Drinking Water Acceptable Solution for Roof Water Supplies

October 2022

This Drinking Water Acceptable Solution for Roof Water Supplies is issued under section 50 of the Water Services Act 2021.

Contents

1. Introduction

1.1. Purpose

Drinking water acceptable solutions are regulatory instruments made under the Water Services Act 2021 (**the Act**).[1] They offer practical ways for drinking water suppliers to provide safe drinking water that are proportionate to the scale, complexity, and risk profile of the relevant type of supply.

A drinking water supplier that chooses to adopt and comply with an Acceptable Solution must, for the purposes of the Act, be treated as having complied with the legislative requirements to which the Acceptable Solution relates (other than the duties to provide safe drinking water that complies with Drinking Water Standards under sections 21 and 22).[2]

Drinking water suppliers who comply with the entirety of this Acceptable Solution will be deemed to comply with the requirements arising under the following sections of the Act:

- Duty to take all reasonably practicable steps to supply aesthetically acceptable drinking water (section 24).
- Duty to protect against risk of backflow (section 27).
- Duty to have a drinking water safety plan (section 30).
- Duty to prepare and implement a source water risk management plan (section 43(1)).
- Duty to comply with the Drinking Water Quality Assurance Rules (section 49(3)).

A drinking water supplier who complies with this Acceptable Solution does **not** need to prepare a drinking water safety plan (including a source water risk management plan) or provide a copy to Taumata Arowai.

Drinking water suppliers adopting this Acceptable Solution must also comply with their other obligations under the Act and any other relevant legislation.

[1] Section 50 of the Act provides that Taumata Arowai may, by notice, issue a drinking water acceptable solution for use in establishing compliance with the legislative requirements.

[2] Water Services Act, s 51.

1.2. Scope

The scope of this Acceptable Solution is limited to drinking water supplies that meet the criteria specified below.

1.2.1 Eligible drinking water supplies

a) Drinking water supplies that collect rainwater from roof surfaces for supply to a building, or group of buildings (not being a domestic self-supply).[3]

   i. The Act and this Acceptable Solution does not apply to a roof water domestic self-supply where water is collected from the roof of a building for the use of a single residential household unit and the water is provided exclusively to the occupiers of that household.

b) Unless permitted by an exception under section 1.2.3, the drinking water supply must have a total base population of no more than 500 people.[4]

   i. The total base population of the roof water supply is the population that is normally supplied drinking water by all end-point treatment systems regardless of any seasonal or temporary increases.

c) All drinking water supplied by the roof water supply must be treated by an end-point treatment system.

1.2.2 Building and base population limits for end-point treatment systems

a) Each end-point treatment system must only provide drinking water to three or fewer buildings within the boundaries of one property.

b) The base population for a single building served by an end-point treatment system must not exceed 500 people.

c) The base population for two or three buildings served by a single end-point treatment system must not exceed 100 people.

[3] This can include the roofs of multiple buildings if the water is collected to a central or shared pre-treatment tank or tanks.

[4] For a roof water supply where the base population is less than 25 people, the Drinking Water Quality Assurance Rules – Very Small Community module offers an alternative compliance pathway.

i. Due to the lack of a chlorination requirement in this Acceptable Solution, the base population limit for multiple buildings supplied by an end-point treatment system via a limited pipe network is more restrictive than for a single building.

1.2.3 Allowed exceedance of base population limits

a) The population supplied by each end point treatment system may exceed its base population limit:

i. For a total of no more than 60 days in any 12-month period; and

ii. Is subject to the water supply having the capacity to supply treated water for these periods; and

iii. Is subject to additional monitoring requirements as stated in the table below.

	Number of buildings downstream of end point treatment system	
Criteria Description	One building	Two or three buildings
Base population limit	500 people	100 people
Monitoring and testing conditions when the population **exceeds** the base population limit	RF6 (see table in section 4)	RF7 (see table in section 4)

1.2.4 Examples of applicable roof water supplies

a) Examples of roof water supplies that are likely to have the characteristics above include:

i. An agricultural property with a main house, shearing quarters, milking shed, etc.

ii. A marae with kōhanga reo, housing for kaumātua.

iii. A rural school with or without associated teacher housing.

iv. Accommodation in the form of flats (multiple buildings served by shared roof water collection i.e., farm stays and bed and breakfast accommodation).

