

NGA Ngarkat Land System

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

Sandplain with dunefields mostly occurring within the Ngarkat Conservation Park

Area: 1,375.5 km²

Annual rainfall: 365 – 460 mm average

Geology: The land system is formed over Tertiary age Parilla Sand and occasional limestone beds, overlain by a discontinuous veneer of Blanchetown Clay equivalent. Molineaux Sand, which was deposited over the older landscape and reworked into dunes covers about 50% of the land surface. There are minor isolated occurrences of Bridgewater Formation calcarenites. These are remnants of an ancient coastal dune. There is also a minor area of indurated Parilla Sand on a ridge which is an extension of the Marmon Jabuk Range.

Topography: The Ngarkat Land System comprises a vast sand plain overlain by sinuous chains of low to moderate (and occasionally high) jumbled and parabolic sandhills. The majority of the flats and swales between the sandhills are formed on Parilla Sand and have sandy surfaced soils, but about 10% of the flats (underlain by Blanchetown Clay equivalent), have heavier loamy surfaces.

Elevation: 40 - 140 m

Relief: 3 - 10 m

Soils: The soils are typically sandy - deep sands or sand over clay. Heavier texture contrast soils and calcareous sandy loams are minor.

Main soils

H3 Deep siliceous sand - extensive (dunes)

G3 Thick sand over sandy clay - extensive (sandy flats)

Minor soils

D3 Sandy loam over dispersive clay - loamy flats

F1 Ironstone gravelly sandy loam over clay - sandstone rises

G1 Shallow loamy sand over red sandy clay loam - calcreted rises

B6 Shallow stony loamy sand over calcrete - calcreted rises

Main features: The Ngarkat Land System is characterized by very infertile sandy soils on sand plains and dunes. These soils are highly susceptible to wind erosion and water repellence, particularly on dunes. The isolated heavier textured flats are potentially productive, but are too restricted to be of significance. Much of the land, particularly the sandy flats and low sandhills, has horticultural potential, but most is contained within the Ngarkat Conservation Park.



Soil Landscape Unit summary: 15 Soil Landscape Units (SLUs) mapped in the Ngarkat Land System:

SLU	% of area	Main features #
GkA	1.4	<p>Depressions and flats formed on Tertiary sands and clays with less than 10% low sandy ridges. Main soils: <u>thick sand over sandy clay</u> - G3 (V) and <u>sandy loam over dispersive clay</u> - D3 (C) with <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 on minor heavier flats.</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	4.1	<p>Depressions formed on Tertiary sands and clays with 10-30% low sandy ridges. Main soils: <u>thick sand over sandy clay</u> - G3 (E) and <u>sandy loam over dispersive clay</u> - D3 (L), with <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 on minor heavier flats.</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>
HiB	0.1	<p>Rises formed on Tertiary sands to sandy clays, indurated and ferruginized at the surface. Surface sandstone and ironstone are common. Main soils: <u>ironstone gravelly sandy loam over clay</u> - F1 (E) and <u>thick sand over sandy clay</u> - G3 (E).</p> <p>Key properties:</p> <p>Drainage: Well to moderately well drained.</p> <p>Fertility: Low to moderately low. Ironstone tends to tie up phosphorus.</p> <p>Physical condition: Good in surface. Fair in subsoils on lower ground.</p> <p>AWHC: Low to moderate.</p> <p>Salinity: Low.</p> <p>Erosion potential: Water: Moderately low. Wind: Moderately low to moderate.</p> <p>Water repellence: Slight.</p> <p>Rockiness: Up to 10% sandstone and ironstone gravel in places.</p> <p><u>Summary:</u> Marginal fertility and wind erosion potential are the main limitations.</p>



HkA	0.6	<p>Depressions formed on Tertiary clays with less than 10% low sandy ridges. Main soils: <u>sandy loam over dispersive clay</u> - D3 (E), with <u>thick sand over sandy clay</u> - G3 (C) on flats and <u>deep siliceous sand</u> - H3 (M) on sandy rises.</p> <p>Key properties: Drainage: Moderately well drained. The dispersive clay subsoil prevents free drainage. Fertility: Moderate. 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. AWHC: Moderately low. Salinity: Low in the surface, may be moderate at depth. Erosion potential: Water: Low. Wind: Low. Water repellence: Nil. 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. Limitations to cropping are minor.</p>
HIA	0.6	<p>Depressions formed on Tertiary clays with 10-30% low sandhills. Main soils: <u>sandy loam over dispersive clay</u> - D3 (E) with <u>thick sand over sandy clay</u> - G3 (C) on flats and <u>deep siliceous sand</u> - H3 (L) on sandy rises.</p> <p>Key properties: Drainage: Moderately well drained. The dispersive clay subsoil prevents free drainage. Sandhills are rapidly drained. Fertility: Moderate (flats) to very low (sandhills). 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. AWHC: Moderately low (flats). Low (sandhills). Salinity: Low in the surface, may be moderate at depth. Erosion potential: Water: Low. Wind: Low (flats). High (sandhills). Water repellence: Nil (flats). Strong (sandhills). 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>
MHB	0.2	<p>Isolated low stony rises formed on Bridgewater Formation calcarenites. These are outliers of the Archibald Range Land System.</p>
O-A	1.9	<p>Moderate to steep parabolic or jumbled siliceous sand hills, more than 12 metres high, formed on Molineaux Sand. Main soils: <u>deep siliceous sand</u> - H3 (V) throughout, and <u>thick sand over sandy clay</u> - G3 (L) on lower slopes and flats.</p> <p>Key properties: Drainage: Rapid. Fertility: Very low. Physical condition: No limitations (soft to loose sand). Clayey subsoils, where present, are friable. AWHC: Moderately low to moderate. Salinity: Low. Erosion potential: Water: Low. Wind: High to very high. Water repellence: High. Rockiness: Nil.</p> <p><u>Summary:</u> The land is dominated by high sandhills with very low fertility. They are prone to water repellence and wind erosion. Much of the land has not been cleared. The high sand hills are unsuitable for farming.</p>



