A guide to completing a water supply management plan

For schools using private drinking water supplies

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Acknowledgement

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Foreword

Access to safe and reliable drinking water is essential to our community's health and wellbeing.

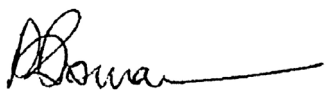
Many rural and semi-rural Victorian schools rely on private drinking water supplies, such as rainwater and bore water. It is the schools' responsibility to safeguard health by managing and maintaining their water supply.

This guidance document has been developed to assist rural and regional schools that provide private drinking water to understand the risk management expectations and to effectively manage the risks associated with their private drinking water supplies.

Managing risks associated with private drinking water supplies requires a long-term commitment from school management. It is the responsibility of schools to exercise a duty of care and ensure that drinking water supplies are safe and fit for human consumption. This can be achieved by the adoption of the preventive risk-based approach described in this guidance document.

The Department of Health and Human Services, in partnership with the Department of Education and Training, is committed to working with schools to facilitate the ongoing provision of safe drinking water supplies.

We would like to recommend this guide to schools with private drinking water supplies as a practical source of advice for managing their water supply system.



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Introduction

Throughout Victoria there are schools and facilities that rely on private drinking water supplies. Schools and facilities that have private drinking water supplies are responsible for managing their water supply systems and ensuring the water provided for drinking is safe. This guide is designed specifically for Victorian schools that rely on private drinking water supplies. Outbreaks of gastroenteritis can occur as a result of people drinking contaminated water from private 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.

A water supply management plan (WSMP) is a structured plan designed to assist schools and facilities to manage private drinking water supplies. Completing a WSMP helps identify those risks associated with a water supply system that should be appropriately managed. *Guidelines for private drinking water supplies at commercial and community facilities 2009* and the *Private water supply guidelines* by NSW Health provide general guidance for commercial and community facilities on how to prepare and implement a WSMP.

What is a private drinking water supply?

When treated reticulated (mains) drinking water is not available, an alternative source of water is required; this alternative water supply is referred to as a private water supply. If the private water supply is used for drinking, then the water supply is referred to as a private drinking water supply.

How to use this guide

This guide is designed to help schools complete a WSMP. It details each step of the WSMP, followed by an example template. Included are examples of two types of private drinking water supplies:

- rainwater
- groundwater.

These examples can be used as guidance on what to include in a WSMP. Every water supply system is different so the examples in this guide may not cover all the hazards and risks that need to be considered for each water supply system.

Legal aspects

If a school uses a private drinking water supply to provide drinking water or prepare food for others, there is a responsibility to make sure the water will not pose a risk to human health. If registered under the Children's Services Regulations 2009, *Food Act 1984* (Vic), Public Health and Wellbeing Regulations 2009, or Residential Tenancies (Caravan Parks and Moveable Dwellings Registration and Standards) Regulations 2010, **the law requires that water supplied as drinking water is fit for human consumption.**

Children's Services Regulation 2009

Any child being cared for or educated by a children's service must 'have access to fresh drinking water at all times'. In addition, 'all food and beverages on the premises intended for consumption are protected at all times from contamination'.

The Food Act 1984

The Food Act requires food businesses to use drinking water for food preparation at registered food premises. This includes water used for washing food ingredients, cooking, adding to food and drinks, making ice, cleaning, sanitising and hand-washing. Food businesses are required to record details of any private water supply and how it is managed in their food safety program.

Water sources

The main sources of private water supplies include:

- rainwater
- groundwater
- carted water.

Adopt a risk management approach to assess what source of water is most suitable for your school's situation. Figure 1 shows the risk hierarchy of water sources for private drinking water supplies. The risk hierarchy can be used to assist in the choice of a private drinking water source. Caution should be taken to ensure the drinking water source selected is fit for drinking. Adopt a low-risk water source using the highest quality water available. For example, rainwater is considered a high-quality water source with lower risk than surface water. Surface water is considered high risk and is not recommended as a drinking water source. The quality of surface water cannot be guaranteed due to the variability in water quality and possibility of contamination events occurring upstream impacting on the quality of water downstream.

In instances where a reliable source of drinking water is not available, for example during outdoor activities such as hiking and camping, always ensure a sufficient quantity of drinking water is available. If it is not feasible to bring drinking water with you, ensure an alternative drinking water supply is available and fit for drinking by taking the necessary precautions and treatment.

What is a water supply system?

A water supply system includes everything from the collection of the source water through to the point where the water is delivered for drinking (such as a tap). Mapping out your water supply system will assist in developing your WSMP.

Example

A rainwater supply system

Water source
Collection of rainwater from roof/gutters

Treatment
Filtration/chlorine disinfection

Storage and distribution system
Storage tank (rainwater tank and distribution pipes)

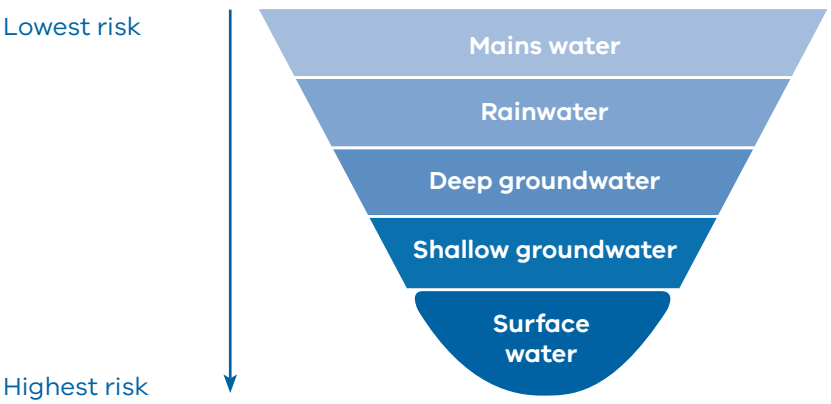
Is there enough fluoride in my private drinking water supply?

Rainwater does not contain fluoride, however some ground water supplies may. In the absence of a mains fluoridated drinking water supply, fluoride supplements should not be added to private drinking water supplies. For people who live in communities without water fluoridation, it is important to undertake the following measures for good oral health:

- maintain a healthy diet
- have regular dental checkups
- use fluoridated toothpaste appropriately.

