

# FACT SHEET

# Water testing



Source: SA Water

Water quality can have a significant impact on the Eyre Peninsula’s livestock and dryland cropping systems – from the amount of water livestock are likely to consume, to the effectiveness of spray applications on crops and pastures.

The water source has a profound effect on water quality, while storage and distribution can have additional impacts. For example, algae, surface dust and other contaminants at the trough can affect drinking water palatability and stock performance.

The colour and smell of water can provide important clues to its quality. Additionally, reduced flow rates may indicate blockages in farm water infrastructure, potentially caused by poor water quality. The cause of these should be addressed along with the impact.

## Test water regularly

Water for livestock should be tested at least once each season to assess its qualities and any changes. Water for spraying and irrigation should be regularly tested for salinity, pH and hardness, particularly where quality is variable.

Key properties including pH, salinity and turbidity can be measured using simple test kits that are widely available from hardware shops, garden centres and online. Continuous measurement versions are also available for ongoing monitoring of a critical water source.

Water quality test kits are useful for providing indicative measures of properties like hardness and alkalinity, particularly if water from different sources is being mixed to improve the overall quality, or if a water supply has seasonal variation. However, regular laboratory testing will provide the most accurate and comprehensive measurements of water quality.

Keeping a record of the sampling conditions and test results will highlight any developing trends and help with long term planning.

## Water quality parameters

General water quality parameters are provided in Table 1. However, consulting with an agronomist, veterinarian or adviser about the specific test results you need is always recommended. Once the analytical requirements have been established, contact the testing provider to ensure the laboratory service or test package will include those data, and to obtain advice on water sampling and handling.

Table 1: General water quality parameters

Spray water	
<b>Basic tests</b> pH Total dissolved solids (TDS) or electrical conductivity (EC) Total hardness	<b>Compare results to:</b> Manufacturer's recommendations Refer to herbicide tolerances to water qualities
<b>Optional Extras</b> Total bicarbonates Suspended solids (muddy water, i.e. turbidity) Iron and ammonium	<b>Compare results to:</b> Manufacturer's recommendations. Refer to herbicide tolerances to water qualities
Livestock Drinking Water	
<b>Basic tests</b> pH Total dissolved solids (TDS) or electrical conductivity (EC) Nitrate and nitrite Sulphate	<b>Compare results to:</b> Livestock drinking water guidelines ANZG (Draft, 2023) <sup>1</sup>
<b>Optional Extras</b> Calcium and magnesium Metals: aluminium, arsenic, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, uranium, vanadium, zinc Fluoride Biological parameters: - as toxin-producing cyanobacteria (request microcystis aeruginosa or microcystins-LR) - as pathogens and parasites (request E. coli)	<b>Compare results to:</b> Livestock drinking water guidelines ANZG (Draft, 2023) <sup>1</sup>
<b>Environmental (land-based) run-off</b> Nitrate, nitrite, nitric oxide Ammonium Nitrogen, total Phosphorous, total Phosphate, filterable reactive pH Total dissolved solids (TDS) or electrical conductivity (EC)	<b>Compare results to:</b> ANZECC & ARMCANZ (2000) water quality guidelines <sup>2</sup>

## Water testing options

Eyre Peninsula farmers have several options for testing their water sources, including:

Test required	Testing options	Comment
Electrical conductivity (EC)	Landscape Board or purchase own EC meter	If purchasing, get some standard solution to calibrate for accuracy. Record sample, location, date, and any other relevant factors.
pH	Purchase own meter or use test strips	If purchasing, get some standard solution to check accuracy.
Test strips (e.g. pH and nutrients – nitrate, phosphate, ammonia, alkalinity, dissolved iron)	Hardware stores	At-home test strips are an easy way to estimate levels, but not as accurate as lab testing. They generally do not have sufficient resolution for good monitoring over time, or for more precise applications such as acidification dosing.



Source: SA Water

## Laboratory testing is the benchmark

As water quality is critical to agricultural performance and productivity, water sources should be regularly tested by a qualified laboratory. Any new water source should also be tested before it is brought online. This initial investment will benchmark the qualities of each water supply and provide certainty around its suitability and performance in different parts of the enterprise.

There are several water quality laboratories that can be engaged to complete water tests for Eyre Peninsula farms. These include:

- EP Analysis (Cummins)
- AWQC (Adelaide)
- Eurofins (Adelaide)

Visit [nata.com.au/find-organisation/](https://nata.com.au/find-organisation/) to find other accredited laboratories.

## Testing for other contaminants

There may be specific contaminants that are of interest or concern in water from a particular source or intended for a particular purpose. These might include microplastics, PFAS chemicals, or agrichemicals.

