Operation of Bores for Small Drinking Water Supplies](#) provides more information on how to operate ground water sources (20), however it is important to note that due to the changing regulatory systems since this document was published elements of information are out of date, e.g., secure bore status is no longer in use.
- Chapter 3 of the [Guidelines for Drinking Water Quality Management for New Zealand \(8\)](#) provides further information on source water abstraction.
- The document [Optimisation of Drinking Water Treatment Systems](#) (15), published by the Ministry of Health, includes more information on how to improve the operation of your source drinking water.
- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) for source water for small water supplies.

Element of Competence	Operate Pre-Treatment Processes		
<b>Context</b>	<p>Sometimes source water requires a pre-treatment process to stabilize the incoming water to the treatment plant to a level that the subsequent treatment processes are effective. Pre-treatment of water is used to reduce, and/or to stabilise variations in the microbial, natural organic matter and particulate load. It can also be used to control algae in the raw water.</p> <p>Pre-treatment of surface water includes processes such as bankside filtration, infiltration galleries, pre-sedimentation, off-river storage, roughing filters, screens and micro-strainers. Adsorption processes can also be used to remove unpleasant tastes and to control odour, and in the case of activated carbon, as a means of adsorbing cyanotoxins from water.</p>		
<b>Outcome</b>	<p>Pre-treatment processes at the Water Treatment Plant are operated, maintained and monitored so that:</p> <ul style="list-style-type: none"> <li>▪ Source water is stabilized to a level that the subsequent treatment processes can treat the water to the required level.</li> <li>▪ Comply with the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> <li>▪ Are restored to normal operation whenever a fault occurs.</li> </ul>		
<b>Relevant Roles</b>			 Operations

### Hazards

Your O&M manual will identify what hazards will be present when you do work on your pre-treatment system. Typically to keep yourself, and the water supply, safe you will need to:

-  Wear Personal Protective Equipment (**PPE**). 
-  Follow **Hygiene procedures**.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to monitor your pre-treatment process to make sure that it is operating correctly.</li> </ul>	<ul style="list-style-type: none"> <li>▪ You need to know the alarms and the action levels where you need to respond, for each of the parameters you monitor.</li> <li>▪ The O&amp;M manual will identify the specific parameters you need to monitor for the specific process you have. Key process parameters and variables associated with pretreatment, can include the influence of variable water quality, pH, temperature, and the design limitations of the plant.</li> </ul>

### Operational Inspections

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>You need to regularly inspect the equipment used in the pre-treatment process. The types of inspections you need to undertake will depend on your particular type of process.</li> </ul>	<ul style="list-style-type: none"> <li>Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the manufacturers' recommendation.</li> </ul>

## Maintenance

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>You need to maintain your pre-treatment system. What you need to do will depend on your particular type of process.</li> </ul>	<ul style="list-style-type: none"> <li>Your O&amp;M manual will have SOPs that you must follow to maintain your pre-treatment process. These will be based on the manufacturers' recommendation for the particular equipment that you use.</li> </ul>

## Calibration

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>Calibrate any sensors used to monitor the pre-treatment process.</li> </ul>	<ul style="list-style-type: none"> <li>The manufacturer of your sensors will recommend a calibration procedure and frequency.</li> </ul>

## Shutdown and Outage Management

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>Shutdown the pre-treatment process when there is a potential issue with it.</li> <li>Bring the pre-treatment process back into operation following an automatic, or manual shutdown.</li> </ul>	<ul style="list-style-type: none"> <li>Your O&amp;M manual will have SOPs that you must follow to manually shutdown and restart the process. These will be based on the water treatment plant design and the equipment manufacturers' recommendation.</li> </ul>

## Fault and Incident Response

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>When there is a problem with your pre-treatment process you need to follow your incident and emergency response plan to resolve the issue as so as possible.</li> </ul>	<ul style="list-style-type: none"> <li>Faults or incidents that might be caused by the equipment itself, or by the incoming water quality that subsequently impacts the pre-treatment process.</li> <li>Your Incident and Emergency response plan must cover how you will respond to faults and incidents. Refer to the element of competence for <a href="#">Incident and Emergency Response Plan</a> for more information.</li> </ul>

## Inventory Management


What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>If a component of the pre-treatment system breaks down, you need to be able to quickly access</li> </ul>	<ul style="list-style-type: none"> <li>That your O&amp;M Manual will indicate what spare parts you need to keep in hand.</li> </ul>

spare parts to repair the system. What you need to do will depend on your type of system.

- The supplier who can supply the parts you need.
  - Purchase dates of spare parts, their shelf life and/or expiry date.
- 
- If your pre-treatment process involves the use of chemicals, you need to make sure these are stored safely.
  - the safe storage, handling and use of chemicals associated with pre-treatment including personal protective equipment (PPE) requirements.
  - how to manage residuals from the water treatment process. Refer to [the Management of Water Treatment Plant Residuals in New Zealand Handbook](#). (20)

### Where to find help

- The objectives of the pre-treatment processes and consequences of sub-optimal performance are detailed in [Chapter 12 of the Guidelines for Drinking Water Quality Management for New Zealand](#) (8).
- The document [Optimisation of Drinking Water Treatment Systems](#) (15), published by the Ministry of Health, includes more information on how to improve the operation of your pre-treatment processes.
- Refer to [the Management of Water Treatment Plant Residuals in New Zealand Handbook](#). (20) for details on how to manage residuals from the pre-treatment process.
- [Drinking Water Quality Assurance Rules](#) for small water supplies.

Element of Competence	Operate Filtration Processes		
<p><b>Context</b></p>	<p>Drinking water must be filtered as part of the treatment process for small suppliers. Filtration removes large particles that might be present in the water, reducing the waters' turbidity. Turbidity is a measure of the "cloudiness" of water. It can be an indicator that potential pathogens like bacteria and protozoa might be present in the water.</p> <p>All small supplies need to have filtration system. Depending on the quality of your source water this can either be a cartridge filter (most common for small supplies), a media filter, or a membrane filter.</p>		<p>Both <b>Acceptable Solutions</b> and the <b>Drinking Water Quality Assurance Rules</b> require small water suppliers to use filtration to treat drinking water.</p>
<p><b>Outcome</b></p>	<p>Filtration processes at the Water Treatment Plant are operated, maintained and monitored so that they:</p> <ul style="list-style-type: none"> <li>▪ Remove suspended matter.</li> <li>▪ Remove any protozoa that might be present e.g., <i>Cryptosporidium</i> oocysts</li> <li>▪ Comply with the <a href="#">Acceptable Solution</a> followed, or with the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> <li>▪ Are restored to normal operation whenever a fault occurs.</li> </ul>		
<p><b>Relevant Roles</b></p>			 <p>Operations</p>

### Hazards

Your O&M manual will identify what hazards will be present when you do work on your filter system. Typically to keep yourself, and the water supply, safe you will need to:

-  Wear Personal Protective Equipment (**PPE**). 
-  Follow **Hygiene procedures**.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to monitor your filters to make sure that they are operating correctly. Typically, you will need to monitor the following parameters related to filtration system:               <ul style="list-style-type: none"> <li>- Flow through the filters.</li> <li>- Headloss through the filters</li> <li>- Pre- and post-filter turbidity</li> <li>- Backwash frequencies (where applicable).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ You need to know the alarms and the action levels where you need to respond, for each of the parameters you monitor:               <ul style="list-style-type: none"> <li>- The headloss (differential pressure) across the filters will gradually increase as the filter blocks.</li> <li>- The post-filter turbidity shows how well the filter has removed particles in the water.</li> <li>- Monitoring the flow and raw water quality (e.g., pre-filter turbidity) through your filters will help to give you an indication of when your filters will need to be replaced.</li> </ul> </li> <li>▪ The O&amp;M manual will identify the specific parameters you need to monitor for the specific filters you have. This is likely to include the</li> </ul>

maximum flow, and headloss that is permitted through the filters along with maximum pre-and-post filter turbidity levels.

- There are specific water quality monitoring requirements that you must meet that relate to filters. What you need to specifically do will depend on whether you follow an [Acceptable Solution](#) or whether you need to meet the [Drinking Water Quality Assurance Rules](#).

## Operational Inspections

### What you need to do

- You need to regularly inspect the filters. The types of inspections you need to undertake will depend on your type of filter. Typically, you will need to:
  - check the differential pressure through the filter.
  - compare the readings of the turbidity meter against a reference meter.
  - check for leaks.

### What you need to know

- Your O&M manual will have an inspection schedule and SOPs that you must follow, these will be based on the manufacturers' recommendation.

## Maintenance

### What you need to do

- You need to maintain your filter system. What you need to do will depend on your type of filter system. For the different filter types, you might need to:

### What you need to know

- Your O&M manual will have SOPs that you must follow to maintain your filtration system. These will be based on the manufacturers' recommendation for the particular equipment that you use.

## Cartridge Filters

- Replace cartridge filters hygienically.
- The cartridge filters need to be replaced when the differential pressure between the inlet and outlet of the filter exceeds the manufacturers' limit for the type of filter you have.
- If you follow an [Acceptable Solution](#) you will need to know the minimum replacement frequency to meet the solutions requirements for cartridge filters.

## Media Filters

- Backwash the filter media.
- Replace the filter media.
- Safely dispose of any treatment residuals.
- How incoming water quality can affect the performance of the filters, e.g., high incoming turbidity, and what to do when this occurs.
- Operating cycles, including backwash and CIP intervals and how to return a unit to service.

## Membrane Filters

- Carryout daily integrity test.
- Backwash the filters
- Clean-in-place (CIP).
- Replace the membranes hygienically.
- How incoming water quality can affect the performance of the filters, e.g., bacterial fouling or scaling on the membranes, and what to do when they occur.
- Operating cycles, including backwash and CIP intervals and how to return a unit to service.

## Calibration

### What you need to do:

- Calibrate the turbidity meter.

### What you need to know:

- A turbidity meter measures the clarity of water. It provides a measure that you can use to judge how well your filtration process is working.
- The manufacturer of your turbidity meter will recommend a calibration procedure and frequency.

## Shutdown and Outage Management

### What you need to do:

- Shutdown the filter when it requires maintenance, or when there is a potential issue with the filter.
- Bring the filter back into operation following an automatic, or manual shutdown.

### What you need to know:

- Your O&M manual will have SOPs that you must follow to manually shutdown and restart the filters. These will be based on the water treatment plant design and the equipment manufacturers' recommendation.

## Fault and Incident Response

### What you need to do:

- When there is a problem with your filtration system you need to follow your incident and emergency response plan to resolve the issue as soon as possible.

### What you need to know:

- Faults or incidents that might be caused by the filter itself, or by the incoming water quality that subsequently impacts the filters.
- Your Incident and Emergency response plan must cover how you will respond to faults and incidents. Refer to the element of competence for [Incident and Emergency Response Plan](#) for more information.

## Inventory Management

### What you need to do:



- If a component of the filtration system breaks down, you need to be able to quickly access spare parts to repair the system. What you need to do will depend on your type of system.

### What you need to know:

- That your O&M Manual will indicate what spare parts you need to keep in hand.
- The supplier who can supply the parts you need.
- Purchase dates of spare parts, their shelf life and/or expiry date.

## Where to find help

- Chapter 14 of the [Guidelines for Drinking Water Quality Management for New Zealand \(8\)](#) provides troubleshooting and optimization guidance for filtration processes.
- Refer to [the Management of Water Treatment Plant Residuals in New Zealand Handbook](#). (20) for details on how to manage residuals from the filtration process.
- The [Acceptable Solution](#) you are following (if applicable)
- [Drinking Water Quality Assurance Rules](#) for rules around filtration for small water supplies.

