

Ways to ensure your drinking water supply is safe

Providing safe drinking water is essential for protecting people from illness. Outbreaks of gastroenteritis can occur as a result of people drinking contaminated water from un-treated or un-maintained drinking water supplies. The risk of illness can be greatly reduced by obtaining water from a good quality source and regularly maintaining and monitoring the water supply system. The following information outlines ways of keeping your drinking water supply safe for children and staff.

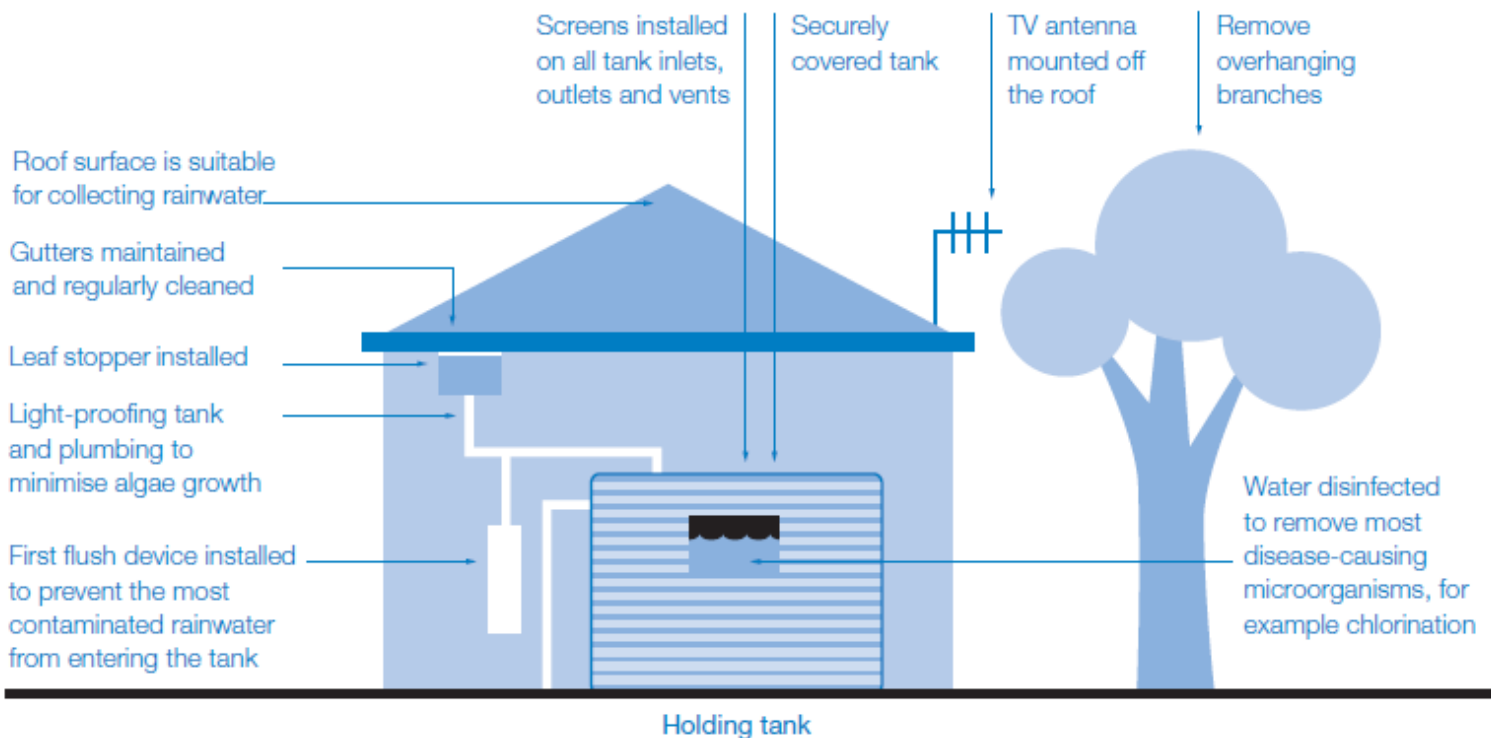
Managing and minimising the risks to your drinking water supply



Ways to minimise risks to RAINWATER supply systems:

Rainwater contamination hazards include:

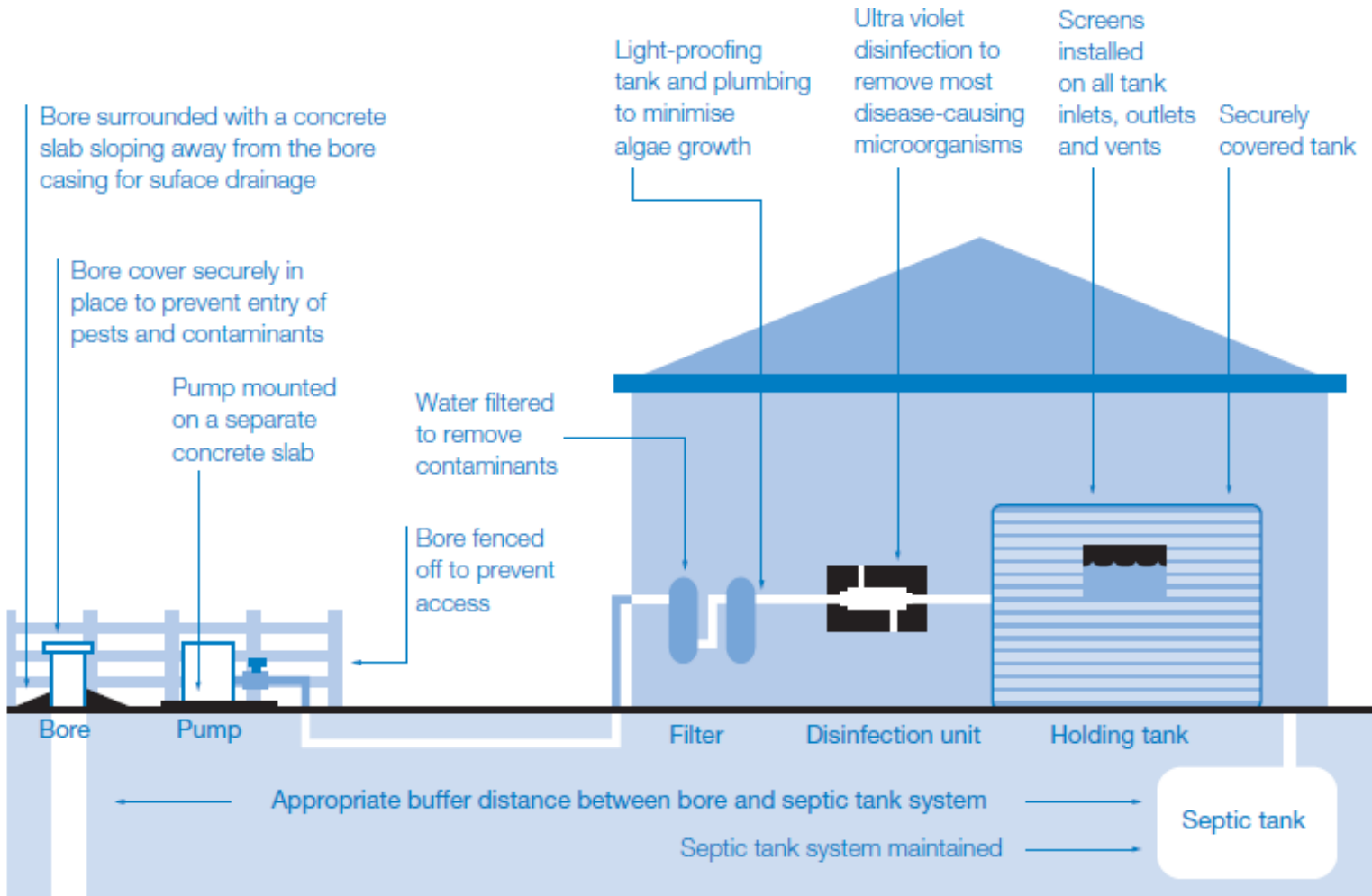
- roof materials such as roofs coated in bitumen products or lead-based paints
- lead flashing or lead-head nails on the roof causing high lead levels in the collected water
- animal faeces (birds, possums) or dead animals and insects in the gutters or tank itself
- leaves, windblown dust, dirt and other debris entering the tank from the roof
- ash and chemicals from wood heaters (for example in instances where chimneys and flues are not installed properly or the burning of inappropriate fuel)
- pesticides and fertilisers from aerial spray drift
- in-ground tanks can be at risk from ground water seepage.



Ways to minimise risks to a GROUNDWATER supply system:

Groundwater contamination hazards include:

- sewage e.g. seepage from septic tanks
- animal faeces run-off in farmland areas
- industrial and agricultural run-off (such as pesticides and fertilisers)
- polluted stormwater
- chemical spills
- naturally occurring chemicals
- contaminated surface waters e.g. during flood events.



Risk diagrams taken from "A guide to completing a water supply management plan", Department of Health, Victoria.