Some odours or colours in water can indicate the presence of iron, sulphates, sulphides or nitrogenous compounds, which may or may not be problematic. However, even harmless odours can put livestock off the water and lead to production issues. (Lardner, H.A., Kirychuk, B.D. & Braul, L. (2022) 'Evaluation of the effects of water quality on drinking preferences of heifer calves', *Translational Animal Science*, 6(4), txac150, doi:10.1093/tas/txac150.)

Most labs can test for most contaminants – although the cost will vary with complexity, demand and other variables. If you have a specific requirement, simply ask your preferred lab or search for facilities that offer the test required.

## How to collect water samples

Whether collecting water for on-farm testing or for sending to a laboratory, the samples should be collected in clean containers of at least 500 mL capacity.

The sample containers should be rinsed out at least four times using the water to be tested, from the intended collection point:

- **For a new bore:** collect samples after pumping for at least 3 hours.
- **For an existing bore:** collect samples after pumping for at least 30 minutes. Collect bore water as close to the head of the bore as possible, to avoid infrastructure affecting the water.
- **For a dam:** sample away from the water's edge and as close to the pump suction inlet as possible. Ideally, attach the sampling bottle to a pole so you can sample from the main water body and avoid edge effect. A filter or strainer can help to keep larger organic material out of the sample.
- **From tanks and other infrastructure:** try to sample near the inlet pipe where representative mixing is occurring. Make a note of where samples are collected, so the same process can be followed every time.

## General recommendations for sampling procedures

Fill the sample containers all the way to the top, so no air is included and seal tightly. Keep the samples cool (on ice or in the fridge).

Label the samples with the farmer's name and contact details, water source and collection date. Add the intended uses, as this can influence testing and interpretation of the results.

Most laboratories will also advise that the samples are submitted promptly, with as little time in transit as possible. Time in the container, especially when also exposed to light, can affect the properties of the water sample, and the lab may need the samples to be transported with ice or refrigeration to preserve the properties being tested for.

It is always best to check with the testing laboratory to establish their requirements and recommendations regarding water sampling, storage and transport.

## Shandying water

One of the simplest ways to manage water quality issues, especially moderate salinity or hardness, is by mixing the 'problem' water with fresh water captured from a clean source – such as rainwater runoff from infrastructure roofing or a lined catchment.

Often called 'shandying', this mixing can be used to reduce the overall concentration of dissolved salts in the final water supply.

A good understanding of both water sources, derived from testing, is essential to manage the shandying ratio of saline or hard water to fresh water and achieve a suitable result for the intended use.

## How to calculate the approximate mineral concentration of shandied water.

The calculations can be simplified by following the guidance below:

- When one water source is relatively pure, shandying equal quantities will halve the concentration of dissolved mineral in the final mix.
- When shandying water sources with different mineral content levels, the milligrams per litre (mg/L) – which equals parts per million (ppm) – for each should be added together then divided by the ratio of volumes being mixed.

For example, to shandy waters with TDS of 9,000 mg/L and 600 mg/L:

- Mix 1 to 1 (2 equal volumes):  $9,000 + 600 = 9,600$ .  
Divided by 2 volumes = 4,800 mg/L
- Mix 1 to 2 (3 volumes):  $9,000 + (2 \times 600) = 10,200$ .  
Divided by 3 volumes = 3,400 mg/L
- Mix 1 to 3 (4 volumes):  $9,000 + (3 \times 600) = 10,800$ .  
Divided by 4 volumes = 2,700 mg/L

While the salinity of shandied water is usually quite predictable, other key properties can depend on the nature of the two waters and their sources. For example, a higher saline groundwater and a low saline surface catchment can have very different levels of hardness, dissolved minerals and turbidity.

If the ratio of different waters in the shandy is not known, it can help if to measure the salinity of the different source waters. This can inform the likely ratio in the mix based on its final salinity, along with how well the source waters are being mixed and if additional mixing procedures need to be implemented.

## References

1. ANZG (2023). Livestock drinking water guidelines (currently in draft form). <https://www.waterquality.gov.au/sites/default/files/documents/livestock-drinking-water-guidelines-draft.pdf>
2. ANZECC & ARMICANZ (2000) Water quality guidelines. <https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armicanz-2000-guidelines-vol1.pdf>

## Managing other water quality issues

For more information on managing:

- **Salinity**
- **Hardness**
- **pH and dissolved iron**
- **Cloudiness, turbidity and algae**

see the Further resources section to access other water quality fact sheets.

### About EP Farm Water Security

EP Farm Water Security is a project to promote better capture, storage and management of water on EP farms. It is led by Primary Industries and Regions SA (PIRSA), with project partners SA Water, the Eyre Peninsula Landscape Board, AWI Extension SA, SA Department for Environment and Water and AgCommunicators.

Agriculture is the dominant force in Eyre Peninsula land use and economic activity. It is also the largest user of mains water, accounting for up to 40 percent of local SA Water supply. By acting now to enhance water capture, storage and infrastructure, farmers have the power to underwrite their own water security, save money and reduce their reliance on mains water.