More information on water fluoridation is available at https://www2.health.vic.gov.au/public-health/water/water-fluoridation

Figure 1: The risk hierarchy for water sources used in private drinking water supplies



A water supply management plan: How to ensure your water supply is safe?

To keep the school's water supply safe for drinking, the following steps should be taken.

Step 1: Nominate a person to be responsible for the water supply system

Someone should be nominated as responsible for the water supply system. The role will require them to make sure the water supply system is adequately managed, treated and routinely monitored to ensure the private drinking water is safe to drink.

This first step requires organisational commitment and preventative measures to ensure the responsible use and management of the water supply.

The following details should be detailed in the WSMP:

School details

1. Name of school
2. Principal
3. School's contact details
4. Principal's contact details (including out-of-school hours)

Responsibilty for system monitoring and maintenance

5. Name of the person responsible for the water supply system, plus their:
- role and responsibilities
- contact details (including out-of-school hours)

6. Name of a **second person** responsible, plus their:
- role and responsibilities
- contact details (including out-of-school hours).

Step 2: Provide a detailed description of the water supply system

A detailed description and map of the water supply system is important to help understand how the system works. The description and map should include:

- the water source
- storage and distribution information
- transfer pipes
- any treatment applied to the water
- all internal plumbing (including pipe and fitting materials and back flow protection)
- location of any onsite wastewater systems (for example, septic tanks, disposal absorption trenches)
- location of any chemicals stored or waste disposed
- location of any other water sources
- the end uses of the water.

A variety of methods can be used to map out the water supply system. Each school should use a format that best suits their needs. For a WSMP template and flow diagram to map out the water supply system, refer to Appendix 1. A WSMP checklist is provided in Appendix 2. Schools are encouraged to use this checklist to ensure all elements relating to their WSMP are implemented. Please note that additional actions specific for each school should be added to this checklist.

Step 3: Identify hazards and ways to manage risks to the water supply

A thorough risk assessment of the water supply system should be completed. A good understanding of the water supply system is required in order to identify all potential hazards to the water supply and possible sources of contamination. The identified hazards need to be managed and adequately addressed to minimise any risk to the water supply. This is done through measures such as routine maintenance of the system, and if required, appropriate treatment.

Factors to consider when identifying hazards:

- possible sources of contamination and any control measures to take
- source water
- storage and risk of contamination inputs above ground and below ground
- treatment failure
- pipework (cross-connection risks and biofilm growth)
- pipe and tank materials (that carry drinking water must comply with AS/NZ4020 and AS 2070.

To help manage risks, Figures 2–3 illustrate some examples of ways to minimise risks to the school's water supply. Additional examples of common causes of contamination are detailed in Appendices 3–4.

Figure 2: Ways to minimise risks to a rainwater supply system

Rainwater contamination hazards include:

- roof materials such as roofs coated in bitumen products or lead-based paints
- animal faeces
- leaves and debris
- 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
- aerial spraying pesticides and fertilisers from aerial spraying.

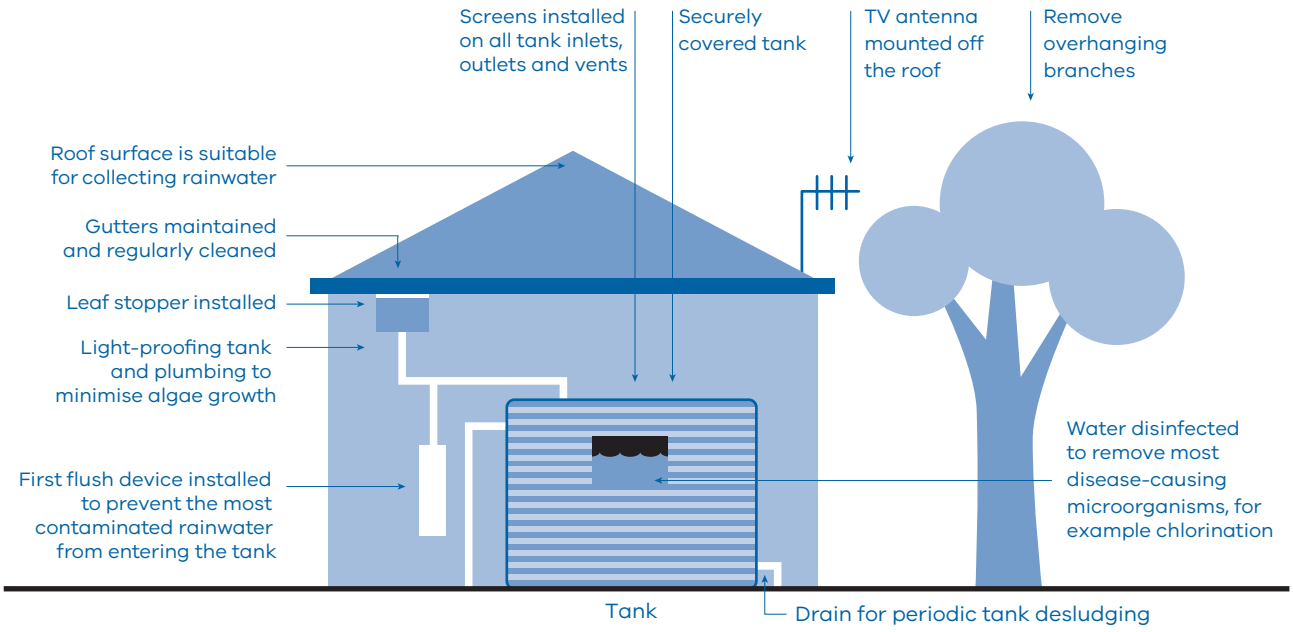
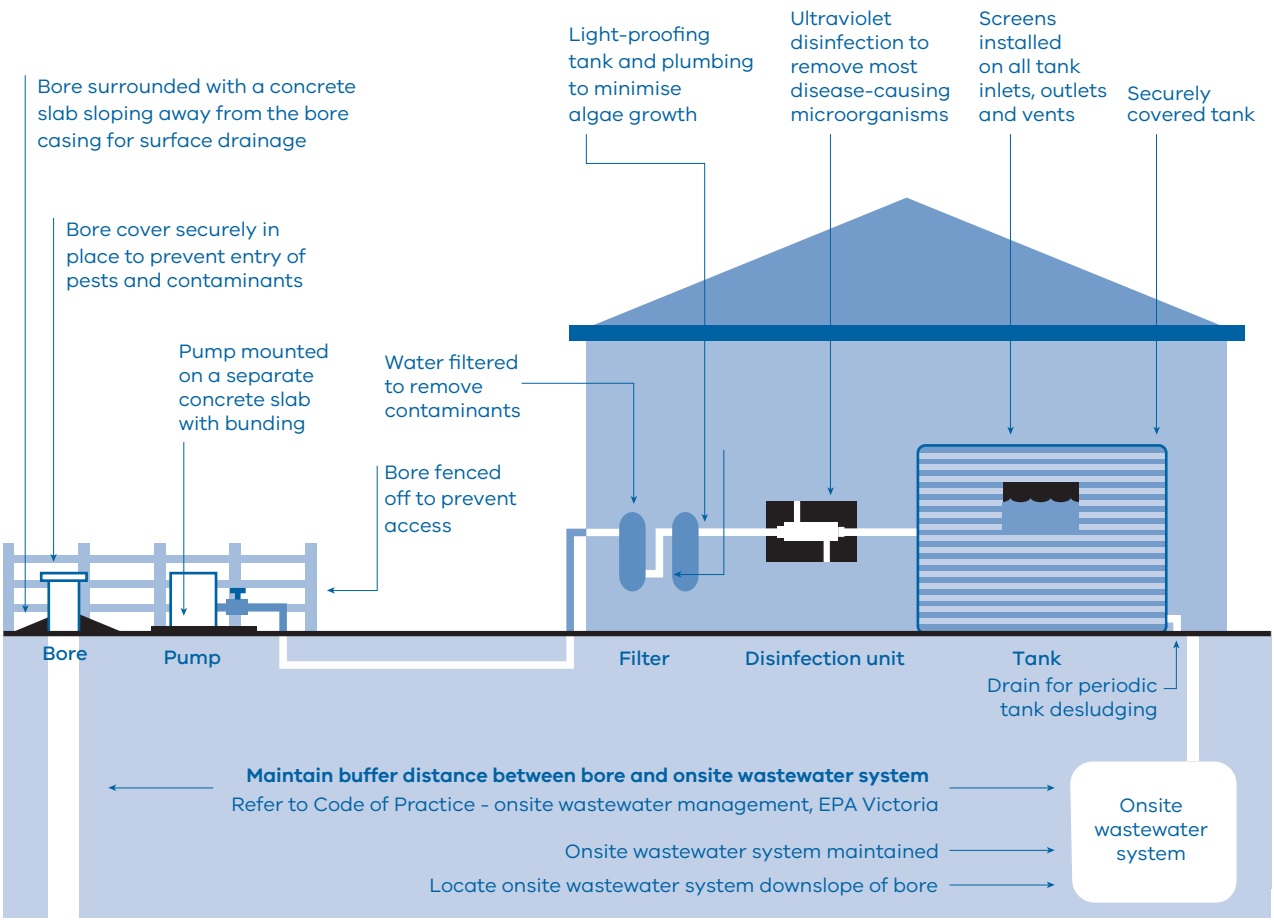


