LOW Lowan Vale Land System

Undulating rises and dunes between Lowan Vale and the Victorian border

Area: 245.5 km^2

Annual rainfall: 460 – 490 mm average

Geology: The original landscape was apparently similar to the present Wolseley Land System, as indicated by remnant occurrences in the area around the Senior Road - Railtz Road intersection. This landscape was formed on late Tertiary age heavy clays, similar to the Blanchetown Clay of the Murray Basin. Streams flowing across this landscape have eroded it, progressively exposing older sediments, mainly Tertiary clayey sands and sandy clays and associated ironstones (ferricretes). These materials frequently outcrop, particularly on steeper slopes. Reworked siliceous sands overlie the main landscape in some areas. The variation in parent materials results in a wide range of soils.

Topography: The Lowan Vale Land System includes the land in the central and southern parts of the Hundred of Cannawigara, and extending south eastwards through the southern part of Senior and into Tatiara. The characteristic feature of the Land System is the pronounced and sometimes strongly undulating landscape, formed by the dissection of older plains by Watercourses flowing in a general westerly direction. A prominent feature of the land is the system of valleys which carry flood waters in wet years. The Tatiara Creek is the most southerly and largest of these Watercourses. Low sandhills, usually with parabolic shape, but with a general east - west lineation are draped over the undulating land surface in places.

Elevation: 70 - 120 m

Relief: 10 - 20 m

Soils: The dominant soils are sands with clayey subsoils. Associated soils include deep sands, loamy texture contrast soils, and cracking clays.

Main soils

G4a	Sand over dispersive brown sandy clay. Extensive throughout
G4b	Sand over dispersive brown clay. Common throughout
F2	Hard loam over dispersive brown clay. Common on flats and lower slopes
H3	Deep bleached. Common on sandy rises
D3	Hard loam over dispersive red clay. Limited on rises

Minor soils

G3	Thick sand over clay
G3/D2	Light sandy loam over red clay
E3	Hard cracking grey clay
E1	Black cracking clay

Vegetation:
- Mallee broom, blue gum and heath (undulating rises)
- Stringybark, mallee and heath (sandhills)
- Bulloak and blue gum (clayey remnants)

Main features: The Lowan Vale Land System includes three distinctive land types. Undulating rises are characterized by sand to sandy loam soils with dispersive clay subsoils. Waterlogging, restricted subsoil root growth and marginal fertility are the main features. Remnant clayey land surfaces have sandy loam over clay and cracking clay soils with moderate to high fertility, but poor soil structure leading to impeded root growth and drainage. Low sand dunes have deep sandy soils with very low fertility, prone to water repellence and wind erosion.

Soil Landscape Unit summary: 10 Soil Landscape Units (SLUs) mapped in the Lowan Vale Land System:

SLU	% of area	Main features #
GaB	10.6	Undulating rises with less than 5% low sandhills formed on Tertiary sandstones and Pleistocene calcified sandy clays and clays. Main soils: sand over dispersive brown sandy clay to clay - **G4a/b** (V) with thick sand over clay - **G3** (L) and light sandy loam over red clay - **G3/D2** (L). Key properties: Drainage: Imperfect due to dispersive clays at moderately shallow depth in the main soil class. Fertility Moderately low (sandy soils). Physical condition: Sandy surfaces have no restrictions. Subsoil structure is poor - hard dispersive clays affect root penetration. Clayey subsoils of G3 are better structured. AWHC: Moderate. Salinity Moderate to low. Erosion potential: Water: Moderately low. Wind: Moderate to moderately low. Water repellence: Moderate. Rockiness: Nil. Other: Acidification potential Summary: Low fertility sandy soils with dispersive clay subsoils which impede water movement and root growth.
GaE	16.2	Lower slopes, valley flats and drainage depressions formed on calcified sandy clays, clays and clayey sands. Main soils: sand over dispersive brown sandy clay to clay - **G4a/b** (E) on flats and slopes, hard loam over dispersive brown clay - **F2** (E) on flats, and thick sand over clay - **G3** (L) on lower slopes. Key properties: Drainage: Imperfect due to dispersive clay subsoils at moderately shallow depth. Thick sand over clay soils are moderately well drained. Fertility: Moderate. Physical condition: Sandy surface soils do not limit plant performance, but loamy surfaces may set hard. Dispersive subsoils restrict root growth. AWHC: Moderate to high. Salinity: Moderate to moderately low. Erosion potential: Water: Low to moderate. Wind: Moderately low. Water repellence: Moderately low to nil. Rockiness: Nil. Other: Acidification potential. Watercourses and adjacent flats are prone to erosion and flooding. Summary: Sandy to loamy surfaced soils with mostly dispersive subsoils which restrict root growth and water movement. Fertility is marginal to moderate. Flooding and erosion potential in wet years.