## Further resources

Additional EP Farm Water Security information and fact sheets  
[pir.sa.gov.au/sardi/projects/eyre-peninsula-farm-water-security-project](http://pir.sa.gov.au/sardi/projects/eyre-peninsula-farm-water-security-project)



EP Landscape Board  
[landscape.sa.gov.au/ep/water](http://landscape.sa.gov.au/ep/water)



Water testing fact sheet, EP Landscape Board  
[cdn.environment.sa.gov.au/landscape/docs/ep/Water-Testing-fact-Feb2022.pdf](http://cdn.environment.sa.gov.au/landscape/docs/ep/Water-Testing-fact-Feb2022.pdf)



EP Water Security Response Plan, SA Water  
[sawater.com.au/\\_data/assets/pdf\\_file/0004/1017625/EP-Water-Security-Response-Plan.pdf](http://sawater.com.au/_data/assets/pdf_file/0004/1017625/EP-Water-Security-Response-Plan.pdf)



Water affecting activities resources and policy guide, EP Landscape Board  
[landscape.sa.gov.au/ep/water/water-affecting-activities](http://landscape.sa.gov.au/ep/water/water-affecting-activities)



### Disclaimer

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## Decision checklist:

- Consult with experts to assess the water test parameters needed.
- Identify a suitable water testing laboratory and confirm the test package covers all required results.
- Prepare sampling supplies, including containers labels, courier arrangements, etc.
- Identify suitable sampling locations.
- Plan for any other requirements, such as running a new bore pump for three hours before sampling.
- Ensure samples will be dispatched for testing promptly after collection.
- Regularly check and monitor water quality to ensure it is safe and fit for purpose, especially prior to using for crop spraying or watering livestock.
- Make sure your water quality tests check for salt, chemical and bio-contaminants such as bacteria and algae.

### Legal considerations

On-farm construction activities designed to access water resources are subject to State Government legal requirements in South Australia. These requirements are designed to protect the water resources, other water users and the natural environment.

The legal requirements are affected by factors such as the location, size and type of the works, for example:

- Large dams and large, highly visible water harvesting structures (e.g. sheeted catchments) may be subject to the need for development approval via your local Council, under the state's planning regulations.
- A permit is required from the Eyre Peninsula Landscape Board for a range of water affecting activities that may impact on watercourses, including the construction or modification of small to medium sized dams in watercourses in some catchments across southern Eyre Peninsula.
- A permit is required from the Department for Environment and Water (DEW) to construct or modify a groundwater well or to discharge water into a well. A licensed well driller must carry out or supervise the drilling or modifications.

Landholders should seek information from their local Council, Landscape Board and DEW when in the early planning stage of their proposal, so that the activity can be located and designed to meet legal requirements and to streamline any approvals process that applies.

**For more information, see the Resources and further reading section.**

Handy links to local councils on the EP, Eyre Peninsula Local Government Association  
[epлга.com.au/about/councils](http://epлга.com.au/about/councils)



Australian Water Quality Centre (AWQC) Water testing available from independent business unit within SA Water  
[awqc.com.au](http://awqc.com.au)



GRDC Spray Water Quality Fact Sheet (October 2019)  
[grdc.com.au/resources-and-publications/all-publications/publications/2019/spray-water-quality](http://grdc.com.au/resources-and-publications/all-publications/publications/2019/spray-water-quality)



Flocculants and water testing instructions, Water Quality Solutions  
[stage.waterqualitysolutions.com.au/how-to-clear-muddy-water/](http://stage.waterqualitysolutions.com.au/how-to-clear-muddy-water/)



Glyphosate and the Effect of Hard Water  
[eurekaag.com.au/glyphosate-effect-hard-water/](http://eurekaag.com.au/glyphosate-effect-hard-water/)



Measuring the turbidity of water supplies  
[wedc-knowledge.lboro.ac.uk/resources/booklets/G031-Measuring-turbidity-in-water-supplies-online.pdf](http://wedc-knowledge.lboro.ac.uk/resources/booklets/G031-Measuring-turbidity-in-water-supplies-online.pdf)



A quick way of measuring the turbidity of water  
[wedc-knowledge.lboro.ac.uk/resources/posters/P023\\_A-quick\\_way\\_of\\_measuring\\_turbidity.pdf](http://wedc-knowledge.lboro.ac.uk/resources/posters/P023_A-quick_way_of_measuring_turbidity.pdf)



### Acknowledgements

NSW DPIRD Water quality for chemical spraying, 2012 ([https://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0008/433691/Water-quality-for-chemical-spraying.pdf](https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0008/433691/Water-quality-for-chemical-spraying.pdf))

Sprayers 101 (<https://sprayers101.com/ph-hardness/>)