New groundwater sources should be tested for naturally occurring chemicals such as arsenic, manganese, nitrates prior to the supply being used. This can be arranged by contacting the MidCentral Public Health Service.

A good understanding of your water supply system is required in order to identify all potential hazards to the water supply and possible sources of contamination. Most issues in smaller water supplies are caused by lack of system knowledge i.e. the system breaks down and no one is aware of it happening or knows what to do. Impact on the water supply from staff changes can also be often overlooked. More than one member of staff should be familiar with the water supply and be aware of the hazards that need to be managed so that any risks to the supply can be minimised.

Treating the water to make it safe for drinking



Treating the water supply helps to ensure the health of children and staff is not placed at risk. The most common treatment methods include filtration, and disinfection (including chlorine and ultraviolet (UV) light).

Filtration

Filters, used to remove sediment, are commonly installed with your regular plumbing between the roof catchment area and the storage tank. They are normally used in combination with UV light/or chlorine disinfection.

Disinfection

Disinfection is generally the last step of water treatment.

- **UV:** is commonly installed with your regular plumbing after filtration because UV light cannot penetrate dirty or clouded water. *Both filters and UV disinfection systems should be designed and installed by a water treatment professional.* It is recommended that UV systems comply with the New Zealand drinking water standards. Scheduling the replacement of older UV systems should include compliance with the current standards at that time. A drinking water assessor at the MidCentral Public Health Service can provide further advice.

UV systems need regular and careful maintenance to ensure they remain effective. It is particularly important that the UV lamps are regularly inspected to ensure the light is working and cleaned to remove any build-up of scum.

- **Chlorine:** is often used to treat small drinking water supplies because it is easily accessible, cheap and can treat large volumes of water. Water can be chlorinated through an automatic dosing system or manually added to the storage tank. The effectiveness of chlorine can be short-lived and will only treat water in the tank at the time of dosing; fresh run-off into the tank may not be disinfected. If more than 0.2 mg/L of free available chlorine is maintained in the drinking water system then *E. coli* are rarely found.

A chlorine dose guide:

Volume of water in tank (litres(L))	AMOUNT OF CHLORINE (LIQUID BLEACH) TO ADD TO TANK millilitres (ml)			
	1 g/m ³	2 g/m ³	5 g/m ³	10 g/m ³
1000	33	67	167	333
2000	67	133	333	667
5000	167	333	833	1667
6000	200	400	1000	2000
7000	283	467	1167	2333
8000	267	533	1333	2667
9000	300	600	1500	3000
10000	333	667	1667	3333
20000	667	1333	3333	6667

- 1 g/m³ routine disinfection for clean water
- 2 g/m³ routine disinfection for reasonably clean water
- 5 g/m³ period disinfection for tanks and pipes
- 10 g/m³ super chlorination for biological contaminated tanks – remove contamination, dose tank, allow water to sit for 24 hours before using.

Monitoring your drinking water supply



Monitoring (taking drinking water samples for testing) is an essential part of the overall 'multiple barrier' approach to good water quality management. Regular monitoring provides evidence that the system is well maintained and treatment processes are working properly.

Microbiological testing

As a minimum, the quality of the water should be tested:

- Monthly, or as stated in your Public Health Risk Management Plan if you operate one (e.g. this could be once per term)
- Before using the water from a new treatment system
- After a treatment system has been altered
- After a contamination event that may have affected water quality, i.e. possum found in tank
- After prolonged periods of treatment system shutdown such as the December/January school holiday period
- After a significant event such as a flood or fire.

Tests of the microbial quality of water should look for the organism *Escherichia coli* (*E. coli*). If *E. coli* is detected, this indicates faecal contamination and the presence of disease-causing micro-organisms. The NZ drinking water standards state that *E. coli* should not be present in drinking water leaving a treatment system or in the distribution zone (pipework and outlets) of a water supply system.

Those taking drinking water samples should receive adequate training and have a good understanding of the sampling requirements. The MidCentral Public Health Service resource ***Taking drinking water samples for microbiological testing*** provides a useful guide.

Water samples should be sent to a laboratory accredited by the Ministry of Health. A list of laboratories can be found at www.drinkingwater.org.nz/mohlabs/labmain.asp. The laboratory can provide sterile sampling bottles and information about sampling protocol. A cheaper presence/absence test (P/A) for *E. coli* may be used for routine monitoring but if *E. coli* are found to be "present" the more rigorous numerical method must be used for repeat tests so that a numerical result (number of *E. coli* can be counted) can be obtained. This will show the degree of contamination in a supply.

You may wish to contact your Environmental Health Officer at your local council as they may provide a sampling service. Alternatively check with other schools/ECE in your local area as you may be able to save money by combining laboratory courier fees for your individual drinking water samples.