1.3. Commencement

The commencement date of this Acceptable Solution is 14 November 2022.

2. Roof drinking water requirements

This Acceptable Solution may be adopted by a drinking water supplier where all the following requirements (except those specifically identified as recommendations) are met.

2.1. General use requirements

a) All roof water collection systems and end point treatment systems are designed, configured, and installed in accordance with this Acceptable Solution.

b) Water provided for flushing toilets and outdoor use may be untreated but must be marked as non-potable in accordance with the Building Code.[5]

2.2. Roof water collection system requirements

The roof water collection system must meet the following requirements:

a) Materials in contact with roof water (roof, spouting, fittings, tanks, etc) are suitable for contact with drinking water and do not leach chemicals or other substances to the extent that treated drinking water is unsafe or exceeds a maximum acceptable value (**MAV**) specified in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022.[6]

b) Lids on all storage tanks are secured to prevent contamination by vermin, birds, faecal material, or other material.

c) Inlets, overflows, and any other small gaps in tanks must be screened to be secure from contamination by vermin, birds, faecal material, or other material.

2.3. Roof water collection system recommendations

It is recommended, but not essential for the purposes of this Acceptable Solution, that the roof water collection system includes the following:

[5] Clause G12.3.4, Schedule 1 of the Building Regulations 1992.

[6] Uncoated lead flashings, lead-head nails, treated timber, asbestos roofs, bitumen, lead-based paints, and other coatings containing chemicals not suited for contact with drinking water are examples of unsuitable materials.

a) The roof surfaces used for the collection of drinking water do not have trees or other vegetation overhanging them. As far as practicable, roofs should be kept free from potential contaminant sources like decaying debris, leaves, branches, bird nests, etc.

b) A leaf screen, with a maximum mesh size of 1.5mm, installed prior to the untreated water storage.

c) A first flush diverter, that is sized appropriately for the roof area, installed prior to the untreated water storage.

d) The roof supply can be isolated from the water storage and treatment system for cleaning and maintenance. This can be achieved with a downpipe diverter.

e) A calmed bottom inlet and floating outtake are installed for untreated water storage tanks.

f) The quantity of untreated water storage is sufficient to support the ordinary drinking water needs of consumers served by the supply. A minimum of 96 hours' average demand of untreated storage is recommended.[7]

2.4. End-point treatment system requirements

a) Each component of the end-point treatment system must be installed:
    i. To meet the peak instantaneous demand for treated drinking water.
    ii. In accordance with the manufacturer's instructions and requirements.

b) The end-point treatment system and all associated pipework and associated fixtures must comply with the Building Act 2004 and the Building Code if relevant.

c) The design and construction of the water treatment system must prevent backflow, being the unplanned reversal of flow of water or mixtures of water and contaminants into the water supply system.

d) Each UV disinfection unit must be validated to at least one of the following standards:
    i. Ultraviolet Disinfection Guidance Manual (USEPA 2006b).
    ii. DVGW Technical Standard W294 (DVGW 2006).
    iii. öNORM M 5873-1: 2020 01 01.[8]
    iv. NSF/ANSI 55 Class A (NSF, ANSI n.d).

[7] This recommended minimum may not be appropriate for areas that are subject to droughts.

