Government of **Western Australia**
Department of **Water and Environmental Regulation**

Contaminated sites fact sheet 6

Groundwater – is my garden bore safe for use?

October 2024

Purpose

This fact sheet is designed to provide advice to garden bore owners/operators on the safe use of groundwater.

Your bore water

Garden bores draw groundwater to irrigate domestic gardens, including across the Perth metropolitan area and in regional areas. Bore water is a viable alternative to using scheme water for irrigation; however, it is vulnerable to contamination.

If you own or operate a garden bore you should **regularly test** the water to ensure it is safe to use. Bore water should never be used for drinking, bathing, filling swimming and paddling pools, food preparation or cooking unless it has been professionally tested and, if necessary, treated. As an additional precaution, home grown fruit and vegetables irrigated with bore water should be washed with drinking water before eating.

Bacteria, viruses, fertilisers, pesticides, herbicides, hydrocarbons (e.g. petrol, oil), metals (e.g. lead, nickel, zinc) and other harmful chemicals from many sources may affect the quality of your bore water.

Groundwater contamination

Bore water can be unsafe to use because of natural processes (such as salinisation) or become contaminated because of land uses occurring on a regional or local scale. Examples of land uses which could be occurring, or could have historically occurred, with the potential to contaminate bore water include:

- leaching from landfill sites
- market gardens or other agricultural uses such as chicken farms

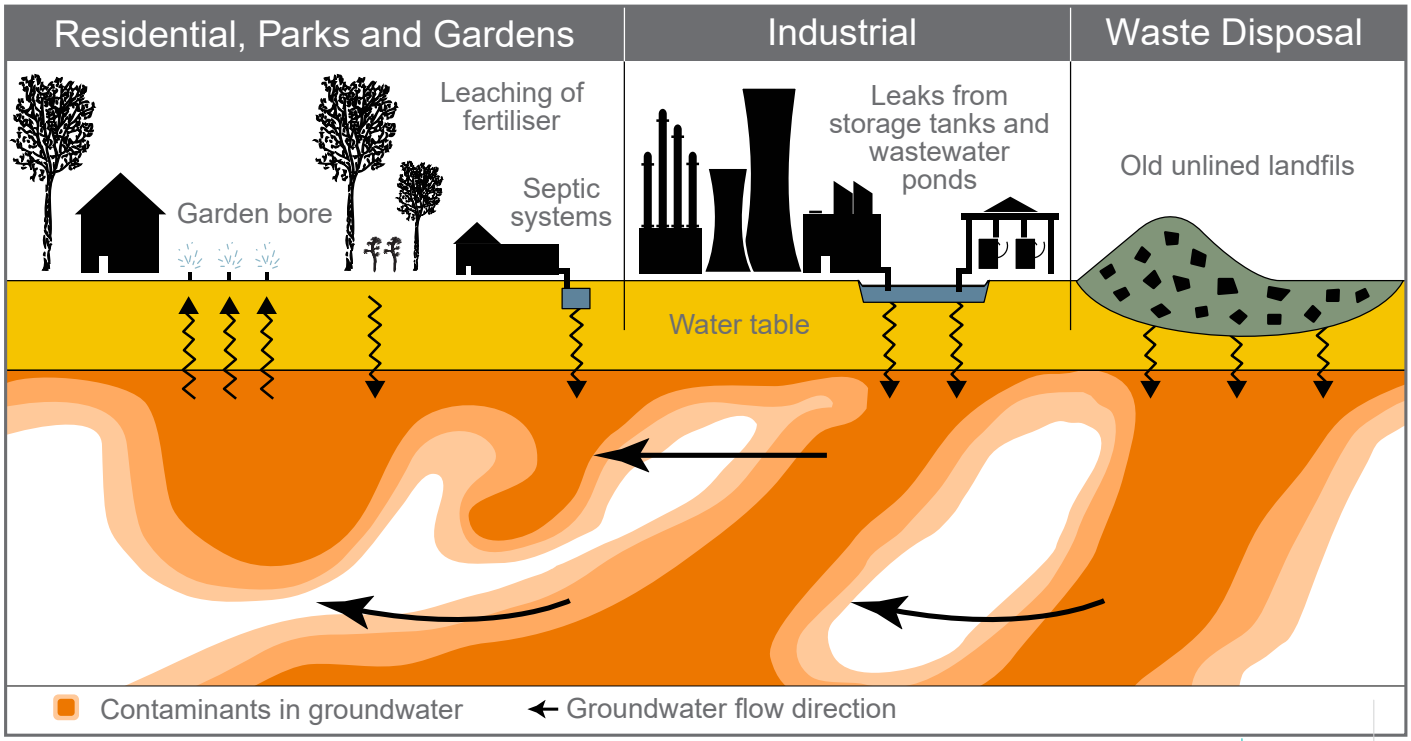

Figure 1 Contamination on the ground travels downward through soils. When chemicals and other contaminants reach the watertable, they can dissolve and move with the groundwater, creating a contaminated groundwater plume