Element of Competence	Operate a UV Disinfection Process		
<p><b>Context</b></p>		<p>For small water supplies, water must be disinfected with UV light to inactivate any micro-organisms that might be present in the water.<sup>6 7</sup></p> <p>There are 2 main types of UV unit.</p> <ol style="list-style-type: none"> <li>1. A chamber that water flows through, which contains a quartz sleeve that a UV lamp(s) sits inside. The lamp emits light, disinfecting the water; or</li> <li>2. A quartz sleeve that water flows through with lamps mounted in air. The lamps which emit light, disinfect the water.</li> </ol> <p>A sensor in your unit will measure the UV Intensity, some units also have sensors that measure UV transmission. A control system is used to close a solenoid valve in the event of an alarm (e.g. low UV intensity, poor water quality, lamp failure etc). This prevents water from passing through the unit and reaching consumers.</p> <p>UV disinfection needs clean water to work properly. Water entering the UV unit must meet the incoming water quality requirements in the manual for the model you are using. Some chemical parameters can have an impact on the effectiveness of the disinfection process. These can include UV transmission, turbidity, hardness, iron, manganese and silica. If pre-treatment is in place for any chemical parameters and this is not working properly, your UV will be affected and won't be able to work properly either.</p>	<p>Both <b>Acceptable Solutions</b> and the <b>Drinking Water Quality Assurance Rules</b> require small water suppliers to use UV disinfection as part of their water treatment process.</p>
<p><b>Outcome</b></p>	<p>UV disinfection processes at the Water Treatment Plant are operated, maintained and monitored so that they:</p> <ul style="list-style-type: none"> <li>▪ Provide sufficient UV intensity to disinfect the water.</li> <li>▪ Comply with the <a href="#">Acceptable Solution</a> followed, or with the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> <li>▪ Are restored to normal operation whenever a fault occurs.</li> </ul>		
<p><b>Relevant Roles</b></p>			 Operations










**Hazards**

Your O&M manual will identify what hazards will be present when you do work on your UV system. Typically to keep yourself, and the water supply, safe you will need to:

<sup>6</sup> This is a requirement of both Acceptable Solutions and also the small supplies compliance criteria in the [Drinking Water Quality Assurance Rules](#). Note that small suppliers can also choose to follow the large supplier rules, which does not mandate the use of UV for every supply.

<sup>7</sup> Your UV unit must be 3rd party validated to one of the following, NSF 55 Class A, USEPA, UVDGM or ONorm.



-  Wear Personal Protective Equipment (**PPE**) to keep yourself safe.   
-  Follow **Hygiene procedures**.
-  Make sure that the **UV unit is powered off** for any maintenance (locked and tagged out).
-  Close the valves upstream and downstream of the UV unit to **isolate** it and drain the water within to **depressurise** the UV chamber before undertaking any maintenance.
-  Do not look directly at the UV lamp while it is operating. The UV light emitted could **damage your eyes** and burn unprotected skin.
-  Some UV lamp unit contain **mercury**, a silver-coloured metal that is liquid at room temperature. If the lamp breaks, then avoid touching or inhaling the mercury and make sure spilt mercury cannot get into the water supply.

## Monitoring

### What you need to do:

- You need to monitor your UV disinfection system to make sure it keeps operating as it was designed to. Typically, you will need to monitor some parameters immediately upstream of the UV unit such as:
  - Flow
  - Turbidity
  - UVT

And some parameters related to the UV unit itself such as:

- UV Lamp hours used.
- UV intensity

### What you need to know:

- 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](#).
- You need to know the alarms and action levels that you need to respond to for each of the parameters you monitor.

## Operational Inspections

### What you need to do

- You need to regularly visit the Water Treatment Plant to check on the UV unit. Typically, you will need to:
  - Check for alarms (e.g. lower than expected UVI might indicate that you need to clean the lamp sleeve).
  - Compare the readings of the UV intensity with a reference sensor.
  - Check if any initial noises or high temperatures coming from the ballast cooling fans.
  - Check for leaks.

### What you need to know

- Your O&M manual will have an inspection schedule and SOPs that you must follow, these will be based on the manufacturers' recommendation

## Maintenance

### What you need to do

- You need to maintain your UV disinfection system to make sure that it can continue to treat the water. Typically, to maintain an UV disinfection unit you will need to:
  - Replace the UV lamps.
  - Clean the quartz sleeve(s).

### What you need to know

- Your O&M manual will have SOPs that you must follow to maintain the system, these will be based on the manufacturers' recommendation.

- Replace the quartz sleeve(s).
- Replace the UVI sensor.
- Replace and lubricate the quartz sleeve O-rings.

## Calibration

What you need to do:	What you need to know:
----------------------	------------------------

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Organise for the UVI sensor to be either calibrated or replaced.</li> <li>▪ Install a sensor in the UV unit so it can continue to operate while the calibration is undertaken, or while a new sensor is being purchased.</li> </ul> | <ul style="list-style-type: none"> <li>▪ The UV disinfection process relies on the UVI sensor reading correctly. Calibrating, or replacing, the sensor at intervals recommended by the manufacturer will give you certainty that the sensor readings are accurate.</li> <li>▪ Often it can be more cost effective to replace a sensor than to calibrate it.</li> <li>▪ Where the old sensor is to be re-calibrated this is typically undertaken by the supplier/manufacturer.</li> </ul> |
|--|--|

## Shutdown and Outage Management

What you need to do:	What you need to know:
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- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Shutdown the UV disinfection unit manually when the unit requires maintenance, or when there is a fault with the unit. Typically, you will need to isolate and depressurise the unit to do this.</li> <li>▪ If a shutdown does occur, you need to address it immediately to prevent the community running out of water. Forwarding alarms to a mobile phone/email can help to reduce alarm response times.</li> <li>▪ Bring the UV disinfection unit back into operation following an automatic, or manual shutdown.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have SOPs that you must follow to manually shutdown the UV disinfection unit. These will be based on the design of the treatment plant along with the UV unit manufacturers’ recommendation.</li> <li>▪ Note that your UV disinfection system will have been designed to automatically shut down in certain circumstances such as:           <ul style="list-style-type: none"> <li>- Incoming turbidity (post filter) is too high<sup>8</sup></li> <li>- UV dose is below the acceptable limit<sup>9</sup>.</li> <li>- Incoming flow rate is too high for the unit.</li> </ul> </li> <li>▪ It is important that when a unit is brought back into service after a shutdown or outage, that water is not supplied to the community until the lamp is operating at the correct temperature. Depending on the type of UV unit you have this might mean that water doesn’t leave the unit, or it is discharged to waste until the lamp is operating correctly.</li> <li>▪ Forwarding alarms to a mobile phone, an email address, or a building management system can help to reduce alarm response times.</li> </ul> |
|--|--|

## Fault and Incident Response

What you need to do:	What you need to know:
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<sup>8</sup> Refer to the Drinking Water Quality Assurance Rules, or to your Acceptable Solution for turbidity limits for your situation.  
<sup>9</sup> Refer to the Drinking Water Quality Assurance Rules, or to your Acceptable Solution for UVI limits for your situation.

- When there is a problem with your UV disinfection unit you need to follow your incident and emergency response plan to resolve the issue as soon as possible.
- Faults or incidents that might be caused by the UV disinfection unit itself, or by an upstream issue that subsequently impacts on how well the UV system can operate.
- Your Incident and Emergency response plan must cover how you will respond to faults and incidents. This plan will include troubleshooting for the UV unit based on the treatment plants’ design and the UV unit manufacturers’ recommendations.
- Problems that UV Disinfection systems can have include:
  - Lamp has stopped working.
  - Sleeve has become fouled


## Inventory Management

What you need to do:	What you need to know:
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- |   |  |
|---|--|
| <p>If a component of the UV system breaks down, you need to be able to quickly access spare parts to repair the system. Typically, for UV treatment you should keep the following spare parts on hand:</p> <ul style="list-style-type: none"><li>▪ UV Lamps</li><li>▪ Quartz sleeves</li><li>▪ Quartz sleeve O-ring seals</li><li>▪ Ballast/Controller</li><li>▪ UVI Sensor</li></ul> | <ul style="list-style-type: none"><li>▪ What spare parts are acceptable to use with your particular UV unit.</li><li>▪ The supplier who can supply the parts you need.</li><li>▪ Purchase dates of spare parts, their shelf life and/or expiry date.</li></ul> |
|---|--|

## Where to find help

- Chapter 15 of the [Guidelines for Drinking Water Quality Management for New Zealand \(8\)](#)
  - The [Acceptable Solution](#) you are following (if applicable)
- [Drinking Water Quality Assurance Rules](#) for treatment rules around UV disinfection for small water supplies.

Element of Competence	Operate a Chlorination Disinfection Process		
<p><b>Context</b></p>	<p>For small water supplies, water must be treated with a chlorine-based disinfectant to deactivate or kill pathogenic microorganisms. Treating with chlorine also allows a residual disinfectant to be present in the distribution system.</p> <p>There are a number of different ways to chlorinate drinking water:</p> <ol style="list-style-type: none"> <li>1. Adding <b>sodium hypochlorite</b> liquid using a small dosing pump, or by electrolyzing a salt solution. or,</li> <li>2. Adding <b>calcium hypochlorite</b> (HTH) powder or tablets dissolved into liquid which is then added to the water using a small doing pump. or,</li> <li>3. <b>Chlorine</b> can be added as a liquified <b>gas</b>. Extreme care needs to be taken with this method due to the toxicity of chlorine gas.</li> </ol>		<p>Both <b>Acceptable Solutions</b> and the <b>Drinking Water Quality Assurance Rules</b> require small water suppliers to chlorinate their supply.</p>
<p><b>Outcome:</b></p>	<p>Chlorination disinfection processes at the Water Treatment Plant are operated, maintained and monitored so that they:</p> <ul style="list-style-type: none"> <li>▪ Provide the right amount of FAC to disinfect the water.</li> <li>▪ Do not form disinfection by-products.</li> <li>▪ Comply with the <a href="#">Acceptable Solution</a> followed, or with the <a href="#">Drinking Water Quality Assurance Rules</a>.</li> <li>▪ Are restored to normal operation whenever a fault occurs.</li> </ul>		
<p><b>Relevant Roles</b></p>			 Operations

## Hazards

Your O&M manual will identify what hazards will be present when you do work on your chlorine disinfection system.



**Sodium hypochlorite**, **calcium hypochlorite** and **chlorine** are hazardous substance, and there are specific chemical handling and delivery procedures that you need to follow. These procedures will differ depending on which disinfectant you are using.

Typically to keep yourself, and the water supply, safe you will need to:



Wear Personal Protective Equipment (**PPE**) to keep yourself safe. Depending on the form of chlorine you use this could include rubber boots, overalls, gloves, apron, chemical goggles, and a respirator.



Follow **Hygiene procedures**.

## Monitoring

### What you need to do:

- You need to monitor your chlorine disinfection system to make sure it keeps operating as it was designed to. Typically, you will need to monitor the following parameters related to chlorine disinfection:
  - Incoming turbidity levels
  - Chlorine contact time
  - Freely available chlorine (FAC) levels
  - pH of the treated water

### What you need to know:

- 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](#).
- You need to know the alarms and action levels you need to respond to for each of the parameters you monitor.
- 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.
- How to avoid disinfection by-product formation.

## Operational Inspections

### What you need to do

- You need to regularly visit the Water Treatment Plant to check on the chlorine disinfection system. Typically, you will need to:
  - Check stock levels of chlorine product you use so that you know when the supply is running low.
  - Accept delivery of chlorine products
  - Refill your disinfection system
  - Checking the condition of tanks, dosing lines and pumps used in the chlorine disinfection system
- Safely store, handle and use chemicals associated with disinfection including following the PPE requirements.

### What you need to know

- Your O&M manual will have an inspection schedule and SOPs that you must follow, these will be based on the design of your water treatment system along with the manufacturers' recommendations for any equipment you use.
- The Safety Data Sheet, provided by your chlorine supplier, will explain how the substance your system uses should be safely used, stored, transported, and disposed of. It will provide first aid information, information about the personal protective equipment that the person handling the substance should wear and what to do in the event of an emergency, such as a spill or fire.

## Maintenance

### What you need to do

- You need to maintain your chlorine disinfection system to make sure that it can continue to treat the water. Your maintenance requirements will be specific to the type of disinfection system you have.

### What you need to know

- Your O&M manual will have SOPs that you must follow to maintain the system, these will be based on the particular design of your water treatment system and the manufacturers' recommendation for the particular equipment your site has.

