

PNL Penola Land System

Area:	48.2 km ²
Landscape:	Gentle rises and plains with some calcrete outcrops, extending from south of Penola to north of Coonawarra; often referred to as the "Coonawarra strip". Slightly karstic with indistinct depressions in places. Occasional low sand dunes. Elevation is about 60 m asl, slightly higher near Penola, grading to about 56 - 57 m in the north. Relief < 10 m.
Annual rainfall:	620 – 685 mm average
Geology:	Pleistocene Padthaway Formation calcareous lacustrine clays and Pleistocene Bridgewater Formation calcreted calcarenite on stranded beach ridge deposits.
Main soils:	B4 (30%) Shallow red loam on limestone (Petrocalcic Red-Brown Dermosol) B6 (21%) Shallow loam over red-brown clay on calcrete (Petrocalcic Red Chromosol-Kandosol)
Minor soils:	B5 (8%) Shallow dark clay loam on limestone (Petrocalcic Black-Grey Dermosol) B3 (7%) Shallow sandy loam on calcrete (Petrocalcic Red Tenosol-Kandosol-Rudosol) RR (7%) Bare calcrete D2 (7%) Loam over red clay (Calcic-Hypercalcic Red Chromosol-Sodosol) G3 (5%) Thick sand over clay (sandy Brown-Red Chromosol-Sodosol)
Summary:	The soils are well drained, apart from those few in depressions, swales and swamps. The variable thickness of soils over calcrete means that there are equivalent variations in waterholding capacity and plant root depth potential. This can be moderated by ripping of calcrete to allow root penetration into the relatively softer calcarenite and rubble below the calcrete cap. Much of the land system is used for viticultural production. Stony areas are unsuitable for root crops. Soil salinity is not a problem.

Soil Landscape Unit summary: Penola Land System (PNL)

SLU	% of area	Component	Main soils	Prop#	Notes
M-AA	1.7	Outcrop	RRB2	D	M-AA Outcrop: Very gently undulating low rises and plains with low dune- core topography, with mostly bare calcreted calcarenite outcrop, but often very shallow calcareous clay loam on calcrete; 10-30% shallow, non-calcareous clay loam on calcrete, or non-calcareous clay loam, sharply over well structured red clay, on calcrete. Loamy: Very gently undulating low rises and plains with mostly shallow clay loam sharply over well structured red clay, on calcrete; or often clay loam grading to red well structured clay, on calcrete. M-B Gently sloping rises with clay loam grading to well structured red clay, on calcrete; or shallow clay loam sharply over well structured red clay, on calcrete, which occasionally is below 1metre depth. Stony areas with very shallow soils are common also. Main soils: Outcrop plains and rises: <u>Shallow calcareous loam on calcrete</u> - B2 and <u>Rock or exposed calcrete</u> – RR . Loamy plains and stony rises: <u>Shallow red loam on limestone</u> - B4 and <u>Shallow sandy loam over red-brown clay on calcrete</u> - B6 .
		Loamy	B6B4	M	
M-B	1.3	Rise	B4	D	