- industrial and manufacturing facilities
- waste treatment and/or recycling facilities
- commercial uses such as service stations, vehicle workshops and drycleaners
- transport land uses such as rail corridors and airports
- unauthorised or uncontrolled filling or waste dumping
- leaking fuel or chemicals from storage tanks
- accidental chemical spills
- poorly maintained septic systems
- firefighting training grounds
- excessive use of fertilisers, manure or pesticides in parks and gardens
- poorly managed disturbance of acid sulfate soils.

▶ Common indicators of potential contamination

Even if your garden seems unaffected, it does not mean that there are no contaminants in your bore water. Professional water testing is required to determine what contaminants are present. However, you may notice some typical indicators of possible contamination:

- a chemical or petrol smell
- froth or foam around sprinkler outlets
- a change in water colour
- the sudden appearance of a strong rotten egg smell
- dying or wilting vegetation in the range of the sprinklers (it may show as chemical burns on grass or vegetation)
- a low or high pH (acidity or alkalinity).

If you observe any of the above, switch off your bore and arrange to have the water professionally tested. Alternatively, contact the Department of Water and Environmental Regulation (the department) on 1300 762 982.

Testing bore water

It is recommended you test your bore water annually at the beginning of summer when you are about to start using the bore to irrigate your garden.

While you cannot have your water tested for every conceivable substance, some basic tests can indicate whether a problem may exist.

For example, you can test your bore water for ammonia, which is an indicator for possible contamination from landfill sites or inefficient septic systems. Ammonia test kits for fresh water are available from aquarium suppliers and pet shops.

You can also perform your own pH tests using a pH test kit. The pH of your bore water will affect the health and growth of plants in your garden. Bore water that is too acidic or too alkaline may affect the uptake of nutrients by plants. The normal pH range for reticulation water is between 6 and 8.

▶ Professional laboratory testing for your bore water

For expert analysis and advice, search online to find environmental testing laboratories. Laboratories may have a standard suite for bore water quality testing or will be able to recommend the appropriate chemicals/substances to test for, based on where you live, the land uses around you and the intended use of the water.

Professional analysis will determine the general chemistry of your bore water, including total salt content and pH. It should also provide a breakdown of the mineral content of the water including most of the common trace metals.

How to ensure my groundwater is safe

Concentrations of the following substances in garden bore water should generally be less than (<) the levels indicated in the tables.

Note: Non-potable uses may include irrigation of gardens, parks and reserves, growing vegetables, flushing toilets or washing vehicles and the recreational use of surface water.

Substance	Non-potable use guidelines*	Indicators: where/what to look for
Nitrate (NO_3)	<500 milligrams per litre (mg/L)	From fertiliser run-off/near market gardens
Arsenic	<0.1 mg/L	Bores in areas where buildings/paths are heavily iron stained (red-brown) should be tested for arsenic
Ammonia (NH_3)	<0.5 mg/L	Pungent odour – can be associated with landfill sites and poorly maintained septic systems
Hydrogen sulfide	<0.05 mg/L	Foul 'rotten egg' odour – can be associated with septic systems, old unlined landfills, swampy wetlands
Chloride	<250 mg/L	May cause leaf damage to sensitive plants at levels over 40 mg/L

Metals – toxicants that may be present in groundwater	Non-potable use guidelines*	Indicators: where/what to look for
Cadmium	<0.02 mg/L	Often associated with fertiliser use or near industrial sites
Chromium VI	<0.5 mg/L	May be detected near industrial site and landfills
Copper	<1 mg/L	
Lead	<0.1 mg/L	
Nickel	<0.2 mg/L	
Iron (total Fe)	<0.3 mg/L	Red-brown coloured staining on buildings and paths
Aluminium	<0.2 mg/L	If pH is lower than 5, aluminium and/or zinc may be present at high levels, and can damage plant roots
Zinc	<3 mg/L	