## Calibration

### What you need to do:

- Any sensors used in the chlorination system will need to be either calibrated or regularly replaced.

### What you need to know:

- Calibrating, or replacing, the sensor at intervals recommended by the manufacturer will give you certainty that the sensor readings are accurate.

Typically for chlorine disinfection will need to calibrate:

- the dose controllers’ sensor
- the pH probe that measures the treated water.

## Shutdown and Outage Management

### What you need to do:

- Shutdown the chlorine disinfection unit manually when the unit requires maintenance, or when there is a fault with the unit. Typically, you will need to isolate and depressurise the unit to do this.
- Bring the chlorine disinfection unit back into operation following a shutdown.

### What you need to know:

- Your O&M manual will have SOPs that you must follow to manually shutdown the chlorine disinfection unit. These will be based on the design of the water treatment plant and any equipment manufacturers’ recommendation.
- It is important that when the system is brought back into service after a shutdown or outage, that water is not supplied to the community until the required contact time has been reached.

## Fault and Incident Response

### What you need to do:

- When there is a problem with your chlorine disinfection unit you need to follow your incident and emergency response plan to resolve the issue as soon as possible.

### What you need to know:

- Faults or incidents can be caused by the chlorine disinfection system itself, or by an upstream issue that subsequently impacts on how well the chlorine disinfection system can operate.
- Your Incident and Emergency response plan must cover how you will respond to faults and incidents. This plan will include troubleshooting for the chlorine disinfection system based on the design of the water treatment plant and any equipment manufacturers’ recommendations.
- Problems that chlorine disinfection systems can have include:
  - Poor quality of the chemicals used
  - Running out of chlorine supply
  - A dosing malfunction

## Inventory Management

### What you need to do:

- Store sufficient quantity of chemicals to be able to maintain the supply.
- If a component of the chlorine disinfection system breaks down, you need to be able to quickly access spare parts to repair the system.


### What you need to know:

- If you use sodium hypochlorite, you need to be mindful that it degrades over time.
- What spare parts are acceptable to use with your particular chlorine disinfection system.
- The supplier who can supply the parts you need.
- Purchase dates of spare parts, their shelf life and/or expiry date.

## Where to find help




- Refer to [Chapter 15 of the Guidelines for Drinking Water Quality Management for New Zealand](#) for background on the objectives of the disinfection processes and consequences of sub-optimal performance (8).

- Refer to the [Water New Zealand Good Practice Guide for the Supply of Chlorine for use in Drinking Water Treatment. \(19\)](#)
  - The [Acceptable Solution](#) you are following (if applicable)  
[Drinking Water Quality Assurance Rules](#) for treatment rules around UV disinfection for small water supplies.
-

Element of Competence	Operate Aesthetic Treatment Processes		
	<p>Some water supplies can have aesthetic issues, for example there are concerns about the taste, odour, colour or the feel of the water.</p> <p>Water supplies with aesthetic issues can be treated to improve the aesthetic qualities of the water. Common aesthetic treatment processes include those for:</p> <ul style="list-style-type: none"> <li>▪ pH adjustment</li> <li>▪ Iron and manganese removal</li> <li>▪ Softening</li> <li>▪ Trace organics removal</li> <li>▪ Taste and odour improvement</li> </ul> <p>Note that aesthetic processes are not necessarily discrete e.g., activated carbon also removes cyanotoxins and coagulation can remove colour.</p>		<p>The Water Services Act requires drinking water suppliers to take all reasonably practicable steps to supply drinking water that complies with aesthetic values issued by Taumata Arowai.</p>
<p><b>Outcome:</b></p>	<p>Treatment for aesthetic concerns at the Water Treatment Plant are operated, maintained and monitored so that they:</p> <ul style="list-style-type: none"> <li>▪ Satisfy the Aesthetic Values within the New Zealand Drinking Water Standards.</li> <li>▪ Are controlled and optimized based on test results and analysis of trends.</li> <li>▪ Are restored to normal operation through the identification of the root cause of any faults identified with the process.</li> </ul>		
<p><b>Relevant Roles</b></p>			 Operations

### Hazards

Your O&M manual will identify what hazards will be present when you do work on your aesthetic treatment process. What you will need to do will be dependent on the actual treatment process. Typically to keep yourself, and the water supply, safe at a minimum you will need to:

-  Wear Personal Protective Equipment (**PPE**) to keep yourself safe.
-  Follow **Hygiene procedures**.
-  Identify and mitigate any treatment specific hazards.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to monitor the aesthetic treatment process to make sure it keeps operating as it was designed to. The parameters you will need to monitor will be specific to the issue with your water and the treatment process at your water treatment plant.</li> </ul>	<ul style="list-style-type: none"> <li>▪ You need to know the alarms and action levels you need to respond to for each of the parameters you monitor.</li> <li>▪ Taumata Arowai have published acceptable ranges for determinants that can affect the aesthetic properties of a drinking water.</li> </ul>



- You need to monitor, and respond to, complaints about your water supply, especially if they relate to the taste or odour of the water.
- Complaints about water quality can provide information about the quality of the reticulated water, and sometimes can alert you to the presence of determinants of health significance.
- Both the [Drinking Water Quality Assurance Rules](#) and [Acceptable Solutions](#) require taste and odour complaints to be recorded and reported to Taumata Arowai.

## Operational Inspections

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ You need to regularly visit the Water Treatment Plant to check on the process. The parameters you will need to monitor will be specific to the treatment process at your Water Treatment Plant.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the design of your water treatment system along with the manufacturers’ recommendations for any equipment you use.</li> </ul>

## Maintenance

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ You need to maintain your aesthetic treatment process to make sure that it can continue to treat the water. Your maintenance requirements will be specific to the type of system you have.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have SOPs that you must follow to maintain the system, these will be based on the particular design of your water treatment system and the manufacturers’ recommendation for the particular equipment your site has.</li> </ul>

## Calibration

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ Any sensors used will need to be either calibrated or regularly replaced.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Calibrating, or replacing, the sensor at intervals recommended by the manufacturer will give you certainty that the sensor readings are accurate.</li> </ul>

## Shutdown and Outage Management

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ Shutdown aesthetic treatment process manually when the unit requires maintenance, or when there is a fault with the unit.</li> <li>▪ Bring the process back into operation following a shutdown.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have SOPs that you must follow to manually shutdown the process. These will be based on the design of the water treatment plant and any equipment manufacturers’ recommendation.</li> </ul>

## Fault and Incident Response

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ When there is a problem with your process you need to follow your incident and emergency response plan to resolve the issue as soon as possible.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Faults or incidents that might be caused by the equipment itself, or by an upstream issue that subsequently impacts on how well the process can operate.</li> <li>▪ Your Incident and Emergency response plan must cover how you will respond to faults and incidents.</li> </ul>

This plan will include troubleshooting for the aesthetic treatment process based on the design of the water treatment plant and any equipment manufacturers' recommendations.

## Inventory Management

### What you need to do:



- If a component of the aesthetic treatment process breaks down, you need to be able to quickly access spare parts to repair the system.

### What you need to know:

- What spare parts are acceptable to use with your particular system.
- The supplier who can supply the parts you need.
- Purchase dates of spare parts, their shelf life and/or expiry date.




## Where to find help

- Refer to The Guidelines for Drinking Water Quality in New Zealand (8) for more information about aesthetic property adjustment including for:
  - [pH adjustment](#)
  - [Iron and Manganese removal](#)
  - [Softening](#)
  - [Trace Organics Removal](#)
- The Drinking Water Aesthetic Values published by Taumata Arowai for the acceptable ranges for determinants that can affect the aesthetic properties of a drinking water.

Element of Competence	Operate Water Storage Assets		
<p><b>Context</b></p>	<p>Storing water helps to:</p> <ul style="list-style-type: none"> <li>▪ Buffer the demand of water against the ability for the system to supply it.</li> <li>▪ Maintain uniform pressures in the distribution network.</li> <li>▪ Provide a reserve for emergencies that might impact on the supply.</li> </ul> <p>Because water quality can degrade if it sits too long, the water level in the tank needs to be able to drop to help mix and turn over the water, without dropping below the minimum operating level to allow for emergency storage.</p>		 <p>Figure 4: Water Storage Tanks, Bridge Pa</p>
<p><b>Outcome:</b></p>	<p>Water storage assets are:</p> <ul style="list-style-type: none"> <li>▪ Controlled to ensure an adequate supply of water, while ensuring that the water in the tank turns over.</li> <li>▪ Comply with the <a href="#">Acceptable Solution</a> followed, or the <a href="#">Drinking Water Quality Assurance Rules</a> where applicable.</li> <li>▪ Are restored to normal operation through the identification of the root cause of any faults identified with the process.</li> </ul>		
<p><b>Relevant Roles</b></p>			 <p>Operations</p>

### Hazards

Your O&M manual will identify what hazards will be present when you do work on your water storage assets. Typically to keep yourself, and the water supply, safe at a minimum you will need to:

-  Be aware that tanks are a confined space. Anyone who carries out confined space work needs to have had specialist training and be familiar with the requirements of [AS 2865 Confined Spaces](#).
-  Wear Personal Protective Equipment (**PPE**) to keep yourself safe.
-  Follow **Hygiene procedures**.

### Monitoring

#### What you need to do:

- You need to monitor the tank storage water levels and volumes. Depending on the purpose of you tank you may need to use this information to work out disinfection contact times and tank turnover rates.

#### What you need to know:

- You need to know the alarms and action levels you need to respond to for each of the parameters you monitor. For a tank this might include:
  - the set-points, or pump start and stop levels used to fill the tank.
  - Low level, high level and hatch alarms

- If your tank holds treated water, you will need to take water quality samples from the tank as part of your water quality monitoring.
- The minimum water level in the tank that will allow enough water to be 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. If the tank is turning over much more rapidly than usual this might indicate that there is a leak in the tank or within the network.
- If you follow an [Acceptable Solution](#), there may be a requirement for a certain number of hours of water storage to be held to protect against loss of supply in an emergency.
- Both [Acceptable Solutions](#) and the [Drinking Water Quality Assurance Rules](#) require water quality samples to be taken from storage tanks holding treated water.

## Operational Inspections

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ You need to regularly visit the water storage tank to check:               <ul style="list-style-type: none"> <li>- Whether vermin and other potential contaminants can enter the tank.</li> <li>- If there is a build-up of sediment, or biological growth, that indicates that the tank may need to be cleaned.</li> <li>- For cracks or leaks that indicate that there may be structural or hydraulic integrity issues with the tank.</li> <li>- That the valves that control how water can enter and exit the tank are still able to function by exercising them (i.e., testing and using them).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the design of your water supply along with the manufacturers’ recommendations for any equipment you use.</li> <li>▪ If you follow an <a href="#">Acceptable Solution</a>, there will be a requirement to have tanks regularly inspected.</li> </ul>

## Maintenance

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ You need to maintain your water storage tanks to make sure that it will not compromise the quality of the drinking water. Maintenance typically involves:               <ul style="list-style-type: none"> <li>- Emptying the tank to clean and then disinfect it before bringing it back into service.</li> <li>- Servicing valves to make sure they can continue to function correctly.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have SOPs that you must follow to maintain the tank, these will be based on the particular design of your water supply, the manufacturers’ recommendation for the particular equipment your site has, and the quality of the incoming water.</li> <li>▪ Your tank might need to be cleaned if:               <ul style="list-style-type: none"> <li>- you get taste or odour complaints from customers supplied by a particular tank.</li> <li>- Water samples show that the water in the tank is degrading.</li> <li>- sludge inside the tank is near to the outlet level.</li> </ul> </li> <li>▪ The frequency that you may need to clean the tank will be affected by the quality of the incoming water.</li> </ul>

- If you need to enter the tank you must follow safe entry procedures for confined spaces.

## Calibration

### What you need to do:

- Any sensors, such as those measuring the water level, used will need to be either calibrated or regularly replaced.

### What you need to know:

- Calibrating, or replacing, the sensor at intervals recommended by the manufacturer will give you certainty that the sensor readings are accurate.

## Shutdown and Outage Management

### What you need to do:

- Isolate the tank manually when it requires maintenance, or when there is an issue with the water quality in the tank.
- Bring the tank back into operation following a shutdown.