Figure 3: Ways to minimise risks to a groundwater supply system

Groundwater contamination hazards include:

- sewage
- animal faeces
- industrial and agricultural run-off (such as pesticides and fertilisers)
- seepage from rubbish
- polluted stormwater
- chemical spills and fuel from pump
- naturally occurring chemicals (such as arsenic)
- infiltration with contaminated surface waters and flood waters.



Step 4: Document operation, monitoring and maintenance procedures for the water supply system

Document the standard operating procedures for the school's water supply system, including what procedures to follow for regular operation, monitoring and maintenance.

Appendix 5 provides a list of maintenance activities for private water supply systems. Tailor the list to suit the school's water supply system and add additional items as necessary. Refer to Appendices 6–7 for template checklists for rainwater and groundwater supply systems.

Treating the water supply helps to ensure the health of consumers is not placed at risk. The most common treatment methods include filtration and disinfection (ultraviolet (UV) light and chlorine). To select the best method to treat the school's water, consider consulting a water treatment specialist.

Refer to Appendix 8 and Guidance on the use of rainwater tanks (enHealth) for more information on filtration and disinfection treatments.

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

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

Records should be kept for:

- results of system inspections
- results of microbial and chemical testing
- treatment performance (include indicators such as chlorine levels, UV intensity and turbidity)
- 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
- incidents and the corrective actions taken
- deliveries of carted water
- the posting of warning signs.

If the school has a treatment process in place, keep records of water supply inspections and test results for at least two years.

An environmental health officer from your local council has the authority to ask for maintenance and monitoring records of the school's water supply system. The officer may sample the water for compliance against the *Australian drinking water guidelines 2011*.

Testing the quality of your water

In certain circumstances, the school may need to use a water- testing laboratory to check the quality of its drinking water.

Water samples should be sent to a laboratory accredited by the National Association of Testing Authorities (NATA) to ensure the highest level of accuracy. Contact the laboratory to get details of sampling protocols. Look in the business telephone directory under the heading 'Analysts' or contact NATA to find a laboratory in your area.

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

- before using the water from a new treatment system
- after a treatment system has been altered
- after a significant event that may have affected water quality
- after prolonged periods of treatment system shutdown.

A significant event would include (but is not limited to) events such as flood, fire, dust storms, chemical spills and bushfire.

Refer to the *Australian drinking water guidelines 2011* Available from: https://www.nhmrc.gov.au/guidelines-publications/eh34

Stagnant water after shutdown periods

After periods of prolonged shutdown such as term holidays and end-of-year breaks, water may become stagnant in pipes. Metals such as copper or lead may build up in stagnant water sitting in pipes and leach into the water supply. To ensure that stagnant water is not delivered in the drinking water supply, flush out pipes for a few minutes until fresh water flows through from the water supply system.

Step 5: Have an emergency management plan in place

Schools should plan how to respond if an emergency occurs; include contingency plans and who to notify.

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

- sewage or chemical spills
- dead animals in a storage tank
- bushfires
- equipment failure
- algal blooms.

If you suspect that the school's private drinking water supply has been contaminated, act immediately to ensure everyone with access to the water is notified. Advise teachers of the situation and prevent students from accessing potentially contaminated water.

Put up adequate signage to warn that the water is, or may be unsafe to drink. Ensure that potable water is available via an alternative source such as bottled water or carted water from a registered water carter.

