

NIN Ninnes Land System

Gently undulating plains and low dunefields between Ninnes and the Hummock Range

Area: 38.5 km²

Annual rainfall 390 – 465 mm average

Geology: Medium textured very highly calcareous wind blown sediments of the Woorinen Formation, largely capped by a thin layer of rubbly calcrete resulting from atmospheric exposure. The calcareous material has been covered over about half the area of the Land System by Molineaux Sand. There are two outcrops of ABC Range Quartzite which are part of a lower lying, buried section of the Hummock Range.

Topography: Gently to very gently undulating plains with slopes of 1 - 3%, overlain in places by low dunefields with a northwest - southeast orientation. On the eastern edge of the system are two basement rock outcrops which rise above the plains and have slopes of up to 30%.

Elevation: The highest of the basement rock outcrops is 247 m. Apart from these, the elevation ranges from 230 m in the northeast to 120 m in the southwest.

Relief: Apart from the basement rock highs (up to 50 m high), relief is less than 10 m

Soils: The predominant soils are calcareous sandy loams to loams, with deep sands

Main soils

Calcareous loams of plains and swales

A4a Rubbly calcareous sandy loam

A4b Calcareous loam

Sandy soils of rises

H2a Deep calcareous sand

Minor soils

Calcareous loams of plains and swales

A6 Calcareous clay loam

Sandy soils of rises

H2b Deep non-calcareous sand

G1 Loamy sand over red sandy clay

Shallow stony soils of basement rock highs

B2/A2 Stony calcareous sandy loam

L1/B3 Shallow stony loam

Main features: The Ninnes Land System includes a mixture of dune - swale country and gently undulating plains. The dunes have deep sandy soils with low fertility and wind erosion potential. The swales and the non-sandy plains are characterized by rubbly and non rubbly calcareous loams which generally have favourable production potential. Slight limitations are due to restricted waterholding capacity, nutrient fixation by calcareous soils and boron toxicity in the deep subsoil.



Soil Landscape Unit summary: 9 Soil Landscape Units (SLUs) mapped in the Ninnes Land System:

SLU	% of area	Main features #
AUA AUC	0.2 0.6	Rises formed on basement quartzites. AUA Low stony rise with slopes to 10% and up to 20% quartzite stones. AUC Moderately steep low hill with slopes of 10-30% and up to 20% quartzite stones. Main soils: <u>stony calcareous sandy loam</u> - B2/A2 (V), with <u>shallow stony loam</u> - L1/B3 (C). These small areas are rough and stony with shallow soils and are covered by scattered scrub. They have little agricultural value other than shelter.
SSA	30.2	Gently undulating plains with slopes of less than 2%, overlain by low sand dunes covering about 20% of the land surface, formed on highly calcareous medium textured aeolian sediments (Woorinen Formation). Main soils: <u>rubbly calcareous sandy loam</u> - A4a (E), <u>calcareous loam</u> - A4b (E) and <u>calcareous clay loam</u> - A6 (L), with <u>deep calcareous sand</u> - H2a (L) and <u>loamy sand over red sandy clay</u> - G1 (L) on rises. This land is generally moderately productive, the limitations being caused by the predominantly calcareous soils and interspersed sandy rises. The former have slight limitations due to sub-optimal waterholding capacity and fertility, moderate levels of subsoil boron (23 ppm ave. concentration in 50-100 cm depth zone), salinity and alkalinity, and some potential for wind erosion. The sandy rises have low fertility and waterholding capacity and are prone to wind erosion.
SkB	30.3	Gently undulating plains with slopes of 2-3% and 2-10% surface calcrete stone, overlain by low sand dunes covering about 20% of the land surface, formed on highly calcareous medium textured aeolian sediments (Woorinen Formation). Main soils: <u>rubbly calcareous sandy loam</u> - A4a (V) with <u>deep calcareous sand</u> - H2a (L) and <u>loamy sand over red sandy clay</u> - G1 (L). This land is generally moderately productive, the limitations being caused by the predominantly calcareous soils and interspersed sandy rises. The former have slight limitations due to sub-optimal waterholding capacity and fertility, moderate alkalinity and some potential for wind erosion. Subsoil boron levels are low (ave. concentration in the 50-100 cm zone is 6 ppm). The sandy rises have low fertility and waterholding capacity and are prone to wind erosion.
U-C	0.5	Isolated parallel low sand dunes and rises, 5-10 m high. Main soils: <u>deep calcareous sand</u> - H2a (V) with <u>deep non calcareous sand</u> - H2b (C) and <u>loamy sand over red sandy clay</u> - G1 (L). This land consists almost entirely of deep, low fertility sands in exposed dunes, which are susceptible to wind erosion.
UIG UII UIJ UIK	7.7 5.0 16.2 9.3	UIG Undulating dunefields with more than 60% coverage of dunes to 5 m high. UII Undulating dunefields with 30-60% coverage of dunes 5-10 m high. UIJ Undulating dunefields with 30-60% coverage of dunes up to 5 m high. UIK Gently undulating plains with very low irregular sandy rises. Main soils: <u>deep calcareous sand</u> - H2a (L), <u>deep non calcareous sand</u> - H2b (L) and <u>loamy sand over red sandy clay</u> - G1 (L) on sand dunes, and <u>rubbly calcareous sandy loam</u> - A4a (E) and <u>calcareous loam</u> - A4b (L) on the flats and swales. This is a typical dune-swale landscape with the inherent problem of frequent changes in soil types across the landscape. Control of wind erosion is the main concern on the sandy rises, along with fertility maintenance and the need to encourage deep rooting to maximize water use efficiency. Fertility is the main issue on the flats. Unfavourable carbonate layers may limit rooting depth, thereby reducing water use efficiency. Boron toxicity is not generally a problem (ave. concentration in the 50-100 cm zone is 10 ppm).

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

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|--|---------------------------------------|
| (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:

- A4a** Rubbly calcareous sandy loam (Regolithic, Supracalcic / Lithocalcic Calcarosol)
Calcareous sandy loam to sandy clay loam grading to rubbly Class III B or III C carbonate at about 40 cm, becoming less rubbly with depth.
- A4b** Calcareous loam (Regolithic, Hypercalcic Calcarosol)
Calcareous sandy loam to clay loam grading to a very highly calcareous sandy clay loam to light clay (Class III A carbonate) at about 40 cm, continuing below 100 cm.
- A6** Calcareous clay loam (Regolithic / Pedal, Hypercalcic Calcarosol)
Calcareous clay loam becoming more clayey and calcareous with depth over heavy clay at about 100 cm.
- B2/A2** Stony calcareous sandy loam (Petrocalcic / Lithic, Calcic / Lithocalcic Calcarosol)
Stony calcareous sandy loam grading to soft or rubbly carbonate over hard quartzite or sheet calcrete overlying quartzite within 50 cm.
- G1** Loamy sand over red sandy clay (Lithocalcic / Hypercalcic, Red Chromosol)
Medium thickness loamy sand abruptly overlying a massive reddish brown sandy clay loam to sandy clay with soft to rubbly Class III A, B or C carbonate from about 45 cm and continuing below 100 cm.
- H2a** Deep calcareous sand (Calcic / Hypocalcic Calcarosol)
Thick to very thick calcareous sand grading to a reddish very highly calcareous sand to clayey sand at depths of between 50 and 100 cm.
- H2b** Deep non calcareous sand (Calcareous, Arenic, Red-Orthic Tenosol)
Thick non calcareous sand grading to a reddish very highly calcareous sand to clayey sand at depths of between 50 and 100 cm.
- L1/B3** Shallow stony loam (Lithic, Leptic Rudosol OR Calcareous, Lithic, Leptic Tenosol)
Shallow stony sandy loam to clay loam overlying either hard quartzite or rubbly / sheet calcrete in turn overlying quartzite.

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