[8] UV reactors installed before 1 January 2020 can be certified to öNORM M5873 (Osterreichisches Normungsinstitut 2001).

e) Where a UV disinfection unit has been installed before 12 October 2022 and the manufacturer has provided written evidence (e.g. manufacturer's website, instruction manual, etc) that the unit delivers a minimum UV reduction equivalent dose of 40 mJ/cm^2 then the unit is not required to meet the UV validation requirements set out above at 2.4(d).

f) Each end-point treatment system must (as a minimum):

   i. Have two stage cartridge filtration with 20 micron and 5 micron or less, nominal pore sizes.

   ii. Have a UV disinfection unit that delivers a minimum reduction equivalent dose of 40 mJ/cm^2 as measured by a UVI or UV dose sensor.

   iii. Monitor UV dose continuously and generate a local onsite alarm if the UV dose is below 40 mJ/cm^2 or outside the limits specified by the manufacturer.

   iv. Have flow control to ensure water flow is within the specification of the UV unit and be designed to shutdown automatically on a low UVI or UV dose.

   v. Have a lamp status indicator if a UV disinfection unit contains more than one lamp.

   vi. If applicable, not allow flow of water during a UV disinfection unit's lamp warm-up period until the required UVI or UV dose is achieved (an automatic control valve or start/stop of the pump must be used to control flow during the warm-up period).

   vii. Have an air release valve(s) to allow air to be removed from the system on start up.

   viii. Have manual isolation valves fitted upstream and downstream of the treatment system to allow for maintenance.

   ix. Be sized to ensure flow rates comply with clause G12.3.7(a) (Water supplies) of the Building Code and are adequate for the correct functioning of fixtures and appliances within the building.

2.5. Using alternative water sources

a) Treated water from a water carrier registered with Taumata Arowai can supplement the roof supply and can be delivered to a treated water storage tank (if there is one) or an untreated water storage tank.

b) Water from a spring or bore that is used to supplement the roof water supply must be delivered into the untreated water storage tank so that all drinking water provided to the building(s) served by the supply passes through the end-point treatment system. The spring or bore water and the system used to collect this water must comply with the following sections and requirements in the Drinking Water Acceptable Solution for Spring and Bore Drinking Water Supplies:

   i. Section 2.2. Pre-requisite source water monitoring.

ii. Section 2.3. Pre-treatment requirements.

iii. Section 2.4. Bore and spring water collection system requirements.

iv. SB3 in Section 4. Monitoring and testing.

c) Surface water or water from a water carrier not registered with Taumata Arowai cannot be used to supplement the roof supply.

2.6. Treated water tank requirements

If a treated water tank is included as part of the drinking water supply:

a) It must be secure against the ingress of rainwater and surface water.
b) Inlets, lids, overflows, and any other small gaps in tanks must be secure from contamination by birds, animals, faecal material, or other material.

3. Operation and maintenance

a) The operation and maintenance of the roof water supply, including all treatment systems under this Acceptable Solution, is the responsibility of the drinking water supplier.

b) The drinking water supplier must provide information about the drinking water supply to the consumers at the properties connected to it and communicate whether the consumers are required to maintain or test the end-point treatment system. This must include a process to ensure all new consumers are informed of any maintenance or testing requirements.

c) The drinking water supplier must keep and maintain documentation that supports the ongoing operation and maintenance of the whole of the roof water supply. This must include (but is not limited to):

i. A description of the drinking water supply and key components.

ii. A supply diagram that shows the components of the supply system, including sources, backflow devices, valves, pumps, treatment components, connections, and bypasses.

iii. Incident and emergency response procedures.5

iv. Key contacts, including details for operators, manufacturers, suppliers, regulators, property owners, and consumers.

v. Maintenance and inspection schedules and associated procedures that meet the drinking water supplier's and/or manufacturer's requirements for equipment used in the supply (e.g., end-point treatment system equipment, roof water collection system equipment, etc).

vi. Schedule and procedures for inspecting the roof(s), gutters, untreated and treated storage tanks (e.g., storage tanks are intact to prevent access of vermin or ingress of contaminants) and associated infrastructure.

vii. Good hygienic practices, including prohibition of people working on a water system who are experiencing any gastrointestinal illness, protection of work sites, materials, and tools from contamination, and minimising the entry of contamination into the water supply during any activity.

d) The drinking water supplier must inspect each treatment system and roof water collection system at intervals of no more than two (2) months.

e) All activities undertaken according to the maintenance and inspection schedules must be recorded and the documents retained for at least five (5) years to demonstrate the activities have been completed.

f) Operations and maintenance documentation must be consistent with any operation or maintenance requirements provided by the manufacturers of any equipment used as part of the drinking water supply.

