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| *Safe Drinking Water Act 2011* |
| Standard Drinking Water Risk Management PlanINSERT BUSINESS NAME OF DRINKING WATER SUPPLYSmall bore water supplies |
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# Contents

[Contents 2](#_Toc159234329)

[Document control and review 3](#_Toc159234330)

[Key contacts 3](#_Toc159234331)

[Section 1: Description of drinking water supply system 4](#_Toc159234332)

[Section 2: Water Quality Hazards 6](#_Toc159234333)

[Section 3: Maintenance program 8](#_Toc159234334)

[Section 4: Water quality testing 10](#_Toc159234335)

[Section 5: Incident identification and notification protocol 11](#_Toc159234336)

[Section 6: Management and record keeping 13](#_Toc159234337)

[Appendix A: Additional Treatment options 14](#_Toc159234338)

## For drinking water quality assistance and enquires contact

## Water Quality Unit, SA Health

* Phone: 0421 618 311 – for incident reporting
* Phone 8226 7100 – for non-incident related enquires
* Email:waterquality@health.sa.gov.au

# Document control and review

Documentation related to or generated as part of this plan (e.g., inspection reports, incident reports, evidence of remedial action and water quality test results) must be kept for at least 5 years.

|  |  |
| --- | --- |
| **RMP prepared by**  |  |
| **Date prepared** |  |
| **Version number** |  |
| **Next revision date** |  |

# Key contacts

Details of the drinking water provider registered under the *Safe Drinking Water Act 2011.* An approval letter provided by SA Health outlines the requirements and responsibilities of the owner/ manager under the *Safe Drinking Water Act 2011*. **SA Health must be notified of any changes to business details within 14 days of the change being made.**

## Business details

|  |  |
| --- | --- |
| **Business trading name** |  |
| **Name of Owner / manager**  |  |
| **Contact details of the registered drinking water provider / water supply** |  |
| **Address** |  |
| **Operator name and contact details** |  |

## Other important contacts

|  |  |
| --- | --- |
| **Name**  | **Name and Phone Number** |
| **Local Council** |  |
| **Water Testing Laboratory** |  |
| **Water Treatment Company** |  |
| **Tank Cleaning Company** |  |
| **Water Carting Company** |  |

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# Section 1: Description of drinking water supply system

### Table 1: Key components of this drinking water supply system (including photographs of the infrastructure)

|  |  |
| --- | --- |
| **Use of drinking water supply** |  |
| **Surrounding catchment environment** |  |
| **Bore details** |  |
| **Raw water tank(s)** |  |
| **Treatment and/ or disinfection** |  |
| **Pipework and taps** |  |
| **Water quality sampling locations and analysis** |  |

### Schematic of the drinking water supply

# Section 2: Water Quality Hazards

Table 2 provides a list of potential hazards that represent a risk to the bore water quality and the preventive measures that can be implemented to reduce the risk for this water supply system. Many of these hazardous events can be avoided with regular maintenance that are documented in Table 3.