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 the water has been contaminated, the microbiological or chemical levels may have to be tested at a water-testing laboratory. You may wish to consult with your local environmental health officer, or a water treatment specialist for advice.

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.

Gastrointestinal outbreaks in schools

If there are two or more associated cases of gastrointestinal disease confirmed by a medical practitioner, the school is required to notify Communicable Diseases Prevention and Control at the Department of Health and Human Services immediately by phone on 1300 651 160. The school principal should ensure that staff, parents and the school community are aware of the outbreak and make sure anyone suffering from gastroenteritis symptoms seeks medical attention and is excluded from attending school until the symptoms have ceased. Viral gastroenteritis is highly contagious and can be transmitted via person-to-person contact or contact with contaminated surfaces. Gastroenteritis can be transmitted via contaminated food or water. If your school's private drinking water supply is confirmed as the source of gastroenteritis infection, as a priority, immediately stop using the supply of contaminated water for drinking purposes. Inform all teachers and students of the contamination and prevent access to the contaminated water. Make sure an alternative source of drinking water is available. Contact your local council's environmental health officer for assistance.

Taking corrective action

If monitoring indicates that the school's water supply is not safe for drinking, corrective action must be taken. This may include:

- stopping the supply, putting up warning signs (such as "do not drink") or notifying water users if the water is suspected to being contaminated
- sealing the tank and removing the source of contamination
- installing new or different water treatment systems
- emergency disinfection
- roof cleaning and gutter repairs
- arranging an alternative source of drinking water
- undertaking maintenance work on water treatment systems, such as changing filter cartridges or UV lamps.

It is important that records are kept of any corrective actions that are undertaken to make the water supply safe.

Boiling water

Bringing water to a rolling boil is an effective means of disinfecting small amounts of water quickly if microbial contamination is suspected. It is important to note that boiling water does not remove chemicals.

It is important to note that **coffee machines do not necessarily boil water.** Water must be treated before being dispensed into a coffee machine.

Carted water

In some circumstances the school may need to top up its tank with carted water. Carted water must be of drinking quality and transported by a registered water carter from a supply approved by a Victorian water authority. Contact your local water authority. For more information or refer to the *Guidelines for drinking (potable) water transport in Victoria* for more information.

These guidelines are available at https://www2.health.vic.gov.au/public-health/food-safety/food-businesses/water-supply-safety-for-food-preparation

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 disinfection) 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. (For more information contact WorkSafe Victoria.) Alternatively, professional rainwater tank cleaners can be found in the business telephone directory under 'tank cleaning'.

Cross-connections

Drinking water plumbing must be kept separate from all other water supplies and are required to meet the *Building Act 1993* and Plumbing Regulations 2008, the Plumbing Code of Practice and relevant Australian Standards.

Cross-connections can happen when a non-drinking water supply is accidentally piped into a drinking water supply. Cross-connections can lead to people drinking contaminated water which increases the risk of illnesses such as gastroenteritis.

Minimise the risk of cross-connection by employing a plumber registered by the Victorian Building Authority for all regulated plumbing works related to water supply. In addition, make sure you receive a compliance certificate for any works completed, certifying cross-connection checks for all plumbing works that have been carried out. Ensure that drawings of plumbing work are current. More information on plumbing standards, licences and registration, compliance certificates and technical solutions for plumbing applications are available from the Victoria Building Authority.

Common signs of a cross-connection may include a change to the taste, odour or appearance of drinking water. If you suspect your drinking water supply is contaminated through a cross-connection, raise the alarm and ensure an alternative drinking water supply is used while an investigation in undertaken. Contact your local water authority, private plumber, or local council's environmental health officer for assistance.

Further information

Local government

Environmental Health Officer

For enquiries about the safety of your private drinking water supply, identifying hazards and managing risks to the school's water supply system, water-related issues or emergency water treatment, contact the environmental health officer at your local council (refer to the *White pages* or the Municipal Association of Victoria website at www.mav.asn.au).

Department of Health and Human Services

For enquiries about the safety of your private drinking water supply refer to the *Guidelines for private drinking water supplies at commercial and community facilities* at https://www2.health.vic.gov.au/public-health/water/private-drinking-water-supplies

Water Program

1300 761 874
https://www2.health.vic.gov.au/public-health/water

Divisional Public Health Officer

West Division

Geelong Office (03) 5226 4540
Ballarat Office (03) 5333 6530

North Division

Bendigo Office (03) 5434 5555
Fitzroy Office (03) 9412 5333

East Division

Wangaratta Office
(03) 5722 0555
Box Hill Office (03) 9843 6000

South Division

Dandenong Office
(03) 8765 5444
Traralgon Office
(03) 5177 2500

For notification of two or more related cases of suspected food- or water-borne illness, contact:

Communicable Diseases Prevention and Control

1300 651 160

Department of Education and Training

For information regarding requirements of Victorian schools with private drinking water supplies emergency planning and response, or for issues regarding infrastructure for Victorian schools with private drinking water supply systems, contact:

Regional Facility Manager

Barwon-South Western Region

Geelong Office (03) 5225 1010

Eastern Metropolitan Region

Glen Waverly Office
(03) 9265 2437

Gippsland Region

Moe Office (03) 51270400

Grampians Region

Ballarat Office (03) 5310 5308

Hume Region

Benalla Office (03) 5761 2159

Loddon Mallee Region

Bendigo Office (03) 5440 3148

Northern Metropolitan Region

Coburg Office (03) 9488 9434

Southern Metropolitan Region

Dandenong Office
(03) 9794 3545

Western Metropolitan Region

Footscray Office (03) 9291 6527

Victorian School Building Authority

East Melbourne Office
1800 896 950

Rural Water Corporation

For information on groundwater use, licensing and bore construction, contact:

Southern Rural Water

1300 139 510

Goulburn-Murray Water

(03) 5826 3600

National Association of Testing Authorities (NATA) accredited laboratories

For details of laboratories with accreditation for particular water-quality testing, phone 1800 621 666 or visit www.nata.asn.au

Business telephone directory

For the details of businesses that provide water treatment advice and solutions to water supply issues, analysts, tank supplies, tank cleaning, maintenance services and water carting, consult your local or preferred business telephone directory.

References

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Australian Standards

A number of standards relate to private drinking water supplies.

