

QUI Quirke Land System

(Based on the description by A. K. McCord in "A Description of Land in the Southern Mallee of South Australia")

Area: 1,559.3 km²

Annual rainfall: 350 - 425 mm

Geology: The land system is underlain by clayey sands to sandy light clays of the Loxton/Parilla Sand Formations, indurated to sandstones in places. These material are partially covered by younger more clayey Pleistocene sediments (Blanchetown Clay equivalent). The clay is up to 10 m thick. Remnant calcarenites from ancient coastlines may occur in places. Recent aeolian Molineaux Sands are distributed as veneers or deeper dune deposits over most of the landscape. There are only small amounts of secondary carbonate capping the sediments of this System.

Topography: The Quirke Land System is essentially a vast sand plain with overlying sand dunes providing most of the topography. These are variable in height and frequency, but are usually jumbled. Undulating rises may be remnants of ancient coastal dunes.

Elevation: 40 - 130 m

Relief: 5 - 30 m

Soils: The soils are predominantly sandy - deep sands and sand over clay, with minor sandy loam texture contrast soils.

Main soils

H3 Deep siliceous sand - sand dunes

G3 Thick sand over sandy clay - sandy flats

Minor soils

D3 Sandy loam over dispersive red - loamy flats

G4 Sand over dispersive brown clay - sandy flats

Main features: The Quirke Land System comprises mainly sandy soils as deep sands on dunes and sand over clay soils on sand plains. All of these soils have low fertility and are prone to water repellence and wind erosion. The deeper dune sands are more susceptible than the sand plain soils. There are minor heavier textured flats with good productive potential, although some of these are prone to waterlogging. These may be moderately saline.



Soil Landscape Unit summary: 17 Soil Landscape Units (SLUs) mapped in the Quirke Land System:

SLU	% of area	Main features #
GkA	0.8	<p>Depressions and flats formed on Tertiary sands and clays with up to 10% low sandy ridges.</p> <p>Main soils: <u>thick sand over sandy clay</u> - G3 (E), <u>sand over dispersive brown clay</u> - G4 (C), <u>sandy loam over dispersive red clay</u> - D3 (L), all on flats, and <u>deep siliceous sand</u> - H3 (M) on sand ridges.</p> <p>Key properties:</p> <p>Drainage: Well drained generally. Moderately well drained (sandy loam flats) and rapidly drained (sand ridges).</p> <p>Fertility: Low to very low (sandy soils). Moderate (sandy loams).</p> <p>Physical condition: No restrictions except for dispersive clay subsoils in G4 and D3 soils.</p> <p>AWHC: Low (sandy soils). Moderate (sandy loams).</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Low. Wind: Moderate to moderately high (sandy flats). Low (sandy loams), high (sand ridges).</p> <p>Water repellence: Moderate to strong (sands). Nil (sandy loams).</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The predominantly sandy soils have low fertility and are susceptible to wind erosion and water repellence. The sandy loam soils have few limitations for cropping, although shallow subsoil clays may restrict drainage and rooting depth.</p>
GIA	3.0	<p>Depressions formed on Tertiary sands and clays with 10-30% low sandy ridges.</p> <p>Main soils: <u>thick sand over sandy clay</u> - G3 (E), with <u>sand over dispersive brown clay</u> - G4 (C) and <u>sandy loam over dispersive red clay</u> - D3 (L), and <u>deep siliceous sand</u> - H3 (C) on sand ridges.</p> <p>Key properties:</p> <p>Drainage: Well drained generally. Moderately well drained (sandy loam flats) and rapidly drained (sand ridges).</p> <p>Fertility: Low to very low (sandy soils). Moderate (sandy loams).</p> <p>Physical condition: No restrictions except for dispersive clay subsoils in G4 and D3 soils.</p> <p>AWHC: Low (sandy soils). Moderate (sandy loams).</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Low. Wind: Moderate to moderately high (sandy flats). Low (sandy loams), high (sand ridges).</p> <p>Water repellence: Moderate to strong (sands). Nil (sandy loams).</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The predominantly sandy soils have low fertility and are susceptible to wind erosion and water repellence. The sand ridges are particularly at risk if exposed. The sandy loam flats have few limitations for cropping, although shallow subsoil clays may restrict drainage and rooting depth.</p>