Other chemicals that may be present in groundwater	Non-potable use guidelines*	Indicators: where/what to look for
Benzene	<0.01 mg/L	Fuel odour, may be associated with fuel storage or service stations
Toluene	<0.025 mg/L	
Ethylbenzene	<0.003 mg/L	
Xylenes	<0.02 mg/L	
PFOS and PFHxS	<0.7 µg/L (or <0.07 µg/L potable uses or irrigation home-grown produce)	May be associated with firefighting training grounds, bulk fuel storage, landfills or wastewater treatment plants
PFOA	<5.6 µg/L (or <0.56 µg/L potable uses or irrigation home-grown produce)	

*Levels derived from non-potable use guidelines values published in the department's guideline Assessment and management of contaminated sites, December 2021. You can also consider advice in section 4.2 on water quality for irrigation and general water use in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000), noting that this advice is aimed at agricultural users

Other garden bore water concerns	Impacts
pH (acidity) normal range is 6.0 – 8.5	<5 is highly corrosive (acidic)
Hardness (alkalinity) caused by calcium and magnesium salts (mostly in coastal regions)	Salts/crusts may form on bore pipes, fittings
Total dissolved salts (salinity)	Salinity measuring more than 1000 mg/L may cause scaling/ corrosion on bore pipes/fittings and leaf burn on plants

Other issues that may affect your bore water include hydrocarbons (from leaking petrol station storage tanks) and pesticide contamination if you live close to market gardens, landfills or industrial sites handling these types of chemicals. If your bore water levels exceed any of the values above, switch the bore off and seek expert advice (see last page of this fact sheet).

► Collecting a bore water sample

To collect a bore water sample that will return an accurate result, check with the laboratory for required sample size and any special handling or transportation procedures and follow the instructions below:

- Switch on your bore and let it run for at least five minutes. This will flush the stagnant water from the irrigation system.
- Using gloves, fill a clean plastic or glass bottle (laboratory can usually supply), to the top of the bottle neck. This will limit the amount of air in the sample and produce more accurate results.
- Take the sample from a tap or hose linked to the bore.
- If no taps or hoses are connected to your bore, take the bore water sample from a sprinkler. If possible, first remove the dripper/sprinkler head (while the bore is off) so that the water is not sprayed before collecting the sample. Caution: with a sprinkler head off, a strong jet of water may come from the sprinkler. You can reduce the pressure of the stream by removing additional sprinkler heads, turning on more than one irrigation station at the same time or by turning off the bore and collecting the water as it drains from the system.
- If the sprinkler head cannot be removed, a washed container (such as an ice-cream container) can be used to collect water from a lawn sprinkler.

For more advice on collecting a bore water sample or help interpreting laboratory results, call the department contaminated sites information line on 1300 762 982.

Water from garden bores in Perth can be coloured due to sediment or clay in the soil. This water frequently contains iron which causes red-brown coloured staining around houses, fences and footpaths. The water may have a rotten egg smell (hydrogen sulfide). This water may be suitable for irrigating gardens but not for other uses. It does not pose a health threat to people, except if the smell is very strong.

Collecting a bore water sample

Considering installing a garden bore?

Please consider the following before installing a garden bore:

- Read the 'Bore water' advice on the Department of Health website or frequently asked questions on the department website.
- Not all areas of WA are suitable for garden bores. To find out if your property falls within an area recommended for bore water use, check maps published on the department's website. These show areas suitable for installing a domestic garden bore within the superficial aquifer.
- Check for potential contamination sources nearby that might impact on the groundwater below your home (e.g. landfills, service stations). Visit the department's website to access information on known contaminated sites. The contaminated sites database holds information on sites classified as:
  - *contaminated — remediation required*
  - *contaminated — restricted use*
  - *remediated for restricted use.*

Information on all other sites, including those awaiting classification, is available by submitting Form 2 - Request for a summary of records in respect of land to the department.

- Check if you live in an area likely to be affected by acid sulfate soils. Check links to risk maps on Landgate's Shared Land Information Platform (SLIP).
- Discuss bore construction conditions with your local government environmental health officer. Consider asking a neighbour for a bore water sample and have it tested to assess groundwater quality in the area.
- Look at the department's Perth Groundwater Map* to determine the depth and direction of groundwater flow at your property. This will indicate the potential cost of installing a bore and show whether groundwater may be flowing from an area with potentially contaminating activities.

*(Perth region only)

More information

For advice on contaminated sites, please contact the department's contaminated sites information line on 1300 762 982 or email info@dwer.wa.gov.au.

This document is available in alternative formats and other languages on request.

Related documents

Find additional publications about contaminated sites and related fact sheets, or contact the department on 1300 762 982.

Legislation

This document is provided for guidance only. It should not be relied upon to address every aspect of the relevant legislation. The full text of the *Contaminated Sites Act 2003* is available from the Department of Justice.