4. Monitoring and testing

a) The drinking water supplier must undertake water quality testing and keep records including (but not limited to) the conditions in the following table.

Condition	Requirement
RF1	All water samples that are used to demonstrate compliance with this Acceptable Solution must be: 1. Analysed by a laboratory accredited by IANZ for the type of analysis being undertaken 2. Collected according to any instructions and specifications provided by the laboratory.
RF2	Drinking water suppliers must take all reasonably practicable steps to ensure that samples to be tested for *E. coli*, total coliforms, or other microbiological contaminants are delivered to a laboratory within 24 hours of the sample being collected, and where practical at a water temperature that is no higher than the water temperature at the time of sampling but above zero degrees Celsius.

Condition	Requirement
RF3	Collected rainwater must be monitored for the following determinands at least once between June and August when this drinking water acceptable solution is first adopted and then every three years between June and August: i. Benzo[a]pyrene – test only required if there is a chimney or open fire on the property(s) the source water is collected from ii. Cadmium iii. Copper iv. Lead v. Zinc
RF4	If a monitoring result for a chemical determinand exceeds 50% of the **MAV** in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022, additional monitoring must be undertaken on a three-monthly basis until four (4) consecutive results are less than 50% of the MAV.
RF5	A sample for *E. coli* and total coliforms must be taken from treated water leaving each end-point treatment system at least once every three months.
RF6	For end point treatment systems serving one building: Samples for *E. coli* and total coliforms must be taken from treated water leaving the end-point treatment system **in the week prior, or otherwise as soon as reasonably practicable,** to the population exceeding 500 people and **twice each week** (with at least three (3) days between samples) until the population no longer exceeds 500 people.
RF7	For end point treatment systems serving two or three buildings: Samples for *E. coli* and total coliforms must be taken from treated water leaving the end-point treatment system **in the week prior, or otherwise as soon as reasonably practicable,** to the population exceeding 100 people and **twice each week** (with at least three (3) days between samples) until the population no longer exceeds 100 people.

5. Incident and emergency management

a) The drinking water supplier must have documented incident and emergency management procedures to ensure the supply of a sufficient quantity of safe drinking water.

b) The drinking water supplier must have a plan to undertake a managed response according to their procedures. The plan must:

i. Outline reasonably anticipated incidents or emergencies (e.g., *E. coli* detection, total coliform detection, power failure, interruption to supply, consumer complaint/illness, sample exceeds a MAV in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022).

c) For the incidents or emergencies identified in 5(b)(i), confirm how the drinking water supplier intends to:

i. Take immediate action to ensure that the health of water consumers is protected and remedy the situation.

ii. How water consumers will be communicated with and when it is appropriate to issue boil water notices or do not drink notices.

iii. Investigate the source or cause of the incident and address it as soon as possible.

iv. Notify Taumata Arowai that the drinking water is or may be unsafe

v. Identify and implement measures required to ensure that the problem does not reoccur.

vi. Outline what additional laboratory testing will be undertaken for each incident and emergency and if necessary, detail alternative drinking water sources (e.g., bottled water, water carrier, etc).

d) Suppliers must review incident and emergency response plans after every major incident and update the plans based on learnings from the review.

e) All incidents and emergencies must be recorded, and records retained for five (5) years to demonstrate the activities have been completed.

6. Training

a) People who maintain or operate the roof water supply must be competent to undertake the tasks necessary to ensure the system provides safe drinking water.

b) The person responsible for the roof water supply must have a good understanding of:

i. the emergency and incident management procedures
ii. how to comply with this Acceptable Solution.

7. Definitions

Term	Definition
Act	The Water Services Act 2021.