Chlorine testing

If you chlorinate your supply testing of chlorine residual (free available chlorine) should be carried out at least weekly, preferably daily. This can be done using a simple DPD tablet and colour comparator. Regular testing for free available chlorine will:

- serve as a check on the continuous free available chlorine level
- indicate when chlorine demand has increased, requiring further dosing
- reduce the level of complaints of strong chlorine odours, which may result from excessive or insufficient dosing.

If a free available chlorine level is maintained of more than 0.2 mg/L (ideally 0.2 - 0.5 mg/L) children and staff can be reasonably confident that most disease-causing organisms will be destroyed after a 30 minute period. However, some disease causing organisms (such as cryptosporidium) are more tolerant of chlorine (will not be killed) and require removal by filtration/UV.

Maintenance of your drinking water supply



Following is a list of maintenance activities that you can tailor to suit your drinking water supply, i.e. you can add additional items that are relevant to your supply as necessary.

Water source: RAINWATER	Clean spouting/gutters, gutter screens (3-monthly and after storms events)
	Check and trim overhanging branches (annually)
	Inspect and repair downpipes (annually)
	Check condition of roof (annually)
Water source: GROUNDWATER	Check the bore head and any other mechanisms installed are sealed/watertight
	Check bore is securely protected such as fences, locks (monthly)
	Check maintenance and operation of the pump (monthly)
Tank	Check inlet and outlet screens - ensure secure, in good condition, no breakages (3-monthly)
	Check access covers are secure and in good condition (monthly)
	Clear strainer of debris (3-monthly and after storm events)
	Check structural condition for cracks, leaks etc (annually)
	Check accumulated sludge level and internal cleanliness, clean out as required (annually or as required).
	Check water level regularly, particularly over summer months.
Distribution system (pipe-work)	Check plumbing/piping is fully operational and well maintained (annually)
	Check there are no cross-connections between potable and non-potable systems (if there is there should be a operating procedure for staff that ensures that the potable supply is not contaminated with the non-potable water)
	Ensure pipes are flushed following periods of inactivity (such as school holidays and end of year breaks) and after any repairs to the systems
	Ensure there are no dead ends or unused pipes in the system where water can stagnate
	Check any back-flow prevention devices (as per the manufacturers instructions)
Treatment system	Check and replace filters (as per manufacturers instructions - replace earlier if a decrease in water flow is noticed)
	Test chlorine level is at or above 0.2 mg/L (0.2 - 0.5 mg/L is usually adequate) (at least weekly or after heavy rains)
	Ensure adequate treatment can be maintained at all times (an adequate amount of chlorine is kept on site, filters/UV lamps are replaced prior to their end of life – not after.
	Check UV light is operating and free from scum (weekly)
	Replace UV lamp when UV intensity falls below the minimum needed for disinfection, or when the lamp has operated for the rated number of hours (as per manufacturers instructions), or when it fails.
General	Look for evidence of problems on an ongoing basis (e.g. lack of water pressure, evidence that there may be a leak or that filters need replacing) and deal with issues when they arise.

Planning how to respond to a contamination/emergency event



Schools and ECE services with their own drinking water supplies should plan how to respond if an emergency occurs. Contingency plans should be in place around specific risks relevant to your supply and should include responsibilities of staff, actions that need to be taken to make the supply safe, who to notify, and the resources that will be needed to cope with the emergency (and how to obtain them). Contingency plans will be in your PHRMP if you have one.

Unusual events can contaminate water supplies that are normally clean and can result in the supply not being able to be used. Depending on the type of supply (rainwater/groundwater) these events might include:

- *E. coli* detected in routine monitoring of the drinking water supply
- complaints of discoloured, tasting or smelly water coming from the taps
- a detectable chlorine residual cannot be obtained during testing (if supply is chlorinated)
- reports of illness that may be linked to the water supply
- vandalism and break-ins
- natural disasters
- dead animals in a storage tank
- fires
- equipment failure, e.g. pipelines or water storage
- treatment failure, e.g. UV failure
- prolonged power failure
- mismanagement of non-potable connections on a potable supply e.g. non-treated tank used for a swimming pool, historical non-potable connections such as farm tanks which are still connected to the potable system etc
- absence of key staff (e.g. the person who usually looks after the water supply).

If you suspect that your drinking water supply has been contaminated act immediately to ensure everyone with access to the water is notified. Advise teachers/management/staff of the situation and prevent students/children from accessing potentially contaminated water.