<p>HkA HkK</p>	<p>2.4 0.1</p>	<p>Depressions formed on Tertiary clays with up to 10% low sandy ridges.</p> <p>HkA Non saline flats. HkK Flats prone to waterlogging.</p> <p>Main soils: <u>sandy loam over dispersive red clay</u> - D3 (E) with <u>sand over dispersive brown clay</u> - G4 (C) and <u>thick sand over sandy clay</u> - G3 (L), all on flats and <u>deep siliceous sand</u> - H3 (M) on sandy rises.</p> <p>Key properties:</p> <p>Drainage: Moderately well drained. The dispersive clay subsoil prevents free drainage. Drainage in HkK is imperfect.</p> <p>Fertility: Moderate.</p> <p>Physical condition: Surface soils tend to become sticky when wet, largely due to temporary waterlogging caused by water perching on top of the shallow clayey subsoil.</p> <p>AWHC: Moderately low.</p> <p>Salinity: Low in the surface, may be moderate at depth, especially in HkK.</p> <p>Erosion potential: Water: Low. Wind: Low.</p> <p>Water repellence: Nil.</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The heavier soils are more fertile and less prone to erosion and water repellence than the sandy soils of the rest of the Land System. Except in the minor marginally saline flats, limitations to cropping are minor.</p>
<p>HIA HIB HIK</p>	<p>1.9 0.3 0.2</p>	<p>Flats and low rises formed on Tertiary clays, overlain by 10-30% low sandhills. There are some depressions prone to waterlogging.</p> <p>HIA Flats. HIB Rises HIK Flats with up to 10% of land prone to waterlogging.</p> <p>Main soils: <u>sandy loam over dispersive red clay</u> - D3 (E), with <u>sand over dispersive brown clay</u> - G4 (C) and <u>thick sand over sandy clay</u> - G3 (L), all on flats and <u>deep siliceous sand</u> - H3 (L) on sandy rises.</p> <p>Key properties:</p> <p>Drainage: Moderately well drained, although flats prone to seepage are imperfectly drained. Dispersive clay subsoils prevent free drainage. Sandhills are rapidly drained.</p> <p>Fertility: Moderate (flats) to very low (sandhills).</p> <p>Physical condition: Surface soils tend to become sticky when wet, largely due to temporary waterlogging caused by water perching on top of the shallow clayey subsoil. No limitation on sandhills.</p> <p>AWHC: Moderately low (flats). Low (sandhills).</p> <p>Salinity: Low in the surface, may be moderate at depth.</p> <p>Erosion potential: Water: Low. Wind: Low (flats). High (sandhills).</p> <p>Water repellence: Nil (flats). Strong (sandhills).</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The heavier soils of the flats are more fertile and less prone to erosion and water repellence than the sandy soils of the rest of the Land System. Limitations to cropping are minor. The sandhills are infertile and highly susceptible to wind erosion and water repellence.</p>



O-A	1.3	Dunefields underlain by Tertiary sands or clays, with variable sizes and proportions of dunes.
OAE	25.2	O-A High dunes with less than 10% swale area.
OAF	28.1	OAE 60-90% high sand dunes.
OAG	9.1	OAF 60-90% moderate sand dunes.
OAH	1.0	OAG 60-90% low sand dunes with minor seepage in some flats.
OAJ	7.7	OAH 30-60% high sand dunes.
OAK	1.2	OAJ 30-60% low irregular sand ridges.
OAL	<0.1	OAK Plains with extensive sand spreads.
OAM	2.6	OAL 60-90% high sand dunes with 2-10% of flats subject to seepage.
OAb	15.1	OAM 60-90% moderate sand dunes with 2-10% of flats subject to seepage. OAb 60-90% moderate dunes superimposed on undulating rises (possibly ancient coastal dune remnants).
<p>Main soils: <u>deep siliceous sand</u> - H3 (E-V) on sand dunes and spreads, and <u>thick sand over sandy clay</u> - G3 (C-E) with <u>sand over dispersive brown clay</u> - G4 (L-C) <u>sandy loam over dispersive red clay</u> - D3 (M) in swales and flats.</p> <p>Key properties:</p> <p>Drainage: Rapidly (dunes) to well drained (flats). Imperfectly drained in seepage flats.</p> <p>Fertility: Very low (dunes), low (sandy flats) and moderate (sandy loam flats)</p> <p>Physical condition: No restrictions except for dispersive clay subsoils in G4 and D3 soils.</p> <p>AWHC: Low (sandy soils) to moderate (sandy loam soils).</p> <p>Salinity: Low generally but may be moderate on seepage flats.</p> <p>Erosion potential: Water: Low. Wind: Very high to extreme (dunes), high (sandy flats), low (sandy loam flats)</p> <p>Water repellence: Strong (dune sands), moderate (sandy flats), nil (sandy loam flats).</p> <p>Rockiness: Nil.</p> <p><u>Summary:</u> The sandy ridges are too infertile and susceptible to wind erosion and water repellence for sustainable cropping, but the flats have some potential, particularly where surfaces are loamier. Potential productivity on the predominant sand over clay soils is limited by low fertility, water repellence and wind erosion potential.</p>		

PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

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



Detailed soil profile descriptions:

- D3** Sandy loam over dispersive red clay (Hypocalcic, Red Sodosol)
Thin hard sandy loam abruptly overlying a poorly structured and dispersive clay, weakly calcareous from about 50 cm, grading to Tertiary sediments below 100 cm.
- G3** Thick sand over sandy clay (Eutrophic, Red Chromosol)
Thick loose sand with a bleached A2 layer abruptly overlying a red and brown sandy clay grading to Tertiary sand or sandstone (as deep as 200 cm).
- G4** Sand over dispersive brown clay (Calcic, Brown Sodosol)
Medium thickness loamy sand over a brown and red coarsely structured dispersive sandy clay, calcareous from about 35 cm, grading to Tertiary sediments below 100 cm.
- H3** Deep siliceous sand (Calcareous / Basic, Arenic, Bleached-Orthic Tenosol)
Grey loose sand with a paler coloured and generally bleached A2 layer grading to a yellowish sand which may have soft carbonate segregations with depth or may be non calcareous throughout.

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