Water storage tanks

Above-ground polyethylene tanks should comply with AS/NZS 4766 *Polyethylene storage tanks for water and chemicals*

Rainwater tanks made of other materials may be certified under ATS 5200.026 (and bear WaterMark certification). ATS 5200.026 is not applicable for some tanks, such as concrete tanks, underground tanks and flexible water storage tanks. In this case these tanks should be structurally sound and water tight.

Plumbing and distribution systems

Pipe work and plumbing fittings that carry drinking water should comply with AS/NZS 4020 *The testing of products for use in contact with drinking water* or AS 2070 *Plastics materials for food contact use*.

Undertake all plumbing works in accordance with AS/NZS 3500:2003 - *National Plumbing and Drainage Code* and the Plumbing Industry Commission (PIC) *Recycled Water Plumbing Guidelines*.

Treatment systems

A number of standards have been developed for water treatment systems, including:

- AS/NZS 4348 Water supply–domestic type water treatment appliances–performance requirements
- *AS/NZS 3497 Drinking water treatment units–plumbing requirements*
- *ATS 5200.103 Technical specification for plumbing and draining products–Part 103: water treatment systems*
- American National Standards Institute standard ANSI/NSF 53 *Drinking water treatment units–health effects*.

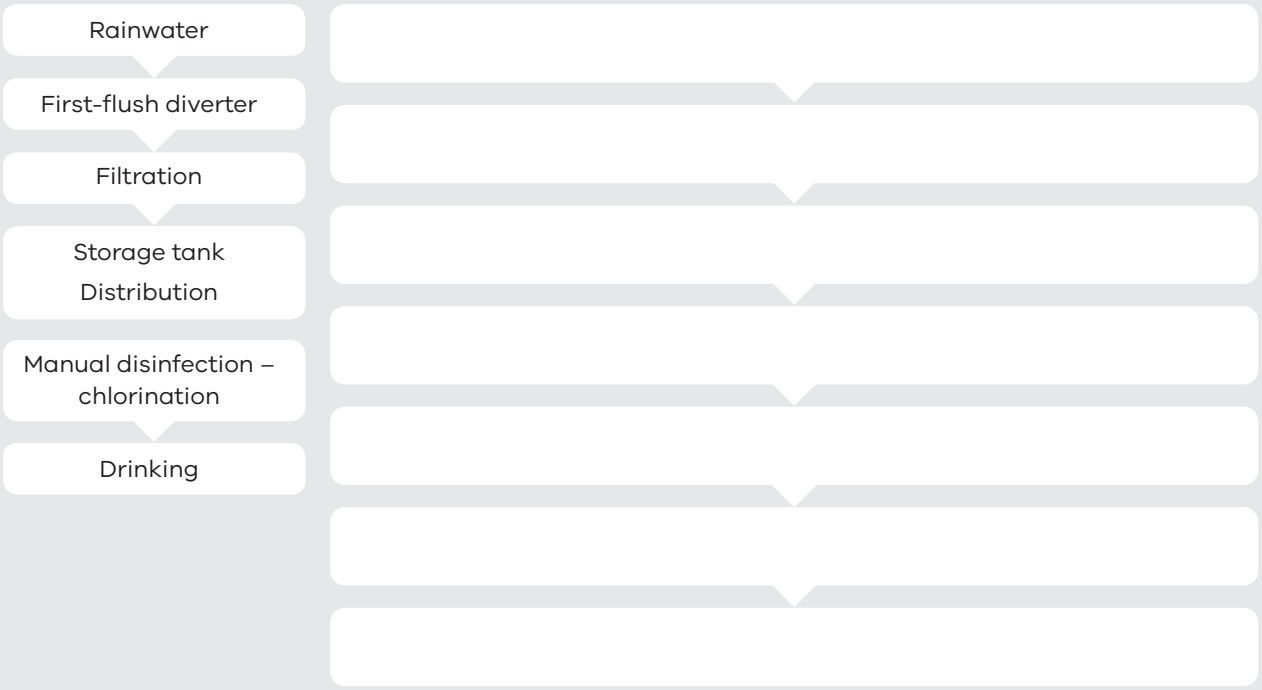
If your treatment system does not comply with one or more of these standards, discuss with the supplier or manufacturer whether they apply. The Australian Standards and Australian Technical Specifications (ATS) can be purchased from: <www.standards.com.au>.

American National Standards Institute standard is available from: <www.nsf.org>.

Appendix 1: Water supply management plan template

Water source(s)	☐ Rainwater ☐ Groundwater ☐ Surface Water ☐ Other
Uses of the supply	☐ Drinking ☐ Food preparation (including cleaning food preparation surfaces) ☐ Hand washing ☐ Bathing ☐ Other, please explain _____
Treatment methods	☐ Filtration ☐ Chlorination ☐ UV disinfection ☐ Other, please specify _____
Map of system	Use this flow diagram to map your system. Include your water source, storage tanks and treatment systems.

Example



Appendix 2: Water supply management plan checklist

Schools are encouraged to use this checklist to ensure the elements relating to the water supply management plan have been implemented.

Step	Action	Checklist
1. Record school's details and details of nominated person	A nominated person(s) is assigned to be responsible for the school's water supply system.	☐
	The school's details and details of the nominated person(s) are recorded and in a readily accessible location.	☐
2. Provide a detailed description of the water supply system	A detailed description and map of the water source and water supply system have been documented.	☐
3. Identify hazards and ways to manage risks to the water supply	A thorough risk assessment identifying hazards to the water supply system has been completed. Refer to Appendices 3–4 for potential hazards.	☐
	The hazards and identified risks are appropriately addressed and managed.	☐
4. Document operation, monitoring and maintenance procedures for the water supply system	The standard operating procedures for the water supply system are documented.	☐
	All regular monitoring activities are identified and documented.	☐
	All regular maintenance activities are identified and documented. This includes methods for water supply sample testing by NATA accredited laboratories.	☐
5. Have an emergency management plan in place	An emergency management plan has been developed. This includes contingency plans and who to notify.	☐
	Where contamination of the water supply is suspected, access and delivery of water is suspended.	☐
	Where the water supply system is suspected or confirmed to be contaminated, an alternative drinking water supply is made available.	☐
	Corrective action is taken to ensure the water supply is safe for drinking. This includes appropriate treatment and disposal of contaminated water.	☐

Appendix 3: Common sources of rainwater contamination and how to reduce the risks