Put up adequate signage to warn that the water is, or may be, unsafe to drink and that it must be boiled. If the water cannot be treated to a standard safe for drinking, you should provide an alternative drinking water supply until the regular water supply is proven to be safe, e.g. bottled or carted water. If there are any cases of illness due to consumption of the contaminated drinking water, the affected individual should be provided with school-level medical assistance or assessed by a doctor.

If you suspect that the water has been microbiologically contaminated, a drinking water sample should be taken and tested at a Ministry of Health accredited laboratory. You may wish to consult with the MidCentral Public Health Service (contact details below), your Environmental Health Officer at your local council for advice. The MidCentral Public Health Service has developed the resource ***Guidelines for responding to a drinking water contamination event*** which provides more specific guidance on actions required, e.g. identifying what has caused the contamination and the importance of follow-up sampling.

Carted water

In some circumstances you may need to top up the storage tank with carted water from a water carrier. Carted water must be of drinking quality and it is recommended that it is transported by a Ministry of Health registered water carrier. You can request to see a copy of the water carriers current registration certificate.

The storage tank should be cleaned before potable water is delivered to prevent any sludge being re-suspended, which may cause odour or water-quality issues. If the tank has not been cleaned before delivery, a settling period followed by treatment (such as chlorination) may be needed. Where cleaning necessitates entering the tank, always ensure a professional tank cleaner is employed. Working in confined spaces is dangerous and should only be carried out by professionals. Professional tank cleaners can be found in the business telephone directory under 'Tank Services'.

Documentation / Logs



For each monitoring activity, the following information should be recorded:

- person responsible (including contact details)
- frequency of monitoring
- procedure used
- outcome of monitoring activity
- any corrective action taken.

Records should be kept for:

- results of system inspections
- results of microbiological (e.g. *E. coli*) and chemical testing
- treatment performance (include indicators such as chlorine levels, UV intensity and turbidity, lamp hours completed)
- details (date and type) of maintenance carried out on the water system, including calibration of any monitoring equipment and equipment manufacturer maintenance and replacement schedules
- dates of contamination events, incidents and the corrective actions taken
- deliveries of carted water.

Public Health Risk Management Plans for Schools and Early Childhood Education services

The Ministry of Health advocates the use of Public Health Risk Management Plans (PHRMPs) to provide adequate assurance of safe drinking water. Completing a PHRMP helps identify risks associated with a water supply system that need to be appropriately managed. The staff who operate the water supply should be part of its preparation, because ultimately it is for their use, but once it is completed it is a valuable source of information that other staff may need to use.

PHRMP's need to include organisation details, water supply description, identifying risks and prioritising what needs attention, an improvement plan, a monitoring & inspection plan, emergency & incident plans, and standard operating & maintenance procedures (much of which have been outlined in this advice sheet). PHRMP's need to be submitted for approval to a Drinking Water Assessor at the MidCentral Public Health Service.

To help drinking-water suppliers to develop PHRMPs for their drinking-water supplies, the Ministry of Health has developed the Drinking Water Assistance Programme. This is a free service aimed at small suppliers to help them to understand and improve the technical operation of their supplies and provide assistance in the preparation of PHRMPs. Further information can be obtained by contacting the Drinking Water Assistance Program Facilitator at the MidCentral Public Health Service.

The Ministry of Health Annual Review of Drinking Water Supplies



Every year the Ministry of Health undertakes a drinking water quality survey where drinking water information is collected from all drinking water supplies on the *Register of Community Drinking-water Supplies in New Zealand*. This means that every year your school or ECE will be contacted by MidCentral Public Health Service staff to obtain monitoring/sampling Information which is checked for compliance with the Drinking Water Standards and forms part of the annual Ministry of Health publication *Annual Review of Drinking-Water Quality in New Zealand*.

Resources



The Ministry of Health pamphlets *Water Collection Tanks* and *Secure Groundwater Bores and Wells* provide more in-depth information on these supply components and are useful for schools and ECE services. The *Small Drinking-water Supplies: Preparing a public health risk management plan* and the *Small Drinking-water Supplies: Public Health Risk Management Kit* publications are useful for the preparation of PHRMPs.

These resources can be obtained from the Ministry of Health drinking water website www.moh.govt.nz/water or from the MidCentral Public Health Service (below). The Ministry of Health website also has useful information on drinking water legislation, the annual review, the drinking water assistance programme, Public Health Risk Management Plans, other drinking water publications and resources (including the Standards), and the latest drinking water updates.

Contact us



Please don't hesitate to contact a Health Protection Officer, Drinking Water Assessor or Drinking Water Assistance Program Facilitator at the **MidCentral Public Health Service** if you require assistance or have any questions regarding your drinking water supply.

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