Building Code	Schedule 1 of the Building Regulations 1992. The Building Code is contained in regulations under the Building Act 2004.
Calmed bottom inlet	An inlet to a storage tank that delivers water to the bottom of the tank through a U-bend or similar feature, minimising any disturbance of sediment at the bottom of the tank.
Determinand	A substance or characteristic that is determined or estimated in drinking water.
Domestic dwelling	As defined in section 10(2) of the Act: Domestic dwelling means a building that is used as a single household unit, whether it is— (a) tenanted on a long- or short-term basis; or (b) occupied permanently or temporarily (for example, a holiday home) 'Household unit' has the meaning given to it by section 7 of the Building Act 2004.[9] Examples of a 'domestic dwelling' in the Act include a single property with tenants on a lease, or a single holiday house that is rented to tourists on a short-term basis. Examples that are not 'domestic dwelling' in the Act include a multi-dwelling building (for example, multiple separate apartments contained in a single building), or a marae, wharekai (dining hall), or community hall, or a café building.
Domestic self-supply	As defined in section 10 of the Act. Means a stand-alone domestic dwelling that has its own supply of drinking water.
Drinking Water Quality Assurance Rules	The Drinking Water Quality Assurance Rules 2022, made by Taumata Arowai under section 49 of the Act.

[9] 'Household unit' is defined (section 7 Building Act 2004) as a building or group of buildings, or part of a building or group of buildings, that is—

(a) used, or intended to be used, only or mainly for residential purposes; and

(b) occupied, or intended to be occupied, exclusively as the home or residence of not more than 1 household; but

(c) does not include a hostel, boardinghouse, or other specialised accommodation.

Drinking water supplier	As defined in section 8 of the Act: Unless the context otherwise requires, drinking water supplier— (a) means a person who supplies drinking water through a drinking water supply; and (b) includes a person who ought reasonably to know that the water they are supplying is or will be used as drinking water; and (c) includes the owner and the operator of a drinking water supply; and (d) includes a person described in paragraph (a), (b), or (c) who supplies drinking water to another drinking water supplier; but (e) does not include a domestic self-supplier.
Drinking water supply	As defined in section 9 of the Act: Unless the context otherwise requires, drinking water supply— (a) means the infrastructure and processes used to abstract, store, treat, transmit, or transport drinking water for supply to consumers or another drinking water supplier; and (b) includes— a. the point of supply; and b. any end-point treatment device; and c. any backflow prevention device; but (c) does not include a temporary drinking water supply provided for under sections 33 or 34 of the Act or a domestic self-supply.
end-point treatment	Treatment of drinking water at the final point of the supply at which the consumer can consume, use, or collect drinking water.
First flush diverter	A device used to prevent contaminated roof water from entering a storage tank after the first rainfall following a dry period.
Floating outtake	An outlet from a storage tank through a flexible pipe attached to a float, allowing water to be drawn from the top of the tank.
maximum acceptable value or MAV	The maximum acceptable value of a determinand that is permitted in drinking water. The full range of MAVs for relevant determinands is set out in the Water Services (Drinking Water Standards for New Zealand) Regulations 2022.
Networked supply	A drinking water supply that provides drinking water via a distribution system at a pressure and volume to meet consumer demand, or at a restricted flow and volume. These supplies may include storage facilities within the network to buffer demand. As defined in the Drinking Water Quality Assurance Rules.

operations and maintenance manual	A hardcopy or electronic document that outlines how to operate and maintain the drinking water supply under this drinking water acceptable solution to ensure safe water is provided.
Roof water	The rainwater collected from the roof of a building or structure.
Surface water	A body of water that is open to atmosphere, whether running (streams and rivers) or quiescent (lakes, reservoirs, impoundments, and ponds). Surface water does not include spring or bore water.
Taumata Arowai	The New Zealand water services regulator, established under the Taumata Arowai–the Water Services Regulator Act 2020.
total base population	Total base population of the roof water supply is the population that is normally supplied drinking water by all end-point treatment systems regardless of any seasonal or temporary increases.
Treatment system	A treatment system that complies with this drinking water acceptable solution.
UV	Ultraviolet light.
UVI	The intensity of UV radiation, usually measured in mW/cm2.
Water Services (Drinking Water Standards for New Zealand) Regulations 2022	The Water Services (Drinking Water Standards for New Zealand) Regulations 2022 made under section 47 of the Water Services Act 2021.