### What you need to know:

- Your O&M manual will have SOPs that you must follow to manually isolate the tank. These will be based on the design of the reticulation around the tank.
- It is important that when the tank is brought back into service after a shutdown, that water is not supplied to the community until you are sure that it meets the drinking water standards.

## Fault and Incident Response

### What you need to do:

- When there is a problem with the tank you need to follow your incident and emergency response plan to resolve the issue as soon as possible.

### What you need to know:

- Your Incident and Emergency response plan must cover how you will respond to faults and incidents, this will include what you need to do if there is an issue with water storage.

## Where to find help

- Refer to [Worksafe Quick Guide Confined spaces: planning entry and working safely in a confined space \(21\)](#)
- Refer standard [AS 2865 Confined Spaces](#) for more information on confined space safety
- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to water storage.

Element of Competence	Operate Pumping Systems	
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<b>Context</b>	<p>Pumps are used in several ways within a water supply, the main types in use include:</p> <ul style="list-style-type: none"> <li>▪ Bore pumps, which draw water from underground sources and can be located either inside the bore casing, or above ground.</li> <li>▪ Process pumps which are used to dose chemicals and to pump water to monitoring equipment.</li> <li>▪ Transmission and booster pumps which move water around the piped network.</li> </ul> <p>Often pump systems will have more than one pump available; so that if a pump fails, the other automatically takes over.</p>	
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Figure 5: Booster pump set

<b>Outcome:</b>	<p>Pumps are maintained and:</p> <ul style="list-style-type: none"> <li>▪ Controlled to ensure an adequate supply of water.</li> <li>▪ Operated to make sure systems uses energy efficiently.</li> <li>▪ Restored to normal operation when any faults are identified.</li> </ul>
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<b>Relevant Roles</b>	 Operations
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### Hazards

Your O&M manual will identify what hazards will be present when you do work on your pumping assets. Typically to keep yourself, and the water supply, safe at a minimum you will need to:

-  Be aware that pumps need to be electrically isolated before undertaking any work on them.
-  Follow **Hygiene procedures**.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You should monitor pump starts and stops along with the sites overall power consumption</li> </ul>	<ul style="list-style-type: none"> <li>▪ If the pumps are turning on and off much more frequently than usual, or if you notice a sudden raise in power consumption, this might indicate that there is a water leak that needs to be addressed.</li> <li>▪ You need to know the alarms and action levels you need to respond to. For a pump this might include the set-points, or pump start and stop levels.</li> </ul>

### Operational Inspections

What you need to do	What you need to know
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- The operational inspections you will need to undertake will depend on the type of pumps. Typically, you might need to visit the pumps to check:
  - For leaks that indicate that there may be issues with the seals.
  - The condition of the motors cooling fan to see if it needs to be cleaned.
  - For any unusual noises or vibrations.
- Your O&M manual will have an inspection schedule and SOPs that you must follow, these will be based on the design of your water supply along with the manufacturers' recommendations for any equipment you use.

## Maintenance

### What you need to do

- You need to make sure your pumps are maintained so that they can continue to deliver water. Maintenance typically involves lubrication and replacement of seals, diaphragms, tubing etc. Pump maintenance should only be undertaken by an appropriately qualified pump technician. They will lubricate moving parts and replace seals, diaphragms, tubing etc.
- For submersible (bore) pumps you may need to organise pulling it out of the ground for servicing.

### What you need to know

- Your O&M manual will have SOPs that you must follow to maintain the pumps, these will be based on the particular design of your water supply and the manufacturers' recommendation for the particular equipment your site has.

## Calibration

### What you need to do:

- Any sensors, such as those measuring the water level in a tank that control pump set-points, will need to be either calibrated or regularly replaced.

### What you need to know:

- Calibrating, or replacing, the sensor at intervals recommended by the manufacturer will give you certainty that the sensor readings are accurate.

## Shutdown and Outage Management

### What you need to do:

- Isolate the pump manually when it requires maintenance.
- Bring the pump back into operation following a shutdown.

### What you need to know:

- Your O&M manual will have SOPs that you must follow to manually isolate the pump. These will be based on the design of the reticulation around the pump.
- It is important that when the pump is brought back into service after a shutdown, that water is not supplied to the community until you are sure that it meets the drinking water standards.

## Fault and Incident Response

### What you need to do:


### What you need to know:

- When there is a problem with a pump you need to follow your incident and emergency response plan to resolve the issue as soon as possible.
- Your Incident and Emergency response plan must cover how you will respond to faults and incidents, this will include what you need to do if there is an issue with a pump.




### Where to find help

- The [Acceptable Solution](#) you are following (if applicable).
  - [Drinking Water Quality Assurance Rules](#) that apply to distribution systems.
-



Element of Competence	Operate the Distribution System		
<b>Context</b>	<p>The distribution system takes the treated water and delivers it to your consumers.</p> <p>Drinking water distribution systems need to be operated in a co-ordinated way so that adequate pressure, residual disinfectant and flows are maintained, and pressure surges, contamination and leakage are avoided.</p>		<p>This section of the Competency Framework is <b>not</b> relevant for self-supplied buildings .</p>
<b>Outcome:</b>	<p>The drinking water distribution system can supply sufficient and safe water to all consumers.</p>		
<b>Relevant Roles</b>			 Operations

### Hazards

- Your O&M manual will identify what hazards will be present when you do work on your backflow devices. Typically to keep yourself, and the water supply, safe at a minimum you will need to:
-  Follow **Hygiene procedures**.
  -  If your distribution system is located in the **road**, you need to be aware of traffic risks and the road opening and closing procedures required by the Road Controlling Authority (either your Council or Waka Kotahi NZ Transport Agency) before undertaking any work in the road reserve.
  -  Distribution system are installed below ground. Therefore you need to be aware of **excavation safety** when undertaken any work on it.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to monitor residual disinfection levels and water quality determinants within the distribution network.</li> <li>▪ You need to monitor the pressure within your water supply.</li> <li>▪ You need to monitor complaints about your water supply because this can be related to what is</li> </ul>	<ul style="list-style-type: none"> <li>▪ The <a href="#">Drinking Water Quality Assurance Rules</a> and <a href="#">Acceptable Solutions</a> have set monitoring requirements for distribution systems.</li> <li>▪ Pressure within the drinking water distribution system needs to be maintained within a set range to avoid pipe bursts at high pressure yet maintaining sufficient pressure at the point of supply to meet the water supply’s level of service. This is a particular concern when meeting fire-fighting requirements.</li> <li>▪ Elevated levels of customer quality complaints in a specific part of the distribution system might indicate a problem that the pipes in this area.</li> </ul>

happening in distinct parts of your distribution system.

- You need to monitor the flows and level of water demand in your system.
- The Water Services Act requires you to supply a sufficient water to your customers. Refer to the [Water Demand](#) element of competence for more information.
- Sudden increase in demand, or high demand in the middle of the night, can indicate that you have a problem with leakage.
- Unexpectedly high levels of demand can also indicate that you may have illegal connections to your network that you don't know about. This can pose a risk to your supply if the illegal connection does not have appropriate backflow prevention.
- You need to monitor the risk of backflow to your distribution system.
- Refer to the [Water Demand](#) element of competence for more information.

## Maintenance

### What you need to do:

- 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 and/or manufacturer's instructions and by a qualified person.
- If your water distribution system is prone to:
  - collecting sediments; or
  - growing biofilms; or
  - has a history of dirty water complaints or off-odours due to long detention times and low flows,
 then you may need to clean the distribution network e.g., by flushing, scouring or pigging the mains.
- 

### What you need to know:

- Any parts (pipework or fittings) used to maintain the distribution system must be products suitable for use in contact with drinking water (AS/NZS 2020:2018).
- New customers need to be assessed for their backflow risk before connecting them to the system.
- Your O&M Manual will have SOPs that you must follow to install new assets or connection to the distribution system.
- Your O&M manual will have SOPs that you must follow to clean the distribution system. Take care not to flush any super-chlorinated water into an ecologically sensitive area.
- 

## Shutdown and Outage Management

### What you need to do:

- Communicate with customers about any impact the maintenance or shutdowns might have on them before starting work.

### What you need to know:

- How to identify and contact impacted customers.

## Fault and Incident Response

### What you need to do:



- When there is a problem with the distribution system you will need to follow your incident and emergency response plan to resolve the issue as soon as possible. Typical issues with the distribution system that you will need to respond to include:
  - Pipe bursts
  - Leakage

### What you need to know:

- Your Incident and Emergency response plan must cover how you will respond to faults and incidents, this will include what you need to do if there is an issue e.g., pipe burst, within the distribution system.

### Where to find more information:

- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to distribution systems.

Element of Competence	Backflow Prevention	
<p><b>Context</b></p>	<p>Backflow, from a customer’s property back into distribution system, is a public health risk. It can occur when the pressure in the distribution system drops below the pressure in the supplied property.</p> <p>Backflow prevention devices help to prevent backflow from occurring. They must be appropriately selected, installed and tested to successfully protect the drinking-water distribution system from backflow contamination.</p> <p>Testable backflow devices are usually installed on higher risk connections, with untestable backflow devices usually installed on lower risk residential connections.</p> <p>If water for your supply is extracted from bores, or you supply water carriers with water, you will also need to address these unique backflow risks.</p> <p>There are specific backflow testing requirements depending on whether you follow an <a href="#">Acceptable Solution</a> or whether you need to meet the <a href="#">Drinking Water Quality Assurance Rules</a>.</p>	
<p><b>Outcome:</b></p>	<p>The risk of backflow into your supply is understood and:</p> <ul style="list-style-type: none"> <li>▪ Regularly reviewed to identify any new risks to your supply.</li> <li>▪ Prevented at high-risk connections by using testable devices that are regularly checked and repaired, or replaced, where needed.</li> <li>▪ Reduced at medium risk connections by using air gaps or non-testable devices, and a replacement programme.</li> <li>▪ Where water is abstracted from a bore, the aquifer is protected from backflow.</li> </ul>	
<p><b>Relevant Roles</b></p>		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">               Management         </div> <div style="text-align: center;">               Operations         </div> </div>

The Water Services Act requires drinking water suppliers to protect their drinking water supplies from the risk of backflow.

**Hazards**

Your O&M manual will identify what hazards will be present when you do work on your backflow devices. Typically to keep yourself, and the water supply, safe at a minimum you will need to:

-  Follow **Hygiene procedures**.

**Monitoring**

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ You need to regularly review the risk of backflow on the distribution system from the properties/connections that you supply water to.</li> </ul>	<ul style="list-style-type: none"> <li>▪ How to determine if a connection is a low, medium, or high risk for backflow.</li> <li>▪ What type of backflow preventer is suitable for certain customers e.g., water meters with built-in dual check valves may be used for residential</li> </ul>

customers, whereas testable backflow prevention devices may be required for high-risk industrial customers.

- You need to keep records about the backflow risk from different connections along with information about what type of backflow prevention device has been installed on each connection.
- The [Drinking Water Quality Assurance Rules](#) and [Acceptable Solutions](#) have set timeframes recording requirements that you need to meet when reviewing backflow risk.

## Operational Inspections

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ If your distribution system has any testable devices you need to regularly assess them to determine if they still operate as expected.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the manufacturers’ recommendations for any equipment you use.</li> <li>▪ The standard <a href="#">AS/NZS 2845.3:2020 Water Supply – Backflow prevention devices, Part 3: Field testing and maintenance of testable devices</a> outlines the minimum requirements for the testing of testable backflow prevention devices in the field.</li> <li>▪ Only qualified people are permitted to assess testable backflow prevention devices.</li> </ul>

## Maintenance

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ If your testing programme identifies a backflow preventer which isn’t working properly you will need to undertake maintenance or replace the device.</li> <li>▪ For untestable backflow preventers you need to have a replacement programme to reduce the possibility that they are no longer effective.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have SOPs that you must follow to maintain the backflow preventer, and any associated isolation valves, these will be based on the manufacturers’ recommendation for the particular equipment installed.</li> <li>▪ The standard <a href="#">AAS/NZS 2845.3:2020 Water Supply – Backflow prevention devices, Part 3: Field testing and maintenance of testable devices</a> outlines the minimum requirements for the maintenance of testable backflow prevention devices in the field.</li> <li>▪ Where replacement of a backflow device is required the standard AS/NZS 2845.1.2021 covers the materials, design and performance requirements that the device needs to meet.</li> </ul>

## Calibration

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ The equipment used to field test your backflow prevention devices needs to be regularly calibrated.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Calibrating your field-testing equipment will give you certainty that the field test readings are accurate.</li> </ul>

## Shutdown and Outage Management

### What you need to do:

- Communicate with the customers about any impact the testing / maintenance or replacement of the backflow prevention valve might have on them before starting work.
- You will need to close valves to isolate the backflow preventer when it requires testing or maintenance.
- Following testing and/or maintenance you will need to make sure that any valves that were closed are returned to an open position.