System component	Source of contamination	Action
Roof and gutter	Build-up of leaves, dirt and animal droppings	• Install a first-flush diverter • Clean the gutters and roof regularly • Install gutter shields • Mount TV antennae off roof • Maintain the guttering • Remove overhanging branches • Use leaf filters or screening at the tank inlet • Conduct regular inspections • Treat the water (filtration and disinfection)
	Roof material (such as lead-based)	• Don't collect water from roofs coated or painted with substances that may leach hazardous materials (such as lead from lead-based paints) • Maintain roof, gutters and downpipes in good condition • Replace lead flashing
	Spray drift (such as pesticides and fertilisers)	• Seal any exposed treated timber • Clean the gutters and roof regularly
	Solar hot-water system, overflows and bleed-off pipes from roof-mounted appliances such as cooling systems and hot-water services	• Install a first-flush diverter • Don't collect water from the gutters below solar hot water systems • Ensure overflow and bleed-off pipes do not discharge onto the roof or into gutters that collect the rainwater supply
Screens and strainers	Build-up of dirt and debris in strainers	• Clean screens and strainers regularly • Conduct regular inspections
Storage tank	Birds, animals, insects, algal growth	• Install screens on all tank inlets and overflows with maximum 1 mm mesh • Cover the tank with a light-proof cover • Conduct regular inspections of tank covers and screens to ensure they are intact • Treat the water (filtration and disinfection)
	Sediment build-up within the tank	• Clean (desludge) regularly (minimum every two years) • Clean before receipt of carted water • Locate the draw-off point for taking water from the tank at least 150 mm above the base of the tank (the manufacturer's minimum height for the draw-off point should be noted)
	Tank materials and pipe materials	• Ensure storage tanks comply with Australian Standards. Refer to enHealth Guidance on use of rainwater tanks (available online at http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-enhealth-raintank-cnt.htm)
		• Ensure the tank is structurally sound

System component	Source of contamination	Action
In-ground storage tank	See page from surface water/sub-surface water such as sewage from an onsite wastewater system tank Sites inundated with flood waters.	• Ensure the tank is properly designed and sealed to prevent entry of surface or sub-surface water • Ensure the tank is not buried in land contaminated with chemicals • Ensure the buffer distance between the tank and wastewater disposal system complies with EPA publication 891.2: *Guidelines for Environmental Management: Code of Practice - Onsite wastewater management* (available online at http://www.epa.vic.gov.au/water/wastewater/onsite.asp). Alternatively contact your local council's environmental health officer for further advice • Treat the water (filtration and disinfection)
	Pump and plumbing materials	• Ensure buried pipes are installed away from and shallower than onsite wastewater systems or wastewater pipe work • Ensure all tank materials in contact with drinking water comply with Australian Standards

Appendix 4: Common sources of groundwater contamination and how to reduce the risks

System component	Source of contamination	How to reduce the risk
Bore	Surface water run-off and flood waters	• Raise the bore head above the ground, surface drainage flows away from the bore head • Ensure the bore is surrounded with a concrete slab with the bore casing protruding above the slab and sloping away from the bore head • Ensure the bore cover is securely in place and free from holes or cracks • Ensure the bore casing is intact • Locate livestock fences at least 50 m from bore • Treat the water (filtration and disinfection) • Conduct regular inspections
	Sub-surface contaminants	• Avoid extracting water from sites with known contaminants, including heavy industrial and intensive agricultural areas
	Sewage	• Test the source water for chemicals • Treat the water (filtration and disinfection) • Ensure the buffer distance between bore and wastewater disposal system complies with EPA publication 891.2: *Guidelines for Environmental Management: Code of Practice - Onsite wastewater management* (contact your local council's environmental health officer for further advice) • Maintain the onsite wastewater system • Treat the water (filtration and disinfection) • Locate onsite wastewater system downslope of bore
	Naturally occurring chemicals within water (such as heavy metals and arsenic)	• Test the source water and assess results against guideline values in the *Australian drinking water guidelines*
	Leaching from bore casings, pipes or plumbing materials	• Ensure all materials in contact with drinking water comply with Australian Standards • Conduct regular inspections
Pump	Chemical spillage	• Ensure engines are mounted on a separate concrete slab • Ensure fuel or oil spillage is prevented from getting in the bore • Maintain the pump to prevent deterioration of the fuel and lubricant lines
Storage tank	Birds, animals, insects, algal growth	• Install screens on all tank inlets and overflows with maximum 1 mm mesh • Cover and seal the tank with a light-proof cover • Conduct regular inspections • Treat the water (filtration and disinfection)
	Sediment build-up within the tank	• Clean (desludge) regularly (minimum every two years) • Clean before receipt of carted water • Locate the draw-off point for taking water from the tank at least 150 mm above the base of the tank (the manufacturer's minimum height for the draw-off point should be noted)

System component	Source of contamination	How to reduce the risk
Storage tank	Tank materials	• Ensure storage tanks comply with Australian Standards
In-ground storage tank	Tank materials	• Make sure they are structurally sound • Chemically adjust pH in new concrete tanks
	Seepage from surface water/sub-surface water such as sewage from the onsite wastewater system	• Ensure the tank is properly designed and sealed to prevent entry of surface or sub-surface water • Ensure the tank is not buried in land contaminated with chemicals • Ensure the buffer distance between the tank and wastewater disposal system complies with EPA publication 891.2: *Guidelines for Environmental Management: Code of Practice - Onsite wastewater management* (contact your local council's environmental health officer for further advice) • Treat the water (filtration and disinfection) • Maintain the system
Distribution lines	Stagnant water in pipes	• Flush the pipe work if not used for more than one week • Ensure pipes are self-draining or drained every six months • Bury pipes at least 300 mm below ground and protect them from tree roots • Have a plumber check any plumbing works to ensure no cross-connections have occurred and that "as built drawings are current.
	Pump and plumbing materials cross-connected with non-drinking water supplies	• Ensure buried pipes are installed away from and shallower than onsite wastewater systems or wastewater pipe work • Ensure all pipe work and plumbing fittings that carry drinking water comply with Australian standards • Undertake all plumbing works in accordance with AS/NZS 3500:2003 - *National Plumbing and Drainage Code* and the Plumbing Industry Commission (PIC) *Recycled Water Plumbing Guidelines*.

Appendix 5: List of maintenance activities for private water supply systems

Local councils require schools with private water supplies to keep records of system inspections and test results for at least two years. Use this list to help gather information for the school's records (note this list is not exhaustive).