### Table 2: Hazards, risks, and preventive measures

| Hazardous event | Risk | Preventive Measure |
| --- | --- | --- |
| Shallow unprotected bore – unconfined aquifer, depth less than 20 m  | * Increased risk of illness from ingestions of pathogens or chemicals
 | * Where possible bores should be drilled into a confined aquifer and at the greatest depth to prevent contaminants entering the supply.
* Install disinfection system (e.g., UV light or chlorination)
* Increase water quality testing of microbiological and chemical parameters (see Section 3)
 |
| Livestock entry to bore protection zone | * Illness from ingestion of harmful pathogens contained in livestock waste
 | * Bore should be protected from livestock access (e.g.by fencing in agricultural areas) to allow at least a 50-metre radius around the bore
 |
| Leakage from sewage collection system | * Illness from ingestion of harmful pathogens contained in human waste
 | * Bore should be protected from human waste by not allowing discharge from an on-site wastewater system within 50 metres of the bore (per the On-site Wastewater Systems Code)
* On-site wastewater systems should not be installed within 10 metres of a bore (per the On-site Wastewater Systems Code)
 |
| Toxic chemicals leaching into groundwater | * Health or aesthetic impact of chemicals
 | * Agricultural chemicals, diesel and petrol should not be stored or used within the minimum protection zone except in areas with physical barriers to prevent spills contaminating ground water
 |
| Groundwater may contain microbiological contaminants or health-related chemicals, | * Illness from ingestion of harmful pathogens or chemicals (e.g., arsenic, fluoride)
 | * Bore water should be tested for microbiological and chemical quality prior to use for drinking, food preparation, use in swimming pools or watering edible plants
 |
| Backflow from household plumbing devices or water storages can contaminate drinking water systems including mains water where connected | * Illness from ingestion of harmful pathogens.
* Health or aesthetic impact of chemicals
 | * Backflow prevention devices should be installed in accordance with the plumbing code (AS/NZS 3500)
 |
| Entry of birds and small animals into tank  | * Illness from ingestion of harmful pathogens contained in faecal material or from dead animals
 | * All tank openings should be sealed or covered with mosquito-proof mesh.
* Tank/tank roof integrity should be maintained to prevent access points.
 |
| Mosquitoes breeding in tank | * Nuisance and potential transmission of arbovirus (e.g., Ross River virus
 |
| Algal growth in pipework or tank (if present) | * Appearance, taste, and odour of water may be adversely affected
 | * Light access into storage tanks should be prevented (e.g., ensure tank is completely roofed)
* Ensure pipework is impervious to light (white or opaque pipes can allow light penetration)
 |
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# Section 3: Maintenance program

Regular maintenance can prevent hazardous events in your water supply that can lead to a water quality incident. Records of completed maintenance activities must be kept with the RMP.

The maintenance program for this drinking water supply is detailed in Table 3.

### Table 3: Maintenance program

| Area | Frequency | Activity | Corrective Actions |
| --- | --- | --- | --- |
| Bore protection zone | * Monthly
 | * Inspect area for anything unusual, e.g., signs of livestock activity, the use or storage of chemicals or fuels, wastewater discharges
 | * Restrict animal access via mechanisms such as fences, etc.
* Investigate and remove potential sources of contamination, e.g., chemicals/fuel
 |
| Bore | * Monthly
 | * Check integrity of bore plinth and casing and any other mechanisms installed to ensure that the bore head is water-tight and protected from surface water flows
 | * Repair or replace any faulty mechanisms designed to prevent the entry of surface water.
* Repair damaged bore casing and slab/plinth
 |
| Bore protection zone | * 6 monthly
 | * Check structural integrity of fencing, gates, locks, etc.
 | * Repair any faults
 |
| Pump | * 6 monthly
 | * Maintain/service pump on an annual basis or as per the manufacturer’s recommendations
 | * Repair/replace pump as required.
* If the pump is removed for maintenance, ensure the top of the bore is blocked to prevent entrance by small animals and other debris
 |
| Tank & tank roof | * 6 monthly
 | * Check structural integrity of tank including roof and access cover.
* Internal inspection to check for evidence of access by animals and birds and presence of mosquitoes or larvae.
* Internal inspection to check for algal growth.
* Internal inspection to check for accumulated sediment (to be cleaned every 2 yrs.)
 | * Repair any holes or gaps.
* Remove bird /animal carcass and empty and clean tank. Chlorinate if emptying/cleaning tank is not possible.
* If the bottom of the tank is covered with sediment the tank should be cleaned
 |
| Pipework | * 6 monthly
 | * Check for structural integrity
 | * Repair pipework as necessary
 |
|  |  |  |  |
|  |  |  |  |

# Section 4: Water quality testing

Water quality testing for this drinking water supply is conducted as detailed in Table 4.

Table 7 outlines the responsible person to review the laboratory results and contacts SA Health if required.