### What you need to know:

- How to identify and contact impacted customers.
- The isolation requirements will be based on the design of the reticulation around the backflow preventer.

## Fault and Incident Response

### What you need to do:

- When there is a problem with a backflow preventer that results in contamination to your water supply need to follow your incident and emergency response plan to resolve the issue as soon as possible.

### What you need to know:

- Your Incident and Emergency response plan must cover how you will respond to faults and incidents, this will include what you need to do if your supply is contaminated by backflow, or where a backflow preventer fails.

## Where to find more information:

- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to distribution systems.
- The [Water Safety Plan Guide: Distribution System – Backflow Prevention](#) provides details on backflow risks to the drinking water distribution system.
- The Water New Zealand guidance document [Boundary Backflow Prevention for Drinking Water Supplies \(22\)](#) provides water suppliers with backflow prevention guidelines.
- That Part 1 of the Standard AS/NZS 2845.1:2021 Water Supply – Backflow Prevention Devices specifies requirements for the materials, design and performance testing of backflow devices used to prevent contamination of drinking water supplies.
- That Part 3 of the Standard [AS/NZ 2845.3:2020 Water Supply – Backflow Prevention Devices \(23\)](#) outlines the minimum requirements for the testing and maintenance of testable backflow prevention devices in the field.

## Element of Competence **Operate Emergency Power System**

**Context**

Small water suppliers need to be aware of how long they will be able to supply water if there is a power cut. Depending on the amount of water storage you have, it is likely that you will need to generate on-site power to allow your supply to continue to function during mains power outages.

Options for a back-up emergency power system include a generator, or a battery bank that stores on-site renewable energy that generate power only during certain conditions such as photovoltaic solar panels or wind turbines. The back-up power system requires a transfer switch, to easily switch back and forth between mains power and on-site source. Where there is no permanently installed back-up power system, you need to know what size of generator you are able to hire, and where you can get it from, in an emergency.

This section is only applicable to suppliers that have emergency power systems.

**Outcome:** The drinking water supply can continue to operate during a loss of mains supply power.


**Relevant Roles**



Operations

### Hazards

Your O&M manual will identify what hazards will be present when you do work on the electrical system. Typically to keep yourself, and the water supply, safe at a minimum you will need to:

-  Be aware of electrical hazards.

### Monitoring

What you need to do:	What you need to know:
<ul style="list-style-type: none"> <li>▪ During an emergency, when the back-up power system in use, you will need to monitor it so you know for how long your back-up system will last.                             <ul style="list-style-type: none"> <li>- If you use a battery bank you will need to monitor the remaining capacity of the system.</li> <li>- If you use an emergency generator you will need to:                                     <ul style="list-style-type: none"> <li>○ Check fuel levels and top up if necessary.</li> <li>○ Check oil levels and top up if necessary.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ If you site uses a generator, during an emergency situation you may need to bring in more fuel.</li> </ul>

### Operational Inspections

What you need to do	What you need to know
<ul style="list-style-type: none"> <li>▪ If you have a permanently installed back-up power system you will need to you will need to run it regularly to check that it can still start and is able</li> </ul>	<ul style="list-style-type: none"> <li>▪ Your O&amp;M manual will have an inspection schedule and SOPs that you must follow, these will be based on the design of electrical system at your site along</li> </ul>

to power the site. If you use a generator you should check:

- For fuel leaks that indicate that there may issues with the seals.
- Check the fuel for biofouling
- For any unusual noises or vibrations.
- The bunding for liquids and drain any water out.

with the manufacturers’ recommendations for particular generator you are using.

- Generators need to be regularly run to make sure that they are able to operate in an emergency situation.
- Old fuel can become fouled and impact on generator operation.

## Maintenance

### What you need to do

- If you have a permanently installed back-up power system you will need to maintain it, to make sure that it can reliably be used in an emergency. Maintenance of a generator typically involves oil changes, replacement of seals, diaphragms, tubing and filters etc.

### What you need to know

- Your O&M manual will have SOPs that you must follow to maintain the pumps, these will be based on the particular design of electrical system at your site and the manufacturers’ recommendation for the particular equipment your site has.

## Shutdown and Outage Management

### What you need to do:

- In the event of a power outage, you will need to make sure your power supply can switch from mains power to an alternative source. If you have a permanently installed generator, or battery bank, this should happen automatically.
- If you do not have a permanently installed back-up power system and may need to hire or borrow a generator if there is a power outage.

### What you need to know:

- Your O&M manual will have SOPs that you must follow to manually isolate the pump. These will be based on the design of the reticulation around the pump.
- To make sure that you get the right sized generator you need to know the voltage, load, and phase of all equipment to be powered from the generator.

## Fault and Incident Response



### What you need to do:

- When there is a problem with the power at your site you need to follow your incident and emergency response plan to resolve the issue as soon as possible.

### What you need to know:

- Your Incident and Emergency response plan must cover how you will respond to faults and incidents, this will include what you need to do if there is a power outage.



Element of Competence:	<b>Shutdown and Outage Management</b>		
<b>Context</b>	<p>Sometimes, there can be an outage of water within your supply. As a result of unplanned events such as a water pipe burst, you will need to undertake emergency work to restore the water supply to service.</p> <p>Other times Small Water Suppliers will have a planned shutdown, where they need to safely isolate and “lock out” assets to undertake planned maintenance.</p>		
<b>Outcome</b>	<p>Where a shutdown, or outage of supply, occurs that impacts on your ability to supply water to the community you will need to proactively respond, including managing customer expectations.</p> <p>Where a planned shutdown needs to occur, assets are safely isolated before undertaking any maintenance in a manner that:</p> <ul style="list-style-type: none"> <li>▪ Avoids the possibility of injury to workers</li> <li>▪ Maintains the safety of water being supplied to the community.</li> </ul>		
<b>Relevant Roles</b>		 <p>Management</p>	 <p>Operations</p>
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Identify the equipment that is to be worked on, including the point of isolation.</li> </ul>		<ul style="list-style-type: none"> <li>▪ There are occasions where this is not always clear, e.g., a switchboard may not isolate all equipment in the vicinity, or nearby isolation valves in the water distribution network might not isolate the section of pipe you need to work on.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Identify the hazards that might need to be controlled in order to isolate the plant or equipment.</li> </ul>		<ul style="list-style-type: none"> <li>▪ The risks associated with isolating a piece of plant or equipment and how to minimise the impacts associated with these.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Identify any other areas of the water supply system that might be affected by the isolation. You need to clearly understand and communicate the effects of the isolation to anybody who may be impacted.</li> </ul>		<ul style="list-style-type: none"> <li>▪ If the isolation means that water will not be able to be supplied to customers, you will need to let them know what to expect.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Select and use the correct equipment to safely isolate the plant to be worked on e.g., valves, isolating locks and tags, locking pins etc.</li> </ul>		<ul style="list-style-type: none"> <li>▪ The SOP for isolating different plant and equipment. This might include things like:                             <ul style="list-style-type: none"> <li>- Electrical isolation and tagging/locking out proving electrical equipment is dead (only to be carried out by registered electricians).</li> <li>- Immobilisation techniques such as valves, chains, locking pin etc.</li> </ul> </li> </ul>	



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- Bleeding off pressure, isolating and bypassing process equipment.
- 

- Remove any potentially hazardous substances from the system by draining, venting, purging or flushing.
  - The procedures for draining, venting, purging and flushing, including neutralisation of chemicals (e.g., chlorine).
  - How to confirm that your isolated equipment is safe to work on.
- 

- Safely remove, or reverse, isolation equipment to return the plant/equipment into service.
  - The procedures for removing isolations and returning plant and equipment to service.
- 

### Where to get more information:

- Refer to the [Guidelines for occupational Health and Safety in the water industry](#) (24), published by Water New Zealand more further guidance.
-

<b>Element of Competence:</b>	<b>Protecting water from contamination</b>		
<b>Context</b>	Water can get contaminated at each step in the supply process. Small Water Supplies need to be aware of the risks to their supply and understand the barriers against contamination that need to be maintained.		
<b>Outcome</b>	Risks to drinking water sources are addressed proactively as part of a multi-barrier approach for managing risks to drinking water supplies from 'source to tap'.		
<b>Relevant Roles</b>		 Management	 Operations

## Groundwater Sources

### What you need to do:

- Protect Groundwater bores from contamination. You will need to make sure:
  - That the bore head is above ground level with a concrete apron.
  - That the bore head is fenced to exclude stock.
  - Never use herbicides when clearing vegetation from around a bore.

### What you need to know:

- Groundwater (source water from bores and springs) will have unique characteristics because water in the aquifer (the geological formation that holds the water) is affected by the surrounding rock. For example, water from a limestone aquifer will be high in calcium.
- Shallow bores (less than 30m deep) and springs are more likely to be affected by rainfall and surface contamination than deep bores.
- Groundwater is the most chemically stable of the water sources, however some chemical parameters may be variable (e.g. iron and nitrate), especially in shallower waters. Some parameters can also be a nuisance (e.g. iron, hardness) or harmful (nitrate, manganese, arsenic). Regular testing is important in understanding your water source. Nitrate is an increasing concern in rural communities.
- Groundwater can be contaminated by a variety of sources, including where the water flows over wastewater leaching runoff, road runoff, fertilisers, agricultural runoff, or where there is fuel leaching through the soil.
- Microbiological contamination can also enter the water through the soil or by infiltration at the bore head.
- Both Acceptable Solutions and the [Drinking Water Quality Assurance Rules](#) contain

## Surface Water – River and Stream Sources

### What you need to do:

- Protect rivers and streams from contamination, keep animals away and avoid chemical use in the catchment.

### What you need to know:

- Activities upstream in the river will impact downstream source water.
- River water is particularly vulnerable to microbiological contamination, which can come from animal waste, dead animals in the river, and algae.
- Chemical contamination can come from a variety of sources including road run-off and crop spraying.

## Surface Water – Lake and Dam Sources

### What you need to do:

- Keep the area around a lake / dam clear of vegetation, protected from herbicide contamination and fenced.
  - Monitor the water level in the lake/dam.
  - Monitor the lake/dam for cyanobacteria (blue/green algae mats)
- 
- Protect the lake / dam from human activity, such as swimming, even if they are large in size.

### What you need to know:

- If the water level drops or the water stratifies, blue-green algae can bloom, and dissolved oxygen levels can drop.
- 
- Because lakes and dams catch water from surface run-off, they are vulnerable to collecting debris and becoming contaminated from the ground run-off.

## Roof Water Sources

### What you need to do:

- Make sure that your tank has a first-flush diverter, and screens installed to protect the water from animals and leaves getting into the rainwater tank.
- Keep the roof and gutters clean. They will need to be rinsed off after events such as volcanic ash eruptions or chemical pesticides from crop spraying. Make sure the dirty rinse water doesn't get in the tank.
- Screen overflow pipes, and airvents, to prevent animals and other contaminants entering the tank.

### What you need to know:

- Rainwater runoff collected from roofs is at risk of contamination from:
  - the metals and paints used on the roof.
  - Leaves on the roof
  - Birds and vermin entering the tank
  - Volcanic ash
  - Crop spraying

## Distribution System - Storage Tanks

### What you need to do:

- Make sure contamination cannot enter through the roof, or overflow pipes.