Water source: rainwater	Clean spouting/gutters (three-monthly and after storms)
	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 watertight and protected from surface flows (monthly)
	Check bore is securely protected, such as fences, locks (monthly)
	Check maintenance and operation of the pump (monthly)
Tank	Check inlet and outlet screens (three-monthly)
	Check access covers (monthly)
	Clear strainer of debris (three-monthly and after storms)
	Check for presence of mosquito larvae in tank water (monthly)
	Check structural condition (annually)
	Check sludge level and internal cleanliness (every two years or as required)
Distribution system	Check plumbing/piping is fully operational and well maintained (annually)
	After periods of shutdown flush out pipes for a few minutes until fresh water flows through from the water supply system.
Treatment system	Replace filters (as per manufacturer's advice or earlier if a decrease in water flow is noticed)
	Test chlorine level is at or above 0.5 mg/L (at least weekly or after heavy rains)
	Test pH level is 6.5–8.5 (weekly)
	Check UV light is operating and free from scum (weekly)
	Replace UV lamps every 12 months (or as per manufacturer's instructions)
Water quality testing	*E. coli* test* (initially to identify risk, when the system is new or altered, or after a significant event such as heavy rainfall)
	Chemical test (initially to identify risk, when the system is new or altered, or after a significant event)

* Assess results against guideline values in the *Australian drinking water guidelines*. Note: To ensure the water supply system has not been compromised over prolonged shutdown periods, maintenance checks are recommended upon commencement of the school term.

Appendix 6: Checklist for inspecting and maintaining a rainwater supply system

Recommended weekly inspections: rainwater

Inspection date	Inspection by	Reading	Corrective actions
Treatment system			
Test chlorine level is at or above 0.5 mg/L (weekly or after heavy rains)			
		mg/L	
		mg/L	
		mg/L	
		mg/L	
		mg/L	
		mg/L	
Test pH level is between 6.5 and 8.5			
Check UV light is operating and free of scum			
		Yes / No	
		Yes / No	
		Yes / No	
		Yes / No	
		Yes / No	
		Yes / No	
Tank			
Check access covers			

Recommended three-monthly inspections: rainwater

Inspection date	Inspection by	Reading	Corrective actions
Water catchment			
Clean the spouting/gutters (three-monthly and after storms)			
Tank			
Check inlet and outlet screens			
Check strainer for debris			
Check for the presence of mosquito larvae in tank water			

Appendix 6: (continued)

Recommended annual inspections: rainwater

Inspection date	Inspection by	Reading	Corrective actions
Water catchment			
Check and trim overhanging branches			
Inspect and repair downpipes			
Check condition of roof			
Tank			
Check structural condition			
Distribution system			
Check plumbing/piping is fully operational and well maintained			
Treatment system			
Replace UV lamps every 12 months or as per manufacturer's instructions			

Recommended two-yearly inspections: rainwater

Tank			
Check sludge level and internal cleanliness			

Infrequent inspections: rainwater

Water quality testing			
E. coli test*			
Chemical test*			

* Assess results against guideline values in the *Australian drinking water guidelines.* Note: To ensure the water supply system has not been compromised over prolonged shutdown periods, maintenance checks are recommended upon commencement of the school term.

Appendix 7: Checklist for inspecting and maintaining a groundwater supply system

Recommended weekly inspections: groundwater

Inspection date	Inspection by	Frequency of inspection	Reading	Corrective actions
Treatment system				
Test chlorine level is at or above 0.5 mg/L (weekly or after heavy rains)				
			mg/L	
			mg/L	
			mg/L	
			mg/L	
			mg/L	
			mg/L	
Test pH level is between 6.5 and 8.5				
Check UV light is operating and free of scum				
			Yes / No	
			Yes / No	
			Yes / No	
			Yes / No	
			Yes / No	
			Yes / No	
Tank				
Check access covers				

Appendix 7: (continued)

Recommended monthly inspections: groundwater

Inspection date	Inspection by	Frequency of inspection	Reading	Corrective actions
Water source				
Check the bore head and other mechanisms installed are watertight and protected from surface flows				
Check bore is protected, such as fenced or locked				
Check maintenance and operation of the pump (continued next page)				

Recommended monthly inspections: groundwater (continued)

Inspection date	Inspection by	Frequency of inspection	Reading	Corrective actions
Water source				
Check maintenance and operation of the pump				

Recommended three-monthly inspections: groundwater

Tank				
Check inlet and outlet screens				
Check strainer for debris				
Check for the presence of mosquito larvae in tank water				

Appendix 7: (continued)

Recommended annual inspections: groundwater

Inspection date	Inspection by	Frequency of inspection	Reading	Corrective actions
Tank				
Check structural condition				
Distribution system				
Check plumbing/piping is fully operational and well maintained				
Treatment system (where applicable)				
Replace UV lamps (every 12 months or as per manufacturer's instructions)				

Recommended two-yearly inspections: groundwater

Tank				
Check sludge level and internal cleanliness (every two years or as required)				

Infrequent inspections: groundwater

Treatment system				
Clean/replace filters				
Water quality testing				
E. coli test*				
Chemical test*				

* Assess results against guideline values in the *Australian drinking water guidelines.* Note: To ensure the water supply system has not been compromised over prolonged shutdown periods, maintenance checks are recommended upon commencement of the school term.

Appendix 8: Common ways to treat a water supply

Filtration

Filters can remove particular contaminants within the water. Filtration can remove some sediment, chemicals, algal toxins (which are a specific type of chemical) and microorganisms.

Filters are commonly installed with the regular plumbing between the roof catchment area and the storage tank. They are normally used in combination with ultraviolet light and/or chlorine disinfection.

Some filters are more effective than others. Consult a water treatment specialist to help choose the filtration method most appropriate for the contaminants you need to remove.

Disinfection

Disinfection is generally the last step of water treatment and will remove most disease-causing microorganisms. It is important to realise that disinfection will not remove chemical contaminants.

Ultraviolet disinfection

Ultraviolet (UV) disinfection is a common and effective form of disinfection, which inactivates many kinds of microorganisms.

Filtration to remove sediment often needs to occur before the water reaches the UV disinfection unit because UV light cannot penetrate dirty or 'cloudy' water. For best results, UV disinfection should be used either at the point of use or in combination with chlorination.

