



Contaminated groundwater — could my garden bore be affected?

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 across the Perth metropolitan area. 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. 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 contaminated due to:

- leaching from old, unlined landfill sites;
- industrial land uses;
- leaking fuel or chemicals from storage tanks;
- accidental chemical spills;
- poorly maintained septic systems;
- excessive use of fertilisers, manure or pesticides in parks and gardens; and/or
- inappropriate disturbance of acid sulfate soils.

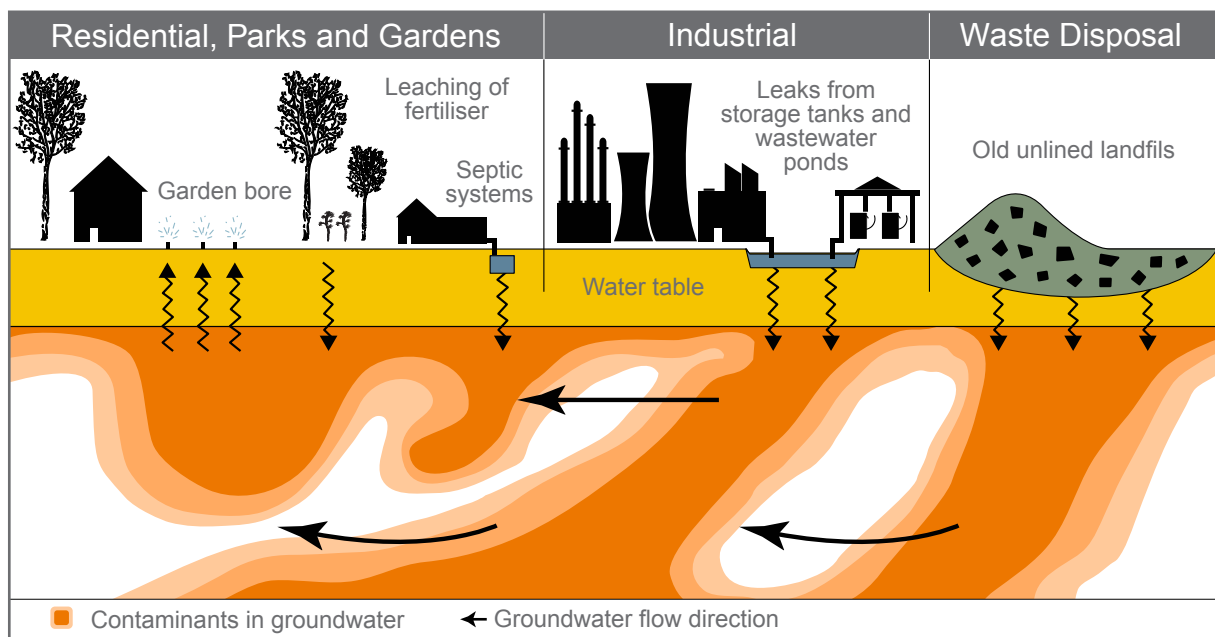


Figure 1: Contamination on the ground travels downward through soils. When chemicals and other contaminants reach the watertable, they can dissolve and move with the groundwater, creating a contaminated groundwater plume.

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 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); and/or
- 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 Environment Regulation (DER) — 1300 762 982.

What should I test my bore water for and how often does it need testing?

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 or not a problem may exist.

For example you can test your bore water for ammonia, which is an indicator for possible contamination from old, unlined 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, look in the Yellow Pages telephone directory under '**analysts**'. The laboratory will 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.

What should I test for to ensure my groundwater is safe?

Concentrations of the following substances in garden bore water should generally be less than (<) the levels indicated 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	< 0.1mg/L	Bores in areas where buildings/paths are heavily iron (red-brown) stained should be tested for arsenic.
Ammonia (NH ₃)	< 0.5mg/L	Pungent odour – can be associated with old unlined landfill sites and poorly maintained septic systems.
Hydrogen sulphide	< 0.05mg/L	Foul 'rotten egg' odour – can be associated with septic systems, old unlined landfills, swampy wetlands.
Chloride	< 250mg/L	May cause leaf damage to sensitive plants at levels over 40mg/L.

Metals — toxicants that may be present in groundwater	Non-potable use guidelines*	Indicators: where/what to look for
Cadmium	< 0.02mg/L	Often associated with fertiliser use or near industrial sites.
Chromium VI	< 0.5mg/L	May be detected near industrial sites and old, unlined landfills.
Copper	< 20mg/L	
Lead	< 0.1mg/L	
Nickel	< 0.2mg/L	
Iron (total Fe)	< 0.3mg/L	Red-brown coloured staining on buildings and paths.
Aluminium	< 0.2mg/L	If pH is lower than 5, aluminium and/or zinc may be present at high levels, and can damage plant roots.
Zinc	< 3mg/L	

*Levels derived from non-potable use guidelines values published in DER's guideline [Assessment and management of contaminated sites, December 2014](#). 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.

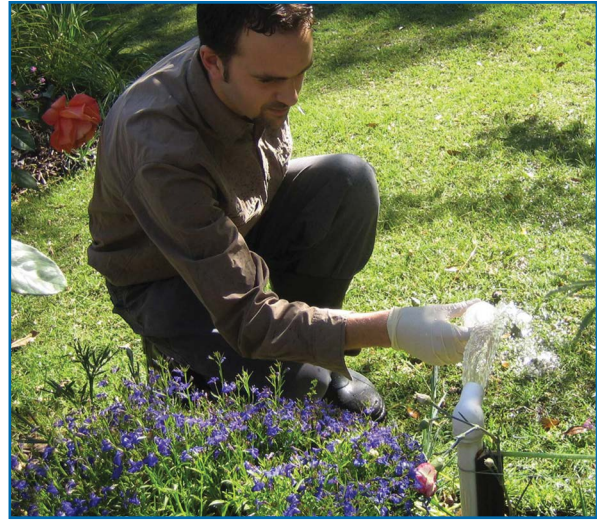
Other garden bore water concerns	Impacts
pH (acidity) normal range is 6.0–8.5	< 5 is highly corrosive (acidic).
Hardness (alkalinity) caused by calcium and magnesium salts (mostly in coastal regions)	Salts/crusts may form on bore pipes, fittings.
Total dissolved salts (salinity)	Salinity measuring more than 1000mg/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 final page of this fact sheet).

How do I collect 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 DER 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 possibly if the smell is very strong.

Considering installing a garden bore?

- Read the 'Bore Water' advice on the [Department of Health](#) website.
- Not all areas of Western Australia 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 of Water'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 [DER'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 DER.

- Check if you live in an area likely to be affected by acid sulfate soils. Links to risk maps on Landgate's Shared Land Information Platform (SLIP) are available on [DER's website](#).
- 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 of Water's [Perth Groundwater Atlas*](#) 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 groundwater contamination or any other contaminated sites matter, please contact the contaminated sites information line on [1300 762 982](tel:1300762982) or email Contaminated Sites. This document is available in alternative formats and other languages on request.

Related documents

Additional publications about [contaminated sites](#) and related [fact sheets](#) are available online on DER's website, or by contacting the Department on [1300 762 982](tel:1300762982).

Legislation

This document is provided for guidance only. It should not be relied upon to address every aspect of the relevant legislation.

Please refer to the *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006* available from the State Law Publisher. Free electronic copies are available from [State Law Publisher website](#).

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Legal advice

The information provided to you by DER in relation to this matter does not constitute legal advice. Due to the range of legal issues potentially involved in this matter, DER recommends that you obtain independent legal advice.