### What you need to know:

- Usually, the water supply is chlorinated before entering the storage tank. This provides for contact time between the chlorine dose and the water being supplied to the community. Problems can arise if contact time is too short, there is not enough chlorine, the water “short-circuits” through the tank or contamination enters the storage tank through the lid or an overflow pipe.

## Distribution System - Storage Tanks

### What you need to do:

- Pipe breakages should be fixed promptly to minimise contamination.

### What you need to know:

- Taste, odour or discolouration can be caused by pipe corrosion or algae growing inside the pipe.

## Distribution System – Connection Points

### What you need to do:



- Water connections need to have backflow prevention devices fitted to them. The type of device used may depend on the level of risk from particular types of customers.

### What you need to know:

- Backflow from water users can enter the distribution network, potentially contaminated it.
- Refer to the Backflow Prevention element of competence for more information

## Where to find more information:

- More information about preventing contamination in the drinking water supply can be found in the Drinking Water Quality Management Guidelines for New Zealand (8), published by the Ministry of Health.

Element of Competence:	Incident and Emergency Response Plan		
<b>Context</b>	<p>When things go wrong with your water supply, the health and safety of your water users, or workers, might be threatened. You will need to respond quickly and effectively at a time when you may be under pressure.</p> <p>Failure to respond in an emergency with your water supply is an offense under the <a href="#">Water Services Act 2021</a>.</p> <p>An Incident and Emergency Response Plan is a written document that outlines the step-by-step procedures that you will need to follow when things go wrong.</p>		
<b>Outcome</b>	<p>When an incident or emergency happens you quickly take the necessary actions to resolve it, helping to protect the health of your water users.</p>		
<b>Relevant Roles</b>		 Management	 Operations
What you need to do		What you need to know	
<ul style="list-style-type: none"> <li>▪ Develop an Incident and Emergency Plan for your supply that covers the incidents or emergencies that might threaten your supply.</li> <li>▪ Common incidents and emergencies that you may need to consider include:                             <ul style="list-style-type: none"> <li>- Power cut</li> <li>- Failure of a treatment unit</li> <li>- Pipe break / leak</li> <li>- Backflow</li> <li>- Increase in source water turbidity</li> <li>- <i>E. coli</i> detected in reticulation</li> <li>- Low FAC detected in reticulation</li> <li>- Exceedance of a MAV</li> <li>- Exceedance of an Aesthetic Value.</li> <li>- Toxic spill in source water</li> <li>- Notification by health authorities of suspected water borne community illness</li> <li>- Human error</li> <li>- Earthquake</li> <li>- Volcanic eruption</li> <li>- Fire</li> <li>- Drought</li> <li>- Vandalism</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ An incident is something that might happen to the supply where you have a chance to restore safe drinking water before it causes a major problem, for example resolving low levels of FAC when this reaches a level that requires an operational response, but before it reaches a critically low level.</li> <li>▪ An emergency includes situations when the water quality, or quantity, has already been seriously compromised, with little to no warning.</li> </ul>	

- Establish a response plan for each identified incident or emergency. At a minimum this should include:
  - A step-by-step detailed response covering what to do to fix the problem.
  - Who has responsibility for responding to each problem, and their contact details.
  - Pre-prepared communication messages like “boil water” or “do not drink” notices, including how and when these would get issued.
  - Increased monitoring if the incident involves a test which exceeds a MAV in the drinking water standards.
  - A plan for providing an emergency source of drinking water.
- What the triggers are for activating the incident and emergency response plan for the various possibilities, for example when a [critical control point](#) has been reached.
- That everybody involved in the operations, maintenance or monitoring of your water supply system needs to know what they need to do in an emergency.
- It is recommended that an up-to-date hardcopy of this plan is kept at the treatment plant, along with an emergency notice on the wall which references the Incident and Emergency Response Plan and the contact details of the people who can help you fix problems with your supply. The attached Emergency Response Poster can be used as a template.

- During an incident or emergency, you will need to:
  - Refer to your Incident and Emergency Response Plan to guide your response.
  - Tell others connected to the water supply what they need to do to stay safe. What you need to tell them will depend on what has caused the emergency.
  - Refer to your Operations and Maintenance Manual to help you troubleshoot the problem.
  - Depending on the cause of your emergency you might need also to bring in other people to help you.
  - You will need to notify Taumata Arowai of your emergency. Depending on the type of emergency you may also need to notify other agencies such as your Regional Council, WorkSafe, or Fire and Emergency to inform them of the issue.
- Communications, reporting, and record keeping requirements associated with emergencies, including making sure your response meets the requirements of the [Acceptable Solution](#) for the supply, where this is applicable.
- That you must notify Taumata Arowai if the drinking is, or maybe, unsafe to drink. Taumata Arowai can be contacted 24 hours per day on 04 889 8350 if there is an imminent risk of serious illness or death. Alternatively, Taumata Arowai can be contacted using Hinekōrako – the self-service portal for drinking water suppliers, or via notification forms on the [Taumata Arowai website](#).

- Test response plans prior to an emergency arising so that you know what will work in practice. Regularly review and update your Incident and Emergency Response Plans, including after any incidents.
- Everybody involved in the operations, maintenance or monitoring of your water supply system must be trained in emergency response practices. Make sure you keep records of this training.

## Where to get more information:

- Both the [Water Safety Kit](#) for small water suppliers and also the [Handbook for Preparing Water Safety Plans](#) developed by the Ministry of Health give examples of incident and emergency response plans.
  - Refer to the [Taumata Arowai website](#) for more information about how to notify incidents
-



# EMERGENCY RESPONSE

An unexpected change to the water supply that could make people sick is an emergency. It requires IMMEDIATE attention.

## WHAT TO DO:

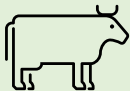





### 1 Check the Incident and Emergency Response Plan

Identify the problem and check your Incident and Emergency Response Plan for what to do. This will have emergency response trigger levels and specific step-by-step actions detailed for you to follow.

Insert QR Code to link to your Plan here.

### 2 Tell Others

Tell others connected to the water supply what they need to do, this will depend on what has caused the emergency:

MICROBIOLOGICAL CAUSE		CHEMICAL CAUSE		NO WATER	
					
Microbiological risks to the water supply can be caused by things like: <ul style="list-style-type: none"> <li>Stock or dead animals in the water</li> <li>Sewage in the water</li> <li>Treatment system failures due to a power-cut</li> <li>Increase in turbidity after rain reducing treatment effectiveness</li> </ul>		Chemical risks to the water supply can be caused by things like: <ul style="list-style-type: none"> <li>Fuel, fertilizer or pesticide spills</li> <li>Ash from a volcanic eruption or fire</li> <li>Toxins from algal blooms</li> </ul>		No water, or not enough water, can be caused by things like: <ul style="list-style-type: none"> <li>Power cut</li> <li>Pump failure</li> <li>Broken pipe</li> <li>Earthquake damage</li> <li>Drought</li> </ul>	
If the emergency is caused by a <b>microbiological</b> risk tell people:		If the emergency is caused by a <b>chemical</b> risk tell people:		If the emergency is caused by <b>no water</b> risk tell people:	

**"Boil your drinking water"**

"Boil water for at least 1 minute before using, or use bottled water"

**"Don't drink the water"**

"Use bottled water"



**"Save water for drinking and cooking only"**

### 3 Fix the Problem

Refer to the Operations and Maintenance Manuals provided by your equipment suppliers or design engineers. Depending on the cause of the problem you might need to bring in other people to help you fix it, such as:

Insert QR Code to link to O&M Manual here.

Equipment Suppliers	<i>Insert name(s) and phone no.(s) here.</i>	Electricity Provider	<i>Insert name and phone no. here.</i>
Electrician	<i>Insert name and phone no. here.</i>	Design Engineer	<i>Insert name and phone no. here.</i>
Pump Mechanic	<i>Insert name and phone no. here.</i>	Water Testing Laboratory	<i>Insert name and phone no. here.</i>
Instrumentation & Control Technician	<i>Insert name and phone no. here.</i>	Plumber	<i>Insert name and phone no. here.</i>

### 4 Notify Authorities

Depending on the cause of the problem you may need to notify regulatory authorities and/or Emergency Services e.g.:

Taumata Arowai	04 889 8350 (24 hours) notifications@taumataarowai.govt.nz	WorkSafe	0800 030 040
Emergency Services	111	Regional Council	<i>Insert phone no. here.</i>
		Medical Centre	<i>Insert name and phone no. here.</i>

**Element of Competence** **Data and Records**

**Context** Past data and records about your water supply can help you identify potential problems and support your decision making.

You will need to provide data and records to Taumata Arowai and your Regional Council to confirm your water supplies compliance with regulations and consents.

**Note:**  
The [Water Services Act 2021](#) requires water suppliers to keep records and provide data to Taumata Arowai.

**Outcome:**

- Relevant information is collected by the Small Water Supplier to allow informed decisions to be made.
- The supply meets its regulatory obligations to supply data to Taumata Arowai and the Regional Council.

**Relevant Roles**



Governance



Management



Operations

**What you need to do:** **What you need to know:**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Collect data and record information about your assets, for use in Asset Management planning including:             <ul style="list-style-type: none"> <li>- Operating and maintenance costs</li> <li>- Installation costs</li> <li>- Age and expected remaining life of assets</li> </ul> </li> <li>▪ Collect data and record information on things that can impact on the safety of your water supply including:             <ul style="list-style-type: none"> <li>- Source water quality</li> <li>- Operations and maintenance of your treatment processes</li> <li>- Distribution network backflow testing and hazard assessments</li> <li>- Water quality testing records</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ Refer to the <a href="#">Asset Management Planning</a> element of competence for more information.</li> <li>▪ Both the <a href="#">Drinking Water Quality Assurance Rules</a> and <a href="#">Acceptable Solutions</a> set out the information about your supply that you need to record.</li> <li>▪ Some parameters need to be continuously monitored, with certain determinants not to exceed a certain value for more a few minutes. This requires accuracy in time measurement and recording to ensure no short-term transgressions go unrecorded.</li> </ul> |
|--|--|

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>▪ Collect and supply data to the Regional Council about the impact the water supply is having on the environment. This usually means you will need to supply water take records to your Regional Council.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Your Resource Consent will detail what information you need to provide to the Regional Council. It will also detail the format that this information might take e.g., telemetry records from water source meters. Refer to the <a href="#">Resource Consent Compliance Monitoring and Reporting</a> element for more information.</li> </ul> |
|---|---|

**Where to find more information:**

- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to Small Water Supplies.

<b>Element of Competence:</b>	<b>Water Safety Plans</b>		
<b>Context</b>	<p>Water Safety Plans (WSPs) identify potential risks to the water supply and document how to manage them. Small Water Suppliers who do not adopt an <a href="#">Acceptable Solution</a> must have a Water Safety Plan.</p> <p>Depending on the experience of the Small Water Supplier, some may need to engage external technical specialists to help support to develop a Water Safety Plan for their supply.</p>		<p><b>Note:</b></p> <p>Small Water Suppliers who adopt an <b>Acceptable Solution</b> do <b>not</b> need to have a Water Safety Plan.</p>
<b>Outcome</b>	The Small Water Supplier safeguards the public's health through the development and implementation of the Water Safety Plan.		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>

**What you need to do:**



- Develop an up-to-date Water Safety Plan (WSP) that addresses the risks to the supply. You may need to engage a technical specialist to help you do this. The WSP need to:
  - Document operational procedures
  - Document the monitoring and inspection requirements.
  - Identify, and prioritise, improvement items.
- Small Water Supplier need to make sure that the WSP is put into practice. This includes making sure that everybody involved with the operations and maintenance of the supply has been trained and is aware of any WSP requirements.

**What you need to know:**

- The characteristics of your drinking-water supply system, and the barriers to contamination in place, including:
  - How to reduce the risk of your source water getting contaminated.
  - How to operate the treatment processes to remove particles, pathogens, and chemical hazards from the water supply.
  - How the disinfection process kills, or deactivates, pathogenic organisms that may be present in the water.
  - The risks to each part of the supply and how this might impact on water quality.
- While Taumata Arowai do not approve WSP's they can audit your supply to make sure that you are implementing the WSP.