UV disinfection systems need to be designed, installed and maintained by a water treatment specialist.

Chlorine disinfection

Chlorine is often used to disinfect rainwater because it is accessible, economical and can treat large volumes of water with a residual effect. Water can be chlorinated either through an automatic dosing system within your regular plumbing or manually added to the tank.

It takes about 5 (mg) of chlorine per litre of water to disinfect the water in the school's tank. However, this will depend on the quality of the water. For effective disinfection there should still be at least 0.5 mg/L present in the water 30 minutes after dosing the water.

The testing can be done with a suitable chlorine test kit (such as a swimming pool kit). If the measured chlorine is below 0.5 mg/L, repeat chlorine dosing until this level is reached.

How to treat water stored in a tank

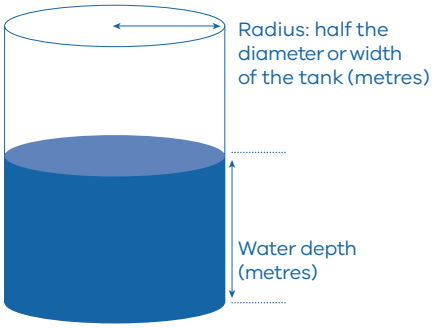
To work out how much chlorine to add to the school's tank for disinfection, first calculate the amount of water in the school's tank.

Rectangular/square tanks

Volume (litres) = depth of water in tank (metres) x tank width (metres) x tank length (metres) x 1,000

Cylindrical tanks

Volume (litres) = depth of water in tank (metres) x tank radius (metres) x tank radius (metres) x 3.140 (π)



When handling and storing chemical compounds, always read and follow safety directions given on the package label.

Appendix 8: (continued)

Determining the amount of chlorine to add

First, the turbidity (cloudiness) of the water should be below a measure of 1 nephlometric turbidity unit. Second, the pH of the water should range from 6.5 to 8.5. A water-testing laboratory will be able to check the turbidity of your water supply, while you can test the pH yourself with a swimming pool kit.

When the turbidity and pH is satisfactory, an initial dose of chlorine less than 5 mg/L may be sufficient to achieve the desired 0.5 mg/L after 30 minutes.

Chlorine is available in a number of different forms. As a general guide, you will need to add:

- 125 mL of liquid bleach (4 per cent available chlorine) for every 1,000 L of water in your tank

  or

- 40 mL of liquid sodium hypochlorite (12.5 per cent available chlorine) for every 1,000 L of water in your tank

  or

- 8 g/2 tsp of granular calcium hypochlorite (65 per cent available chlorine) for every 1,000 L of water in your tank.

The following table estimates the amount of different preparations of chlorine that should be added to various volumes of water to provide an initial concentration of 5 mg/L.

Volume of water in tank (L)	Amount of chlorine to add to achieve 5 mg/L in tank		
	4% liquid bleach (mL)	12.5% liquid sodium hypochlorite (mL)	65% granular or powdered calcium hypochlorite (teaspoon)
1,000	125	40	2
2,000	250	80	3
5,000	625	200	6
6,000	750	240	7
7,500	938	300	9
10,000	1,250	400	12
16,000	2,000	640	19
20,000	2,500	800	24
30,000	3,750	1,200	35

Liquid household bleach can be purchased at a supermarket or hardware store. Check that the product has at least 4 per cent available chlorine and has no additives such as fragrances or detergents.

Sodium hypochlorite and calcium hypochlorite can be purchased from large supermarkets, hardware stores or swimming pool suppliers. Stabilised chlorine (which contains isocyanuric acid) is not effective in enclosed tanks and should not be used.

How to prepare chlorine

When adding the concentrated chemical mixture to the tank, first mix the chlorine solution with cold water in a plastic bucket in the open air, then add to the tank and let it stand for at least one hour (ideally 24 hours) before use.

Always add chlorine to water, never water to chlorine and use appropriate protective equipment including gloves and goggles. Always follow the manufacturer's handling and storage instructions.

All chlorine products are required to be replaced on a regular basis as chlorine activity declines over time.

If you are uncertain about this procedure, contact an environmental health officer from your local council or Water treatment specialist .

Maintenance

Filtration

You must regularly maintain and replace filters for them to be effective. If not, bacteria can grow on the filters and then be released into the filtered water. The manufacturer's operating and maintenance instructions must be carefully followed.

Chlorine disinfection

At the point where the water is used (such as at the kitchen sink), you need to test the chlorine level weekly or after heavy rainfall to check the level of disinfectant in the system. The level of chlorine in the water needs to be at least 0.5 mg/L.

When the water supply has not been used for an extended period of time, such as more than one week, you should check the chlorine level and flush the pipes for a few minutes until fresh water flows through from the tank. Water flushed from the system is safe to use on the garden. Keep a record of chlorine and pH readings.

Ultraviolet disinfection

Ultraviolet disinfection systems need regular and careful maintenance to ensure they remain effective by:

- providing a reliable power supply to the lamp
- maintaining or replacing the filter unit regularly or in accordance with the manufacturer's instructions
- checking on a weekly basis that the lamps are operating and free from scum
- replacing the lamps every six months or in accordance with the manufacturer's instructions
- keeping a record of inspections and maintenance.

Glossary

Carted water

Water carted in a tanker and used to top up a tank.

Groundwater

Groundwater includes water from bores, spear points (shallow installations), springs or wells.

Hazard

A biological, chemical, physical or radiological agent that has the potential to cause harm.

Onsite wastewater management system

Is the same as a 'septic tank system' as defined in the *Environment Protection Act 1970*. It includes an onsite wastewater treatment system (primary or secondary standard) plus the subsequent disposal/recycling system.

Potable

Fit or suitable for drinking on the basis of both health and aesthetic considerations.

Private water supply

When reticulated (mains) drinking water is not available, an alternative source of water is required; this alternative water supply is referred to as a private water supply.

Private drinking water supply

A private water supply that is used for drinking.

Preventive measure

Any planned action, activity or process that is used to prevent hazards from occurring or reduce them to acceptable levels.

Rainwater

Water collected directly from run-off after rain.

Risk

The likelihood of a hazard causing harm in exposed populations in a specified time frame, including the magnitude of that harm.

Source water

Water in its natural state before any treatment.

Surface water

All water naturally open to the atmosphere (such as rivers, streams, lakes and reservoirs).