FREE AUSTRALIAN PADDOCK GUIDE

Mapping soil compaction in a paddock

How to grid a paddock with a commercial manual cone penetrometer, record depth to 300 PSI, and keep a comparable farm record.

400 mm of unrestricting profile is a useful minimum for roots. Red on the map means the dial has already exceeded 300 PSI at the depth you chose.

START HERE

A penetrometer is a question about roots, not a verdict on the farm

Cone resistance is one of the few paddock checks that speaks directly to whether a root can push. A hardpan, a wheel track or a stock camp can sit under a surface that looks fine. Mapping it is about finding those layers while moisture is comparable, then coming back in another season on the same grid.

This guide is written for a commercial manual cone penetrometer — the analogue dial most agronomists already recognise. Digital recording cones are welcome in the farm record when you have them, but you do not need one to map a paddock well.

What TerraTactics stores
Named insertion, GPS, tested depth, resistance (PSI and kPa), and — most useful for the heatmap — the depth where the dial first exceeds 300 PSI. A paddock heatmap lets you choose a target depth; red is reserved for insertions that are already above 300 PSI at that depth.

Why a hardpan matters for soil health

Roots, water and air share the same pore space. When a layer densifies, water perches or bypasses, roots turn sideways, and biology in the profile below is cut off from fresh carbon. That is a soil-health constraint, not just a yield note. Mapping where the layer starts tells you whether the problem is a shallow traffic pan, a plough sole, or a natural texture change.

- Compare like with like: similar moisture, same cone, same operator, same season of the rotation.
- Do not treat a dry ridge and a wet flat as the same story on the same day.
- A single high reading is a flag. A grid that repeats it is a pattern you can manage.

THE NUMBERS

300 PSI, 400 mm, and the colour of the map

Australian paddock practice commonly treats about 300 PSI (around 2,070 kPa) as the point where root growth is restricted for many crops. That is the red stop on an analogue dial and on the TerraTactics heatmap.

READING AT THE CHOSEN DEPTH	WHAT THE MAP SHOWS	WHAT TO WRITE DOWN
Below 200 PSI	Good rooting (green)	Still open at this depth
200–300 PSI	Rooting caution (yellow)	Watch; re-check at similar moisture
Above 300 PSI	Root restricting (red)	Depth where the dial first crossed 300 PSI

400 mm is a practical minimum of unrestricting profile for many annual roots. If the dial has not exceeded 300 PSI by 400 mm, that insertion still counts as good rooting at the target. If it crossed 300 PSI at 150 mm, the heatmap at 150 mm, 250 mm and 400 mm should still be able to show that restricting layer — choose the depth you are modelling, and red remains reserved for > 300 PSI at that slice.

Choose the depth on the heatmap
A paddock is not one number. Wheel tracks often show at 150–250 mm; a plough sole may sit deeper. Select the target depth on the Compaction map so you can model the layer you care about. Wherever that slice is already above 300 PSI, it paints red.

IN THE PADDOCK

Grid the paddock, then push the cone

Lay out a grid

- Start with named points you already use for soil screens, then fill a regular grid between them.
- On a 100 m × 100 m block, a 10 m grid (about 121 insertions) is a research-grade picture. On a working paddock, 20–40 m centres still show wheel tracks and hardpan patches.
- Mark wheel tracks, gateways, headlands and a mid-paddock control on purpose — those are the comparisons that matter.
- Capture GPS at each insertion, or at least a paddock name plus a point name you can find again.

Use the penetrometer properly

- Push vertically, at walking pace, with the cone fully in the soil before you trust the dial.
- Stop at the first depth where the dial exceeds 300 PSI, and write that depth down. Then, if the soil allows, continue to your target (often 400–600 mm) and note the peak.
- Do not lean, twist or hammer. A bent shaft or a rushed push is not comparable next season.
- Record cone size if the instrument has more than one (typically a small and a large cone). Keep using the same one on the same farm.
- Work when the profile is moist enough to be typical for growth — not dust-dry, not slurry.

What to enter in TerraTactics

- Paddock, sample name, captured time, GPS.
- Tested depth (how far you pushed).
- Depth where the dial first exceeded 300 PSI — leave blank only if you never reached it.
- Peak resistance in PSI (analogue) or kPa (digital). Both are stored.
- A short note: moisture, residue, wheel track or control.

GEAR AND RECORD

A commercial manual penetrometer is the right tool

Buy a cone penetrometer that agronomists already use in Australian paddocks: a steel shaft, replaceable cone, and a dial you can read in PSI. That is enough to map a paddock and keep a year-to-year record. You do not need a branded logger to do this job well.

TerraTactics can supply a manual penetrometer to trial and subscriber farms. It is not listed for self-serve checkout — contact us to order so we can match cone size and confirm stock. Email hello@terratactics.com.au or use the contact form at terratactics.com.au/contact.

Keep the record honest
Compaction sits beside the seven soil indicators. It does not change how TerraProbe measures moisture, EC or temperature, and it is not a laboratory bulk-density result. Method, moisture and operator belong in the note every time.

Disclaimer

This guide is general educational information for Australian paddocks. Suitable depths, cones and interpretations vary by soil type, crop and season. TerraTactics does not accept responsibility for management decisions made from this guide. A penetrometer walk does not replace agronomy advice or accredited laboratory analysis.

About TerraTactics

TerraTactics helps Australian farms keep paddock boundaries, GPS-tagged soil readings, field notes, laboratory reports and penetrometer context in one record. Learn more at terratactics.com.au.