**Where to get more information:**

- Refer to the Ministry of Health documents [Small Drinking-water Supplies, Preparing a water safety plan](#) (26) and the [Small Water Supplies, Water Safety Kit](#) (25) for guideline on Water Safety Plans for Small Suppliers. Note that due to regulatory changes since these were published elements of this document are out of date.
- For additional information about the [New Zealand Drinking-water Safety Plan Framework \(26\)](#), along with the [Water Safety Plan Guides for Drinking Water Supplies \(27\)](#), can also be referenced when preparing a Water Safety Plan.

<b>Element of Competence:</b>	<b>Source Water Risk Management</b>		
<b>Context</b>	<p>Source water is the natural fresh water that gets abstracted and then treated for drinking water. Protection of your source water is of paramount importance to the safety of drinking water. Most groundwater or surface water sources of drinking water supplies in New Zealand are located in catchments that have land-use activities that can pose a potential risk of contamination to your source water.</p> <p>Source water risk management involves mitigating the chance of any water contamination occurring to your source water in the first place (a council responsibility), and where contamination has already occurred it involves you managing the impact of the contamination on your supply to prevent any further harm.</p> <p>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. However, it is unlikely that you will have control over what happens within your source water catchment. Because of this, your local councils have a legislated 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 undertake actions to address those risks on your behalf.</p>		<p><b>Note:</b></p> <p>Source Water Risk Management Plans form part of your Water Safety Plan.</p>
<b>Outcome</b>	<p>Risks to drinking water sources are addressed proactively as part of a multi-barrier approach for managing risks to community drinking water supplies from 'source to tap'.</p>		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Identify any hazards that relate to your source water. Small Drinking Water Suppliers should contact their local authority to request information about the risks and hazards that they are aware of to your source water.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Your local authority will have information about issues that might impact on either the quantity or quality of you source water including: <ul style="list-style-type: none"> <li>- catchment land-use activities</li> <li>- potential sources of contamination</li> <li>- other water users</li> <li>- known risks or hazards</li> <li>- source water quality monitoring</li> </ul> </li> <li>▪ What your baseline source water quality is and how environmental conditions, land use or weather events can cause this to change over time. This can cause a challenge to the treatment system, which will need to be capable of responding to source water quality changes.</li> <li>▪ That where the local authority needs to undertake actions to protect your source water,</li> </ul>	

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you should get this confirmed in writing and attach it to your Source Management Plan.

- How you will be alerted to potential incidents and emergencies within the catchment.

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- Use the information above to prepare a source water risk management plan that documents the source water risks and associated mitigation measures. You may need external professional advice when writing this plan.
  - The Water Services Act requires drinking water suppliers to prepare and implement a source water risk management plan as part of their Water Safety Plan, based on the scale, complexity and risk of their supply. This plan must:
    - identify any hazards that relate to the source water, including emerging or potential hazards; and
    - assess any risks that are associated with those hazards; and
    - identify how those risks will be managed, controlled, monitored, or eliminated as part of a drinking water safety plan; and
    - have regard to any values identified by local authorities under the National Policy Statement for Freshwater Management that relate to a freshwater body that the supplier uses as a source of a drinking water supply.

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- If an adverse event in the supply catchment occurs which threatens the safety of the drinking water supply Small Water Suppliers must be able to implement the source water mitigation measures for the supply. You will need to identify how you are managing, controlling, or eliminating source water risks as part of your Water Safety Plan.
  - What potential incidents and emergencies within the catchment will require an operational response and ensure that this are included in your Water Safety Plan.

### Where to find more information:

- That Chapter 3 of the [Guidelines for Drinking-water Quality Management for New Zealand \(8\)](#) identifies the type of things that might impact on the quality of your source water, and what you might need to do to identify these hazards and limit their impact on your supply. The events associated with source water that create the greatest risk to drinking water are animal or human waste, toxins from algae and spills or leaks of contaminants in the catchment.
- That the National Environmental Standards for Sources of Human Drinking Water Regulations (25) (NES) requires Regional Councils to put conditions on consents within the supply catchment if there is the possibility of an event (e.g., spill) leading to a significant adverse effect on your drinking water supply. In this situation, conditions of consent must be imposed that require the consent holder to notify you as the drinking water supplier if an adverse event occurs.

<b>Element of Competence:</b>	<b>Health and Safety</b>		
<b>Context</b>	Small Water Suppliers work in an area with several high risks to their health and safety.		
<b>Outcome</b>	Work is undertaken in a safe manner that mitigates the hazards and risks that you, and others, may be exposed to.		
<b>Relevant Roles</b>	 Governance	 Management	 Operations
<b>What you need to do:</b>	<b>What you need to know:</b>		

- Identify hazards, risk assessment and control measures.

- That the [Health and Safety at Work Act 2015 \(HSWA\)](#) (4) is New Zealand’s workplace health and safety legislation. Small Water Suppliers must look after the health and safety of workers and any other contractors that they influence or direct.

- Safely undertake their work and look after the health and safety of any other workers that they direct. Depending on the particular hazards involved with their supply system, Small Water Suppliers need to be able to:
  - Conduct a health and safety induction for visitors to the site
  - Safely enter confined spaces
  - Work alone, and in isolated areas
  - Work with hazardous substances
  - Work at heights
  - Work in, and above, water.




- The Water New Zealand [Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry](#) (24) provides guidance and model procedures for how to comply with the Health and Safety at Work Act for water suppliers.
- What “permits to work” and operational procedures are in place at the Water Treatment Plant that control the identified hazards.

- Control plant and equipment hazards by:
  - Safely operating machinery
  - Safely operating vehicles
  - Safely operating mobile plant

- What Personal Protective Equipment (PPE) is required when operating and maintaining processes at the Water Treatment Plant.

### Where to find more Information

- The Water New Zealand [Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry](#) (24) provides guidance and model procedures for how to mitigate common health and safety risks in the water industry in New Zealand.

<b>Element of Competence:</b>	<b>Hazardous Substances Management</b>		
<b>Context</b>	<p>Small Water Suppliers ensure that chemicals and hazardous substances used at Water Treatment Plant are used and stored in a safe manner.</p> <p>The Water New Zealand <a href="#">Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry</a> (24) provides guidance and model procedures for how to manage chemical and hazardous substances at Water Treatment Plants.</p>		
<b>Outcome</b>	Chemicals and hazardous substances are stored and used in a safe manner.		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>Manage an inventory of all chemicals and hazardous substances used at the site, including all consumable chemicals, process chemicals and laboratory chemicals. The inventory needs to be kept up-to-date, accurate and easily accessible to emergency workers.</li> </ul>		<ul style="list-style-type: none"> <li>What hazardous substances (i.e., any product or chemical that has explosive, flammable, oxidising, toxic, corrosive or ecotoxic properties) are stored or used at the Water Treatment Plant and the dangers that these substances pose.</li> <li>When the chemicals you have stored will expire.</li> </ul>	
<ul style="list-style-type: none"> <li>Safely dispose of expired chemicals</li> </ul>		<ul style="list-style-type: none"> <li>How and where to dispose of chemicals.</li> </ul>	
<ul style="list-style-type: none"> <li>Ensure that Safety Data Sheets are available for all chemical and hazardous substances used at the site.</li> <li>Ensure that correct signage is in place for hazardous substances.</li> <li>Label containers containing hazardous substances correctly, including when they are decanted or transferred into smaller containers.</li> <li>Store any hazardous substances safely</li> </ul>		<ul style="list-style-type: none"> <li>Health and safety information is available for all chemicals on Safety Data Sheets (SDS) that must be provided at the time of supply.</li> </ul>	
<ul style="list-style-type: none"> <li>Safely work with chemicals and hazardous substances (both in terms of handling and storage requirements) including for: <ul style="list-style-type: none"> <li>Asbestos (historically, some water pipelines were made from Asbestos cement)</li> <li>Fuel</li> <li>Chemicals</li> </ul> </li> <li>Use the correct Personal Protective Equipment (PPE) and other appropriate controls (e.g., ventilation) as indicated on the Safety Data Sheet</li> </ul>		<ul style="list-style-type: none"> <li>You cannot work with or around hazardous substances until you have the knowledge and practical experience to do so safely.</li> </ul>	

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when handling chemicals and hazardous substances.




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- Follow the procedures detailed in the [Incident and Emergency Plan](#) for the Water Treatment Plant site in the event of a spill.

### Where to find more information

- The [Health and Safety at Work \(Hazardous Substances\) Regulations](#) (5) identifies how the chemicals and hazardous substances such as those used in Water Treatment processes need to be managed.
  - The Water New Zealand [Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry](#) (24) provides guidance and model procedures for how to manage chemical and hazardous substances at Water Treatment Plants.
  - That the [Water New Zealand National Asbestos Cement Pressure Pipe Manual](#) (26) details the health and safety requirements when working with asbestos material containing pipes, i.e. for work involving cutting into, removal, storage or replacement of AC pipes. Refer to the Water New Zealand [Good Practice Guide for Occupational Health and Safety in the New Zealand Water Industry](#) (24) for procedures for asbestos material not associated with pipes i.e. asbestos material present in switchboards or building materials.
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<b>Element of Competence:</b>	<b>Auditing</b>		
<b>Context</b>	<p>Small Water Suppliers need to undertake regular internal audits of their supply to make sure that you are complying with the requirements of either the Acceptable Solution you are following, or the Drinking Water Quality Assurance Rules.</p> <p>Taumata Arowai, or a third party on their behalf, may also carry out an audit to determine how well you are applying the acceptable solution or meeting the Drinking Water Quality Assurance Rule.</p>		
<b>Outcome</b>	Regular internal audits are carried out, and where issues are identified these are rectified as soon as possible.		
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>	 <p>Operations</p>

### What you need to do:



- Carry out an adequacy-style audit. This is a check to confirm that the initial installation of the assets, and the documents relied to support the delivery of safe water meet, the requirements of the [Acceptable Solution](#), or the [Drinking Water Quality Assurance Rules](#).
- Carry out an implementation-style audit. This is a check to confirm that the ongoing operation and maintenance of the supply is carried out according to the documentation that has been developed for the supply.

### What you need to know:

- If you are following an [Acceptable Solution](#) this identifies the items that your adequacy audit needs to check.
- If you are following the [Drinking Water Quality Assurance Rules](#) this also identifies issues that need to be internally audited.
- If you are following an [Acceptable Solution](#) this identifies the items that your implementation audit needs to check.
- If you are following the [Drinking Water Quality Assurance Rules](#) this also identifies issues that need to be internally audited

### Where to find more information

- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to small water supplies.

<b>Element of Competence:</b>	<b>Monitoring and Testing</b>	
<b>Context</b>	<p>Small Water Suppliers must monitor the quality of their water. It is critical to understand what is “normal” for your water supply so that, if monitoring picks up any changes in your supply’s usual water quality, the causes can be investigated, and the appropriate action can be taken.</p> <p>A variety of meters, and portable or online instruments and analysers can be used to do this. Critical parameters should be monitored continuously by analysers which will set off an alarm when things go wrong and instigate an automated response. For some parameters, water samples will need to be collected and sent to a laboratory for analysis.</p> <p>The monitoring and testing requirements for your supply need to be documented within Operations and Maintenance Manual. This document will also detail what your response should be when water quality parameter limits are reached.</p>	
<b>Outcome</b>	<p>Water supplies are monitored for the things that are most likely to contaminate them. By monitoring and testing the water you can:</p> <ul style="list-style-type: none"> <li>▪ Identify any changes to the quality of the raw source water which might impact on the treatment processes.</li> <li>▪ Confirm that you are treating water to the required level.</li> <li>▪ Take appropriate action when water quality parameter limits are reached to ensure that the water you supply is safe to drink.</li> </ul> <p>Confirm to Taumata Arowai that your supply meets both the Drinking Water Standards and the <a href="#">Drinking Water Quality Assurance Rules</a>, or <a href="#">Acceptable Solution</a>.</p>	
<b>Relevant Roles</b>	 <p>Governance</p>	 <p>Management</p>
<b>What you need to do:</b>	<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Identify target and action limits for parameters which identify when intervention may be required for your supply.</li> </ul>	<ul style="list-style-type: none"> <li>▪ If you are not following an <a href="#">Acceptable Solution</a>, you need to have a monitoring and inspection plans and document this within the <a href="#">Water Safety Plan</a> for the drinking water supply system. To do this you need to know: <ul style="list-style-type: none"> <li>- The parameters you need to monitor / inspect, and the purpose of the monitoring.</li> <li>- Which the parameters being monitored Critical Control Points (CCPs).</li> <li>- The <a href="#">Drinking Water Quality Assurance Rules</a> identifies parameters to be monitored, the</li> </ul> </li> </ul>	

**Note:**  
If you have adopted an **Acceptable Solution**, the parameters you must include (but are not limited to) in your monitoring and testing are detailed within the Solution.