GbC	15.6	Undulating low rises up to 20 m high with slopes of up to 10%, formed on sandy Tertiary sediments. The rises are overlain by sandhills which occupy about 30% of the area. Main soils: sand over dispersive brown sandy clay - **G4a** (E) on slopes and flats, thick sand over clay - **G3** (L) and light sandy loam over red clay - **G3/D2** (L) on slopes, and deep bleached sand - **H3** (C) on sandhills. Key properties: Drainage: Imperfect (G4) due to dispersive clay subsoils causing perched watertables. Moderate (G3) and rapid (H3). Fertility: Moderately low to low due to sandy surfaces. Very low (H3). Physical condition: Good in surface, although sands are prone to water repellence. Poor in soils with dispersive clay subsoils. AWHC: Moderate to low (G4 and G3). Low (H3). Salinity: Moderate to low. Low (H3). Erosion potential: Water: Moderate. Wind: Moderately low to high (H3) Water repellence: Low to moderate (G4 and G3). High to very high (H3). Rockiness: Nil. Summary: Low to very low fertility, subsurface waterlogging on lower slopes and wind erosion potential/water repellence on higher ground.
GeB	14.6	Rising ground up to 20 metres higher than the associated valleys (GaE). The land is gently undulating with low rises and flats. There are less than 10% low sandhills. Underlying materials are Tertiary sandstones, Pleistocene sandy clays and clays. Main soils: sand over dispersive brown sandy clay to clay - **G4a/b** (E) and on rises and flats, sandy loam over dispersive red clay - **D3** (L) and light sandy loam over red clay - **G3/D2** (L) on rises, and hard loam over dispersive brown clay - **F2** (L) on flats. Key properties: Drainage: Imperfect due to dispersive clay subsoils at moderately shallow depth in all soils. Fertility: Marginal to moderate, depending on sandiness of surface. Physical condition: Good to fair in surface (some hard setting in non sandy soils). Poor in subsoil (dispersive clays). Root growth restrictions are likely. AWHC: Moderate to high. Salinity: Moderately low. Erosion potential: Water: Moderately low to moderate. Wind: Moderately low to moderate. Water repellence: Moderate (sandy soils) to low. Rockiness: Minor ironstone gravel. Summary: Sandy to loamy soils all with dispersive clays at moderately shallow depth cause impeded drainage and restricted root growth. Fertility is moderate to marginal.
HbA	3.8	Gently undulating plains formed on clayey sediments. Main soils: hard loam over dispersive brown clay - **F2** (E), sandy loam over dispersive red clay - **D3** (E) and hard grey cracking clay - **E3** (E). Key properties: Drainage: Imperfect. Dispersive subsoils cause subsurface waterlogging. Fertility: Moderate. Physical condition: Poor. All soils have hard setting surfaces, and dispersive coarsely structured subsoils which impede root growth. AWHC: Moderate to high. Salinity: Moderate (subsoil). Erosion potential: Water: Low. Wind: Low. Rockiness: Nil.

		Water repellence: Nil. Other: Sporadic boron toxicity is likely. Summary: All soils have sandy loam to clayey surfaces with moderate fertility, but impeded drainage and poor soil structure limit productivity.
OBJ	9.3	Gently undulating slightly elevated land comprising flats and rises with approximately 30% low linear sandhills overlying the main landscape. The land is formed on Tertiary sandstones, Pleistocene calcified sandy clays and clays, and Recent Molineaux Sands. Main soils: sand over dispersive brown sandy clay to clay - **G4a/b** (E) on flats and rises, deep bleached sand - **H3** (E) on sandhills, light sandy loam over red clay - **G3/D2** (L) and sandy loam over dispersive red clay - **D3** (L) on rises, and hard loam over dispersive brown clay - **F2** (L) on flats. Key properties: Drainage: Imperfect due to dispersive subsoil clays in most soils. Exceptions are deep sands on sandhills where drainage is rapid. Fertility: Moderately low (sandy soils) to moderate (loamy soils). Very low on sandhills. Physical condition: Good to fair in surface (some loams are hard setting). Poor in subsoils (dispersive clays). Sandhills do not have structure problems. AWHC: Moderate to high. Low in sandhill soils. Salinity: Moderately low to low. Erosion potential: Water: Moderately low to moderate. Wind: Moderately low to high. Water repellence: Low in loamy soils, moderate to high in sandy soils. Rockiness: Minor ironstone gravel. Other: Some acidification potential. Summary: Mixed loamy and sandy soils with moderately low to moderate fertility, most with dispersive subsoils - imperfect drainage and root growth restrictions. Sandhills have very low fertility and are prone to water repellence and wind erosion.
OBf	13.5	Dune - swale system superimposed on low rises. There are approximately 40% well defined low sandhills, less than 100 metres apart. Land is underlain by Tertiary sandstones, Pleistocene calcified sandy clays to clays and Recent Molineaux Sands. Main soils: sand over dispersive brown sandy clay to clay - **G4a/b** (E) in swales, deep bleached sand - **H3** (E) on dunes, with thick sand over clay - **G3** (L) and light sandy loam over red clay - **G3/D2** (L) in swales. Key properties: Drainage: Imperfect to moderately well drained (swales) to rapid (sandhills). Fertility: Marginal (swales) to very low (sandhills). Physical condition: No restrictions on sandy surfaced soils. Subsoil constraints to root growth are low (dunes), low to moderate (G3 soils) and high (G4 soils) due to dispersive clays. AWHC: Moderate (swales) to low (sandhills). Salinity: Moderately low (swales) to low (sandhills). Erosion potential: Water: Low to moderately low. Wind: Moderately low (swales) to high (sandhills). Water repellence: Moderate (swales) to high (dunes) Rockiness: Nil. Other: Acidification potential. Summary: Dunefield with sandy surfaced soils of marginal to low fertility. In swales, subsoil clays restrict root growth and impede drainage; in deep sands of sandhills, main limitations are very low fertility, water repellence and wind erosion potential.