### Table 4: Water quality testing program

| **Sample Point** | **Frequency** | **Monitoring** | **Corrective Action** |
| --- | --- | --- | --- |
|  |  |  |  |

# Section 5: Incident identification and notification protocol

The approved incident identification and notification protocol for this drinking water supply is as follows:

### Table 5: Incident identification and notification protocol

| **Parameter** | **Criteria** | **Notification requirements to SA Health** |
| --- | --- | --- |
| *E. coli*  | * Any detection of *E. coli* per 100 mL sample of water
 | Immediate notification to SA Health on **0421 618 311** AND incident notification form is submitted within 24 hours via email waterquality@health.sa.gov.au. |
| Health and Aesthetic chemicals | * Any exceedance of the ADWG values (see Appendix C for guideline values) for the following parameters:

Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Copper, Fluoride, Lead, Manganese, Mercury, Molybdenum, Nickel, Nitrate, Selenium, Silver, Sulfate and Uranium, Total dissolved Solids, Hardness (CaCO3), Iron, pH, Zinc |
| Contamination of bore water supply | Suspected contamination due to: * A dead animal in storage tank
* Wastewater discharge, flooding, or other surface water ingress (where tank or pipework underground)
 |
| Undefined incident | * Any other incident (not defined above) or where specific concerns exist over the quality of the drinking water supply
 |
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## Incident response

If any of the criteria in Table 5 are confirmed for your drinking water supply:

* Contact Water Quality Unit, SA Health immediately on **0421 618 311**
* Undertake immediate remedial actions (see Table 6). Use packaged water while corrective action is taken.
* Complete the [SA Health Water Quality Incident notification form](https://www.sahealth.sa.gov.au/wps/wcm/connect/public%2Bcontent/sa%2Bhealth%2Binternet/resources/incident%2Bnotification%2Bform%2Bsafe%2Bdrinking%2Bwater%2Bact%2B2011) available from the SA Health website. Documenting the corrective actions taken.
* Submit the completed form within 24 hours to Water Quality Unit, SA Health via email waterquality@health.sa.gov.au

### Table 6: Immediate remedial actions for typical water quality incidents

| **WQ Incident** | **Corrective Actions** |
| --- | --- |
| Detection of *E. coli*  | * Undertake an inspection of the bore, catchment area, storage tank and distribution system to identify any potential sources of contamination.
* Check that the UV disinfection unit or chlorinator (if present) is working.
* Implement any immediate remedial action as required, e.g., water pooling at base of the bore.
* Disinfect the storage tank with chlorine (see Appendix A for information on the procedure and information on calculating doses).
* Ensure chlorinated water is flushed through all pipework.
 |
| Loss or overdose of chlorine disinfection | * Measure the free chlorine residual at the point of use and check the chlorine analyser (immediately after dosing)
* If free chlorine is less than 0.2mg/L
	+ Reinstate (if failure detected) or increase chlorine dosing and flush any undisinfected water from the system.
* If free chlorine is greater than 5 mg/L
	+ Reduce chlorine dose and flush the system to remove water with elevated chlorine.
* Closely monitor equipment and calibrated (if necessary)
 |

# Section 6: Management and record keeping

Personnel outlined in Table 7 have been assigned to take responsibility of the activities required to manage this water supply system under the *Safe Drinking Water Act 2011*.

### Table 7: Responsibility table

|  |  |
| --- | --- |
| **RMP review** |  |
| **Maintenance activities** |  |
| **Water quality sampling** |  |
| **Review of water quality data from laboratory and contacts SA Health if required** |  |
| **Corrective action in response to water quality incident** |  |
| **Record keeping location** |  |

# Appendix A: Additional Treatment options

## Boiling

Where contamination of bore water is suspected or where additional precautions are considered necessary boiling of undisinfected bore water will ensure microbial safety. For example, people with lower immune responses, such as the very young or very old, cancer patients, people with diabetes, organ transplants or those who are HIV positive should consider boiling bore water prior to consumption. Boiling should also be considered if gastric upsets e.g., vomiting and diarrhoea occur. Boiling also provides a disinfection option for water provided to the public, including use in food preparation, as an assurance of safety.

Bringing water to a boil will achieve disinfection. Boiling does not have to be maintained for any length of time – kettles with automatic shutoffs are suitable for this purpose. Boiling the water will kill any harmful bacteria, viruses or protozoa including *Giardia* and *Cryptosporidium*. Boiled water can be cooled and stored in a clean container until use. The taste of boiled water can be improved by pouring it back and forth from one clean container to another or letting it stand for a few hours to increase the dissolved oxygen concentration.