OAE OAF OAG OAI OAJ	8.9 31.3 8.5 9.3 32.7	<p>Dunefields with sand ridges formed on Molineaux Sand overlying Tertiary sediments. Occasional flats are prone to seepage.</p> <p>OAE 60-90% high sand ridges. OAF 60-90% moderate sand ridges. OAG 60-90% low sand ridges. OAI 30-60% moderate sand ridges. OAJ 30-60% low sand ridges.</p> <p>Main soils: <u>deep siliceous sand</u> - H3 (V-E) on ridges, and <u>thick sand over sandy clay</u> - G3 (C-E) with <u>sandy loam over dispersive clay</u> - D3 (M-L) on flats.</p> <p>Key properties: Drainage: Rapidly (dunes) to well drained (flats). Imperfect in minor wet flats. Fertility: Very low (dunes), low (sandy flats) and moderate (sandy loam flats) Physical condition: No restrictions except for dispersive clay subsoils on minor heavier flats. AWHC: Low (sandy soils) to moderate (sandy loam soils). Salinity: Low. Erosion potential: Water: Low. Wind: Very high to extreme (dunes), high (sandy flats), low (sandy loam flats) Water repellence: Strong (dune sands), moderate (sandy flats), nil (sandy loam flats). 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. However, potential productivity on the predominant sand over clay soils is limited by low fertility, water repellence and wind erosion potential.</p>
OCa OCb	0.2 <0.1	<p>Jumbled sandhills overlying undulating rises formed on Tertiary sands to sandy clays, indurated in places.</p> <p>OCa 60-90% high sand ridges. OCb 60-90% moderate sand ridges.</p> <p>Main soils: <u>deep siliceous sand</u> - H3 (V) with <u>thick sand over sandy clay</u> - G3 (L) and <u>ironstone gravelly sandy loam over clay</u> - F1 (L) on lower slopes.</p> <p>Key properties: Drainage: Rapid to well drained. Fertility: Very low to moderately low. Physical condition: Good. AWHC: Low to moderately low. Salinity: Low. Erosion potential: Water: Moderately low. Wind: Moderate to high. Water repellence: High. Rockiness: Up to 2% ironstone gravel.</p> <p><u>Summary</u>: High wind erosion potential and low fertility are the main limitations.</p>
OEb	0.2	<p>Undulating slopes formed on Bridgewater Formation calcarenites overlain by more than 60% moderate jumbled siliceous sand dunes.</p> <p>Main soils: <u>deep siliceous sand</u> - H3 (V) on dunes and <u>shallow loamy sand over red sandy clay loam</u> - G1 (L) and <u>shallow stony loamy sand over calcrete</u> - B6 (L) on flats and low rises.</p> <p>Key properties: Drainage: Rapidly to well drained. Fertility: Low to very low. Physical condition: There are no impediments to root growth. AWHC: Moderately low to moderate. Salinity: Low. Erosion potential: Water: Low. Wind: Moderate to high. Water repellence: High. Rockiness: Nil.</p> <p><u>Summary</u>: The land is characterized by sandy rises and dunes with very low fertility well drained soils prone to water repellence and erosion.</p>



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

(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:

- B6** Shallow stony loamy sand over calcrete (Petrocalcic, Leptic Tenosol)
Loamy sand to loam with variable rubble and slight clay increase with depth overlying calcreted calcarenite shallower than 50 cm.
- D3** Sandy loam over dispersive clay (Hypocalcic, Red Sodosol)
Medium thickness sandy loam to light sandy clay loam abruptly overlying a coarsely structured dispersive red sandy clay, slightly calcareous with depth, grading to clayey Parilla Sand or Blanchetown Clay equivalent below 100 cm.
- F1** Ironstone gravelly sandy loam over clay (Brown Chromosol)
Medium thickness loamy sand to sandy loam with a bleached ironstone gravelly A2 layer, overlying a brown coarsely structured sandy clay to clay grading to indurated Tertiary sandstone within 100 cm.
- G1** Shallow loamy sand over red sandy clay loam (Petrocalcic, Red Chromosol)
Medium to thick loamy sand to sandy loam with a paler coloured A2 layer, abruptly overlying a massive red sandy clay loam to sandy clay underlain by calcreted calcarenite shallower than 50 cm.
- G3** Thick sand over sandy clay (Eutrophic, Red Chromosol)
Thick loose bleached sand, organically darkened at the surface, abruptly overlying a yellowish red sandy clay becoming more sandy with depth grading to indurated Tertiary sand at depths of 100 to 200 cm.
- H3** Deep siliceous sand (Basic, Arenic, Bleached-Orthic / Yellow-Orthic Tenosol)
Thick pale yellow loose sand, organically darkened at the surface, grading to bright yellow sand at between 50 and 100 cm, continuing below 200 cm.

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