TTA	0.5	Low lying flats and swales, with extensive gilgai formed on clayey sediments of Tertiary age. Main soils: hard grey cracking clay - **E3** (E) and hard loam over dispersive brown clay - **F2** (C), with black cracking clay - **E1** (L) in gilgai areas, and sand over dispersive brown clay - **G4b** (L) elsewhere. Key properties: Drainage: Imperfect to poor due to heavy poorly structured clays and / or dispersive clay subsoils. Fertility: Moderate to high (heavier textured soils) to moderately low (sandy G4 soils). Physical condition: The loamy F2 soils and the grey cracking clays have hard surfaces which restrict emergence and root growth. Sandy G4 soils and black clays have loose sandy or friable surfaces which do not impede root growth. All subsoil clays restrict root growth. AWHC: Moderate to high. Salinity: Moderately high in subsoils. Erosion potential: Water: Low. Wind: Moderately low. Water repellence: Nil (cracking clays) to moderate (sandy soils) Rockiness: Nil. Other: Boron toxicity can be expected in clay soils. Summary: The flats are generally imperfectly to poorly drained due to heavy and / or dispersive clay soils at or near the surface. Fertility varies from moderate to high for the heavier soils to moderately low on sand over clay soils. Poor surface structure is widespread. Subsoil salinity and boron toxicity can be expected.
TUB TUC	5.7 10.2	Slopes on Tertiary / Pleistocene clays. **TUB** Slopes up to 3%. **TUC** Slopes up to 5%. Main soils: hard grey cracking clay - **E3** (E), sandy loam over dispersive red clay - **D3** (E) and hard loam over dispersive brown clay - **F2** (E). Key properties: Drainage: Imperfect to moderately well. Heavy and/or dispersive clay subsoils cause sub surface waterlogging. Fertility: Moderately high to high. Physical condition: Fair to poor. Most soils have hard setting surfaces and dispersive subsoils. AWHC: Moderately high to high. Salinity: Moderately low to moderate (subsoils). Erosion potential: Water: Moderately low (TUB) to moderate (TUC) Wind: Low. Rockiness Minor ironstone gravel. Water repellence: Nil. Other: Subsoil boron toxicity likely where substrate clay is within 75 cm of surface. Summary: Poor soil structure and waterlogging, but moderately high fertility.

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 Hard loam over dispersive red clay (Calcic, Red Sodosol)
Thin to medium thickness hard sandy loam (often ironstone gravelly) abruptly overlying a coarsely structured dispersive red and yellow brown clay, with soft carbonate at depth.

E1 Black cracking clay (Self-mulching, Black Vertosol)
Black self-mulching seasonally cracking clay, becoming coarser structured, greyer and calcareous with depth.

E3 Hard cracking grey clay (Epipedal, Grey Vertosol)
Hard coarse blocky seasonally cracking grey clay, calcareous and prismatically structured at depth.

F2 Hard loam over dispersive brown clay (Hypercalcic, Brown Sodosol)
Medium thickness hard setting loamy sand to loam abruptly overlying a coarsely structured grey brown, yellow and red clay grading to soft carbonate.

G3 Thick sand over clay (Calcic / Mesotrophic, Yellow Chromosol)
Medium to thick ironstone gravelly loamy sand abruptly overlying a yellow and red friable sandy clay over sandstone within 100 cm.

G3/D2 Light sandy loam over red clay (Bleached, Calcic, Red Chromosol)
Medium to thick loamy sand to sandy loam with a bleached, sandier subsurface, over a moderately well structured red clay, calcareous with depth.

G4a Sand over dispersive brown sandy clay (Calcic, Brown Sodosol)
Thin to medium thickness sand sharply overlying a brown and yellow or grey mottled dispersive sandy clay with strong columnar structure, calcareous with depth, grading to Tertiary age sandy clay loam to sandy clay. Extensive throughout.

G4b Sand over dispersive brown clay (Hypercalcic, Brown Sodosol)
Thin to medium thickness sand sharply overlying a brown and yellow or grey mottled dispersive clay with strong columnar structure, calcareous with depth, grading to Blanchetown Clay equivalent. Common throughout.

H3 Deep bleached sand (Basic, Arenic, Bleached-Orthic Tenosol)
Thick to very thick bleached sand, organically darkened at the surface over yellow sand continuing below 100 cm. Common on sandy rises.

Further information: DEWNR Soil and Land Program