Care should be taken when boiling water, particularly large quantities, to avoid the risk of scalding.

## Emergency chlorination

Regular manual chlorination of bore water held in tanks is generally only recommended as a remedial action. The effectiveness of chlorine is short-lived, and it will only act on the water in the tank at the time of dosing. Fresh flows of water into the tank after chlorination will probably not be disinfected.

To achieve effective disinfection, it is necessary to add sufficient chlorine to provide a free chlorine residual of at least 0.5mg/L after a contact time of 30 minutes. This can be measured using a suitable chlorine test kit, e.g., a swimming pool kit. As a general guide, to achieve a chlorine dose of approximately 5mg/L you will need to add:

* 40ml of liquid sodium hypochlorite (12.5% available chlorine) per 1000L of water
* 7g of granular calcium hypochlorite (70% available chlorine) per 1000L of water

Further guidance on determining the size of bore water tanks for chlorination and for specific amounts of chlorine for various volumes of water is below.

Calcium hypochlorite should be dissolved in water, in a clean plastic bucket, in the open air, before adding it to the tank. Always add the disinfectant to the water rather than vice versa. When adding the chlorine to the tank, spread it as widely across the surface as possible to promote mixing and let it stand for at least one hour before use. Pipework should be flushed with the chlorinated water.

Sodium and calcium hypochlorite and chlorine test kits can be purchased from large supermarkets, hardware stores or swimming pool stockists. The two forms of chlorination should **never be mixed** as this can cause explosions**.** The chlorine will not make the water unsafe to drink but you may notice a distinct taste and odour that should disappear in 10 to 14 days. Boiling the water will remove most of the taste and odour associated with chlorine.

## Calculations to determine the volume of water in a tank

### To calculate the volume of a rectangular tank, use the formula:

* Volume (in litres) = depth (cm) x width (cm) x length (cm) ÷ 1000

### To calculate the volume of a cylindrical tank either use the formula:

* Volume (in litres) = π x diameter2 (cm2) x depth (cm) ÷ 4000 (where π = 22 ÷ 7)

**OR** use one of the following methods, **remember to calculate the volume of water in the tank and not the volume of the tank:**

 Diameter (cm)

water depth

(cm)

**FORMULA 1**: Volume (in litres) = 0.8 x water depth (cm) x diameter2 (cm2) ÷ 1000

**FORMULA 2**: Volume (in litres) = 0.08 x water depth (cm) x circumference2 (cm2) ÷ 1000

Circumference (cm)

Use a string or tape to measure circumference.

Water depth

(cm)

## Chlorine doses

To achieve 5 mg/L of free chlorine, use the following measurements (mL or g) of hypochlorite (liquid or granular) assigned for the tank volume (calculated above).

**Remember to calculate the volume of water in the tank not the volume of the tank.**

|  |  |
| --- | --- |
| Chlorine Concentration | 5 mg/L |
| Tank Volume (L) | 12.5% liquid Sodium Hypochlorite | 70% granular Calcium Hypochlorite |
| mL | g |
| 1000 | 40 | 7 |
| 2000 | 80 | 14 |
| 3000 | 120 | 21 |
| 4000 | 160 | 28 |
| 5000 | 200 | 35 |
| 6000 | 240 | 42 |
| 7000 | 280 | 49 |
| 8000 | 320 | 56 |
| 9000 | 360 | 63 |
| 10000 | 400 | 70 |
| 11000 | 440 | 77 |
| 12000 | 480 | 84 |
| 13000 | 520 | 91 |
| 14000 | 560 | 98 |
| 15000 | 600 | 105 |
| 16000 | 640 | 112 |
| 17000 | 680 | 119 |
| 18000 | 720 | 126 |
| 19000 | 760 | 133 |
| 20000 | 800 | 140 |

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| For more information |
| Water Quality UnitHealth Protection and RegulationPublic Health DivisionPO Box 6Rundle Mall SA 5000Telephone: 08 8226 7100[www.sahealth.sa.gov.au](http://www.sahealth.sa.gov.au)  |
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