MDA	0.5	Plain	B4B6	D	<p>Broadly undulating, former beach ridge, elongate in a North-South direction, with slightly elevated plains, low rises and swales, often on sheet calcrete, which outcrops in places. Soils vary from extremely shallow to moderately deep. Some plains and swales on the western part have dark clays and are subject to inundation during winter where watertables frequently occur within a metre of the surface. Mostly well drained.</p> <p>MDA Plains with clay loam grading to well structured red clay, on calcrete; or shallow clay loam sharply over well structured red clay, on calcrete. 10-30% deep gradational red clay loam over well-structured red clay; or shallow reddish clay loam on calcrete.</p> <p>MDAA Very gently undulating low, broad rises and slightly elevated plains, showing low dune core topography, mostly with moderately deep to shallow with clay loam grading to well structured red clay, on calcrete; or often moderately deep to shallow clay loam sharply over well structured red clay, on calcrete; 10-30% deep gradational or texture contrast red clay loam over well structured red clay in elevated parts; or shallow dark clay loam over dark clay, on calcrete in low parts. 20-30% stony rises with shallow gradational red clay loam over well structured red clay on calcrete; or very shallow reddish clay loam on calcrete; or bare calcrete; 10-30% very shallow calcareous clay loam on calcrete, or texture contrast red clay loam over well structured red clay on calcrete.</p> <p>Main soils: Plains: <u>Shallow red loam on limestone - B4</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u>. Stony rises: <u>Shallow red loam on limestone - B4</u>, <u>Shallow sandy loam on calcrete - B3</u> and <u>Rock or exposed calcrete - RR</u>.</p>
MDAA	85.5	Plain Stony rise	B4B6 B4B3 RR	V C	<p>Gently undulating plains or low rises with shallow texture contrast red sandy loam over well structured red clay on calcrete; very shallow reddish clay loam on calcrete; or deep sand over brown clay on rises; 10-30% sand over sandy clay loam, or shallow sandy loam over poorly structured brown clay on calcrete.</p> <p>Main soils: <u>Shallow sandy loam over red-brown clay on calcrete - B6</u>, <u>Shallow sandy loam on calcrete - B3</u>; <u>Thick sand over clay - G3</u>.</p>
MFB	0.9	Plain	B6B3 G3	D	
MWAK	3.6	Plain	G3	D	<p>MWAK Plains or low rises underlain by calcarenite, with karstic depressions, adjacent to plains with lower elevation to the west. Soils are mostly sand over brown clay, with 10-30% shallow sandy loam over red clay on calcrete.</p> <p>MWB Gently sloping rises with loam or sand over brown clay; calcreted calcarenite occurs at depth.</p> <p>Main soils: Plains: <u>Thick sand over clay - G3</u>. Rises: <u>Sandy loam over poorly structured brown or dark clay - F2</u> and <u>Thick sand over clay - G3</u>.</p>
MWB	3.9	Rise	F2G3	D	<p>Plains with shallow, dark cracking or self mulching clay over rubbly dark clay on calcrete, deeper dark clay soils in low karstic depressions. <10% rises with shallow texture contrast red clay loam over well-structured red clay, on calcrete.</p> <p>Main soils: Plains: <u>Shallow dark clay loam on limestone - B5</u>. Rises: <u>Shallow sandy loam over red-brown clay on calcrete - B6</u>.</p>
NOC	2.2	Plain	B5	D	
XRC	0.4	Rise Swamp	B6 N3E3	M D	<p>Swamps with mostly wet, deep, dark grey, cracking clay; 10-30% dark clay loam over poorly structured dark brown clay.</p> <p>Main soils: <u>Wet clay loam - N3</u>; <u>Brown or grey cracking clay - E3</u>.</p>



PROPORTION codes assigned to Soil Landscape Unit (SLU) components:

D	Dominant in extent (>90% of SLU)	C	Common in extent (20–30% of SLU)
V	Very extensive in extent (60–90% of SLU)	L	Limited in extent (10–20% of SLU)
E	Extensive in extent (30–60% of SLU)	M	Minor in extent (<10% of SLU)

Detailed soil profile descriptions:

- B2** Shallow calcareous sandy loam on calcrete (Petrocalcic Calcarosol)
Up to 40 cm calcareous loamy sand to sandy loam with variable calcrete rubble overlying calcreted calcarenite - rises.
- B3** Shallow sandy loam on calcrete (Petrocalcic Rudosol)
Medium thickness non calcareous sandy loam, often having a slight clay increase with depth, over calcreted calcarenite shallower than 50 cm - rises.
- B4** Red sandy loam over calcrete (Petrocalcic, Red Dermosol)
Medium thickness red sandy loam grading to friable red clay loam over calcreted calcarenite within 50 cm - rises.
- B5** Shallow dark clay loam on limestone (Petrocalcic, Black Dermosol)
Black clay loam to light clay over calcreted limestone at shallow depth, grading to highly calcareous clay - flats.
- B6** Shallow sandy loam over red-brown clay on calcrete (Petrocalcic, Red Kandosol)
Medium thickness sandy loam with slight ironstone gravel overlying a weakly structured reddish brown sandy clay on calcarenite within 50 cm - rises.
- E3** Brown or grey cracking clay (Brown-Grey Vertosol)
- F2** Sandy loam over poorly structured brown or dark clay (Brown-Dark Sodosol-Chromosol)
Topsoil <30 cm over poorly structured subsoil. Loamy, often sandy loam, to clay loamy texture contrast soil with a sodic/dispersive/poorly structured brown clayey subsoil. Often sandy loam, usually with a bleached horizon, and thin topsoil over a poorly structured B.
- G3** Thick sand over clay (Hypercalcic, Brown Sodosol/ Chromosol)
Thick bleached sand with an organically darkened surface abruptly overlying a massive to coarsely structured brown to reddish yellow sandy clay to clay, calcareous with depth - rises.
- N3** Seasonally waterlogged, non to marginally saline equivalents of soils listed above, viz.:
N3c Wet **G3**
N3d Wet **B5**
N3e Wet **B7**
- RR** Bare rock.

Further information: [DEWNR Soil and Land Program](#)