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frequency of the monitoring and reporting of the results to Taumata Arowai.

- The method of monitoring including instrument used, location, timing, frequency, by whom, and what needs to be recorded.
- What actions to take in response to monitoring / inspection results
- Procedures for reporting results to Taumata Arowai.

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- Use a variety of meters, and portable or online instruments and analysers to monitor the supply.
  - The instruments used to monitor variables in the water treatment process and the basic scientific principles of these key analytical instruments.


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- Carry out key calibration or instrument checks of the above equipment to identify issues with performance. You will need to check the condition of the instrument and any supply tubing; cleaning may be required if a sensor is coated in chemical deposits.
  - The care and maintenance requirements of monitoring equipment including instrument condition assessments and calibration records.

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- Take representative samples of water from key points within the treatment process, safely using appropriate sampling equipment.
  - Refer to the "[How to take a Sample](#)" element of competence for more information on how to do this.

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- Review and analyse the performance of the water supply by using laboratory, site and network quality reports.
  - The need for accurate and precise recording and reporting of process performance, in line with the [Drinking Water Quality Assurance Rules](#) requirements.

### Where to get more information:




- The [Acceptable Solution](#) you are following (if applicable).
- [Drinking Water Quality Assurance Rules](#) that apply to small water supplies.
- The Ministry of Health document [Pathogens and Pathways, and Small Drinking Water Supplies](#) covers the ways water can get contaminated and how to measure contamination.
- The [Handbook for Preparing a Water Safety Plan \(13\)](#), published by the Ministry of Health, includes more information about monitoring.
- Chapter 17 of the [Guidelines for Drinking-water Quality Management for New Zealand](#) (8) identifies the typical parameters that are monitored in water treatment plants for the purpose of operational decision making, as well as typical instruments used to do this.


<b>Element of Competence:</b>	<b>How to take a Sample</b>		
<b>Context</b>	<p>Small water suppliers need to take, and send for testing, representative samples of water as part of the verification monitoring process.</p> <p>Samples need to be taken from:</p> <ul style="list-style-type: none"> <li>▪ Source Water</li> <li>▪ During the treatment process</li> <li>▪ Within the Distribution System</li> </ul>		
<b>Outcome</b>	<p>Samples are collected for testing throughout the water supply system from designated sampling locations.</p> <p>Samples are obtained in a way that ensures they are representative and not contaminated the sample. They are then correctly labelled, packed and sent to the laboratory as soon as possible.</p>		
<b>Relevant Roles</b>			 <p>Operations</p>
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Prepare the equipment and material that you will need to take the sample and send it away for testing. This might include: <ul style="list-style-type: none"> <li>- Contacting the laboratory so you will know of any specific sampling requirements for differing parameters.</li> <li>- Arranging for a courier to transport the samples to the laboratory.</li> <li>- Creating any documentation that need to be sent with the samples such as sample analysis request sheets, chain of custody forms and labels for sample containers.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ The sampling programme for the drinking water supply including: <ul style="list-style-type: none"> <li>- knowing what samples need to be taken and from where,</li> <li>- the sampling frequency for each of the parameters, and</li> <li>- the analytical methods and quality control requirements for each sample type.</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>▪ In preparing to take the sample, you need to take the following steps to prevent contamination: <ul style="list-style-type: none"> <li>- Wash hands thoroughly.</li> <li>- Wipe sample tap clean with a cloth or paper towel.</li> <li>- Flush the tap</li> <li>- Sterilise the tap outlet.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ How to sterilise a tap before taking a sample using either a gas burner, an alcohol wipe or a chlorine solution.</li> </ul>	

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- To take the sample, you need to:
    - Remove the sample bottle cap just before taking the sample. Be careful not to touch the inside of the cap, the seal or neck of the bottle, or put the cap down on a surface where it might become contaminated.
    - If taking a sample from a tap, turn it on the tap, leave the water running and fill the glass sample bottle. Do not rinse the sample bottle.
    - If taking a sample from a source water, make sure that any preservative in the containers is not flushed out when the sample is collected. To get a representative water sample from surface water source water you will need to collect a number of samples from different depths and areas, mixing the samples together into what is called a composite sample.
    - Fill the bottle to the correct level for the type of test you are undertaking. Sometimes this means you will fill the bottle to overflowing, other times you should not fill the bottle completely.
  - What containers and preservatives to use for various parameters to be tested, and any particular quality control criteria for them e.g., containers should not be overfilled if preservatives are present.
  - That the wrong type of bottle, the wrong preservative, incorrect storage, dirty equipment, samples taken at the wrong location, and poor labelling can all contribute to misleading test results.
  - For source water samples, most bodies of water are not well mixed which can make it difficult to get a representative sample.
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- After taking the sample, you need to:
    - Package the sample bottle so it does not break and is kept cool (a chilly bin with ice pack), for delivery to the laboratory.
    - Send the sample off to the laboratory as soon as possible, to arrive at the laboratory ideally within six hours and not more than 24 hours after collection.
  - Samples should be transported to the laboratory as soon as possible. Where the test is required to meet the [Drinking Water Quality Assurance Rules](#) you will need to use an IANZ accredited laboratory.

### Where to find more information

- Refer to [Sampling and Monitoring for Small Drinking Water Supplies \(34\)](#), published by the Ministry of Health, for more information on how to collect samples correctly.
- Standard AS/NZS 5667.1998 - Water Quality contains guidance how to design a sampling programme and also how to take samples from different types of water sources.

<b>Element of Competence:</b>	<b>Resource Consent Compliance Monitoring and Reporting</b>		
<b>Context</b>	<p>Water supplies usually require a resource consent to take water (a water permit), and sometimes to also discharge contaminants onto land or into the air or water (a discharge permit). A resource consent provides permission to take water and discharge wastes that would otherwise contravene the Resource Management Act.</p> <p>When resource consents are issued, they include conditions intended to protect the environment. As a consent holder you have a legal obligation to comply with any conditions set out in the resource consent. This may include collecting and providing data to the Consent Authority on the operation of the water supply (e.g., data on the amount of water taken, or confirmation that maintenance has occurred).</p>		
<b>Outcome</b>	All resource consent conditions related to the water supply are met.		
<b>Relevant Roles</b>	 Governance	 Management	 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>Fulfil the resource consent conditions related to the operation and maintenance of the Water Treatment Plant. This will mean that you need to monitor the performance of the Water Treatment Plant, including trending data, and communicate with the appropriate people when conditions of consent are close to being breached so that action can be taken to prevent this before it occurs.</li> </ul>		<ul style="list-style-type: none"> <li>What resource consent conditions are in place for the Water Treatment Plant and the limitations these apply to the operation of the Water Treatment Plant (e.g., maximum flow rates, total volume).</li> </ul>	
<ul style="list-style-type: none"> <li>Assist staff from the consent authority when they undertake site inspections, e.g., induct them onto the site.</li> </ul>		<ul style="list-style-type: none"> <li>Health and Safety requirements when inducting people onto site.</li> </ul>	
<ul style="list-style-type: none"> <li>Provide operational data to the consent authority in accordance with the conditions of consent.</li> </ul>		<ul style="list-style-type: none"> <li>What data needs to be collected and monitored to meet the conditions of the consent.</li> </ul>	
<ul style="list-style-type: none"> <li>Notify the appropriate people when the operation of the Water Treatment Plant fails to comply with the resource consent conditions and implement the operational response in accordance with the <a href="#">Incident and Emergency Response Plan</a>.</li> </ul>		<ul style="list-style-type: none"> <li>What to do if the operation of the Water Treatment Plant fails to comply with the resource consent conditions, as detailed in the <a href="#">Incident and Emergency Response Plan</a>.</li> </ul>	
<b>Where to find more information</b>			
<ul style="list-style-type: none"> <li>Refer to your local Regional Council for more information on resource consent requirements.</li> </ul>			

<b>Element of Competence:</b>	<b>Communicating about the Water Supply</b>		
<b>Context</b>	<p>Small Water Suppliers will at times need to be involved with proactively communicating to members of the public who are connected to their water supply.</p> <p>They also need to engage with other stakeholders both external to an organisation, like Taumata Arowai and the Regional Council.</p>		
<b>Outcome</b>	Effective communication is used by Small Water Suppliers to engage with stakeholders and the community.		
<b>Relevant Roles</b>	 Governance	 Management	 Operations
<b>What you need to do:</b>		<b>What you need to know:</b>	
<ul style="list-style-type: none"> <li>▪ Identify the people who are involved with the supply that you may need to engage with. This will include, but not be limited to:                             <ul style="list-style-type: none"> <li>- customers, particularly, those people impacted by shutdowns.</li> <li>- regulators (Taumata Arowai and the Regional Council).</li> <li>- equipment suppliers.</li> <li>- laboratories.</li> <li>- those identified in the Incident and Emergency Plan.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>▪ Those people who be affected by decisions or activities to do with drinking water. This is particularly important when managing customers’ expectations around shutdowns or communicating during an emergency.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Put together a contact list and communication plan for incidents and emergencies.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Who can help you respond in an emergency situation.</li> <li>▪ Taumata Arowai can be contacted during emergencies by calling 04 889 8350. This number is available 24 hours a day, 7 days a week.</li> <li>▪ How to troubleshoot common complaints that might be made about the water supply.</li> <li>▪ You need to know how you will approach your customers in an emergency, before an incident occurs. For example, issuing an alert on social media, as well as emailing customers, posting notices in public areas and issuing a press release.</li> </ul>	

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- Engage with stakeholders, particularly in response to complaints, or during emergencies.
  - If there is a water safety incident that puts the health of consumers at risk, you need to let them know straight away.
  - Hinekōrako, the self-service portal for drinking water suppliers, should be used to share information with Taumata Arowai.
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- Given the reactive nature of emergency situations you should have a prepared notice to issue to your consumers, in the event of an emergency.
  - An example of boil water notice, when there is a microbiological risk to the water supply, can be found on the following page.

### Where to find more information:

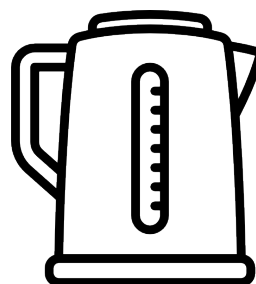
- The [Acceptable Solution](#) you are following (if applicable).
  - [Drinking Water Quality Assurance Rules](#) that apply to small water supplies.
  - The American Waterworks Association has published a guide, [Drinking Water Advisory Communication Toolbox](#), which although aimed at an American audience, provides a useful guide for the type of things you might need to consider when communicating about issues like boil water notices.
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## BOIL WATER NOTICE

<Insert name of your water supply>'s water is unsafe to drink at the moment.

Boiling the water will make it safe to drink



## BOIL YOUR DRINKING WATER

**“Boil water for at least 1 minute before using, or use bottled water”**

**When the water has been boiled, and cooled down, use it for:**

- Drinking
- Preparing food and baby formula
- Washing dishes
- Brushing teeth
- Pets water bowls

**Tap water is still safe to use for:**

- Showers and baths
- Shaving
- Flushing toilets
- Washing clothes
- Watering plants
- Dishwashers (on hottest setting)

We are working on fixing this problem as soon as possible. You will be told when the water is safe again.

For more information contact: *Insert name(s) here.*

Phone: *Insert phone no. here.*

Email: *Insert email address here..*

Website: *Insert link to website. here.*

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