

Liming and acidity in the Hills

What does acidity mean for our soils?

When the soil pH falls below 5.0 calcium chloride ($CaCl_2$), nutrients such as phosphorus, magnesium and calcium start to become unavailable, and toxic amounts of aluminium and manganese can occur. This means the productivity of pastures and crops will decrease. Acidity in the subsoil will also restrict root access to nutrients and water.

Topsoil (above 10cm) and subsoil (below 10cm) acidity is widespread in the Hills and Fleurieu region. Generally, keeping topsoil above 5.5 ($CaCl_2$) and subsoil above 4.8 ($CaCl_2$), will amend ongoing acidification due to land use.

What is soil pH?

Soil pH is the concentration of hydrogen ions in the soil. pH is measured on a logarithmic scale from 0 to 14, meaning a pH of 4 is ten times more acidic than a reading of 5. On the scale, 7 is considered neutral, below 7 is acid and above 7 is alkaline.
Most agricultural systems where nitrogen fertiliser is applied and/or where grain, hay or animal products are exported have acidic soils, i.e., the concentration of hydrogen ions increases.

Fact: pH ($CaCl_2$) generally 0.5-1.2 units lower than pH (water).

It is also more accurate as less affected by seasonal conditions.

How to amend acidity

Soil testing

Understanding pH variation and how it varies across your paddocks is important for managing it. For example, clays can resist pH changes more easily than loams, which resist more easily than sands. Once pH is known in different areas, soil ameliorants can be applied as needed. Fertiliser application should be tailored according to the varying soil conditions (following the 4Rs is recommended, right time, right place, right product and right rate).

Liming

Liming is one of the most common ways to treat soil acidity. Carbonate from calcium carbonate and magnesium carbonate neutralises acidic soils.
The amount of lime needed will depend on soil pH profile, lime quality, soil type, farming system and rainfall.

The quality of lime is dictated by the neutralising value and particle size.

Neutralising value (NV) = is a % of pure calcium carbonate. Pure calcium carbonate = 100%. Higher the NV, less lime is needed. Ideally aim for NV > 80-90%.
Particle size = finer the product, the quicker it reacts in soil. Ideally >60% should pass through a 300-micron sieve. However, the finer the lime, the more difficult it is to spread.

A mixture of fine and coarse particles will overcome this but be mindful that coarser products will be slower to take effect.

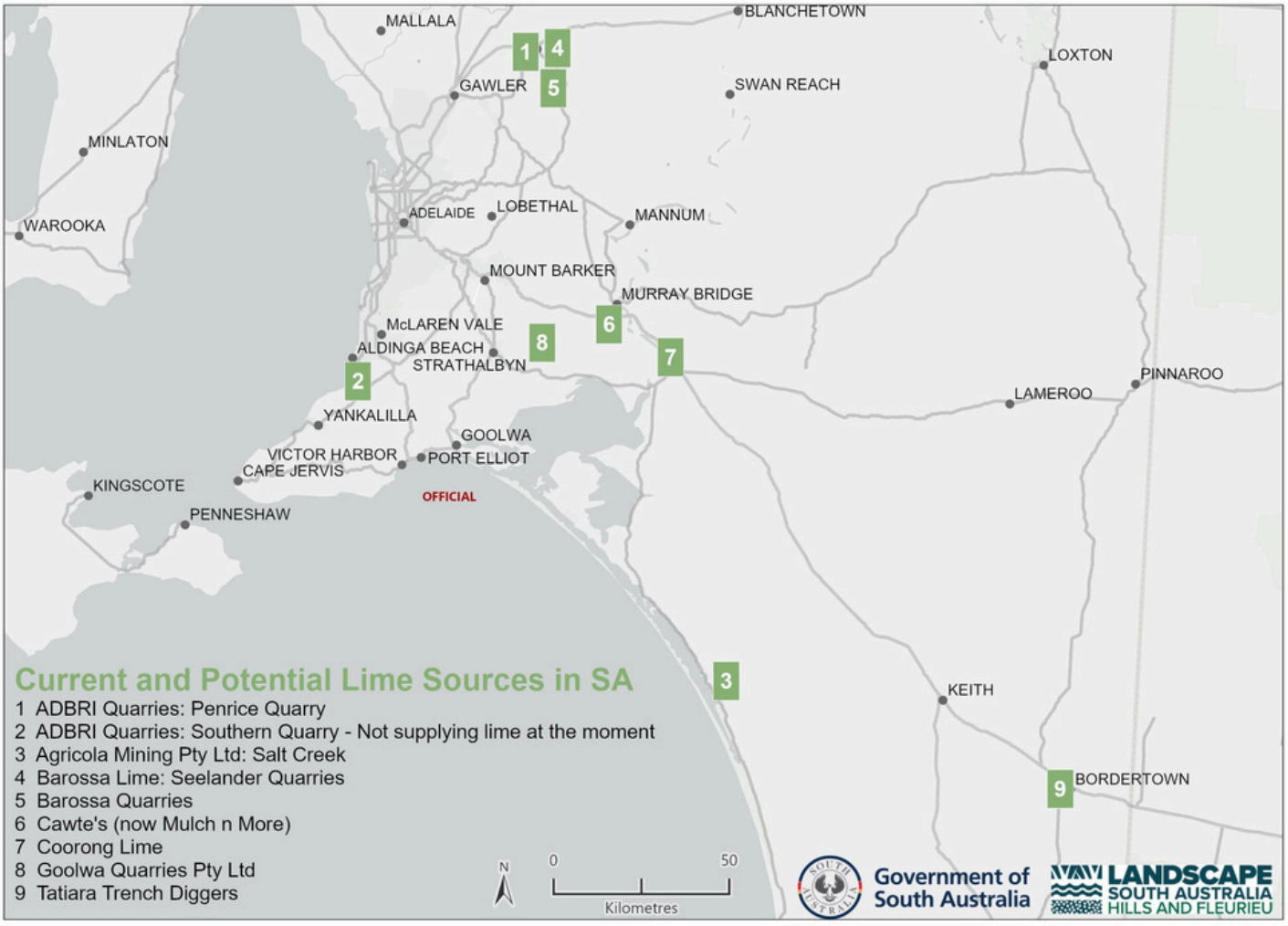


Figure 1. Map of current sources of lime with close proximity to the Hills and Fleurieu. Please note this information can change. For a wider map, refer to Resources | Acid Soils Southern Region. Map adapted from 'Current and Potential lime sources in South Australia,' Harding and Hughes, 2018.

Management to reduce rate of acidification

- Maintain groundcover and grow deep-rooted perennials
- Add legumes and nitrogen fixing pastures into the system to reduce fertiliser use
- Grow acid tolerant pastures and crops
- Retain cut hay to feed
- Fertiliser management (4Rs)

Alternatives to lime

- Clay spreading
- Biochar (depends on source material)
- Composts from alkaline material
- Organic fertilisers
- Increasing organic matter and fungal populations

How much lime do you need? It is based on soil texture.
Refer to GRDC lime calculator:
MAINTENANCE_LIME_RATE_CALC_MW-19.xlsm

Further information

Further information is available through Landscapes Hills and Fleurieu

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