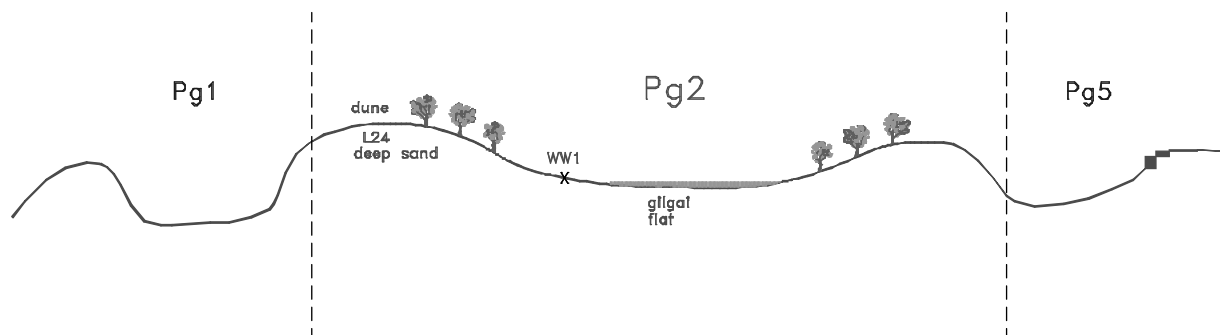


6.2.2 BIG DESERT TRANSITION - 2 LAND SYSTEM

Map unit Pg2



Landscape

This land system is small and has been mapped as one land unit: gently undulating plains (Pg2). There is a distinct boundary between this land system and the sandier soils of the Big Desert-1 land system to the north, and the clayier Grey and Red Plains and Rises-5 land system further south. The boundary is marked by a distinct vegetation change.

The landscape consists of low rises and gentle slopes leading to flatter swales or depressions that commonly have gilgai micro-relief. The land unit is characterised by hummocks of sand alternating with clay plains.

Plate 7 Large areas of swales between the sandy rises.



Native Vegetation

The common vegetation is Mallee eucalypts. Parts of this unit have been extensively cleared for agricultural purposes.

Soil Types

The rises have a deep cover of sand with occasional mottled sodic yellow sandy loam occurring to varying depths (L24). The topsoil is hydrophobic (repels water) and therefore the summer and initial autumn rains have difficulty penetrating the profile, making the rain unavailable to deeper

plant roots. The water repellency also means that the topsoil is prone to sheet erosion.

Claying (i.e. spreading clay across the surface) of the sandier rises is a method that has been adopted to decrease the amount of hydrophobicity and allow more water to be retained in the soil for plant use.

The lower slopes and depressions commonly have a sandy horizon over large clay columns, which have a bleached hardsetting capping (solodised solonetz). The hardsetting capping occurs to various thicknesses (WW1).

Plate 8 Bleached hardsetting capping above the clay columns that can restrict root penetration.



Large cracks in the columns cause difficulty for roots to penetrate the profile. The hardsetting nature of the clays makes it difficult for the plant roots to access the water and nutrients. The deep subsoil shows signs of cracking when dry, and is also apparent by the gilgai micro-relief and the varying colours and textures of the soil.

A variation in soil type can occur where the A2 is absent and the clay is intermixed with a higher percentage of sand.

Current Land Use

The variety of land uses has been increased in recent times due to claying of the rises. A range of pastures and crops can now be grown on areas that would otherwise be too arid for crop establishment.

Representative soil type of land unit

Although land suitability assessments have been conducted for two land elements (low dunes (L24) and lower slopes (WW1)), the lower slope (WW1) is regarded as the most representative soil type.

REPRESENTATIVE SOIL TYPE FOR THE BIG DESERT TRANSITION - 2 - Pg2 LAND UNIT

MAP UNIT: Pg2

Site No.: WW1

Position in landscape: Lower slope **Grid Ref:** 498900 E, 5989600 N
Aust. Soil Class.: Vertic (Bleached-Sodic), Calcic, Grey. CHROMOSOL (Medium sandy surface)
Northcote Factual Key: Dy5.43 **Great Soil Group:** solodised solonetz/solodic

General Landscape Description:

The landscape is generally gently undulating. Small rises, often with greater than one metre of sand (L24), occur in association with long slopes with gilgai micro-relief where the depth of sand decreases down the slope. The long slopes are regarded as the dominant land element in this land unit, therefore this soil type has been used to represent the Big Desert Transition-2 gently undulating plains land unit on the map. The lower slopes can have soils with a strong columnar structured subsoil (with clearly defined bleached domes on top of the columns) or with a more blocky structure in the subsoil.

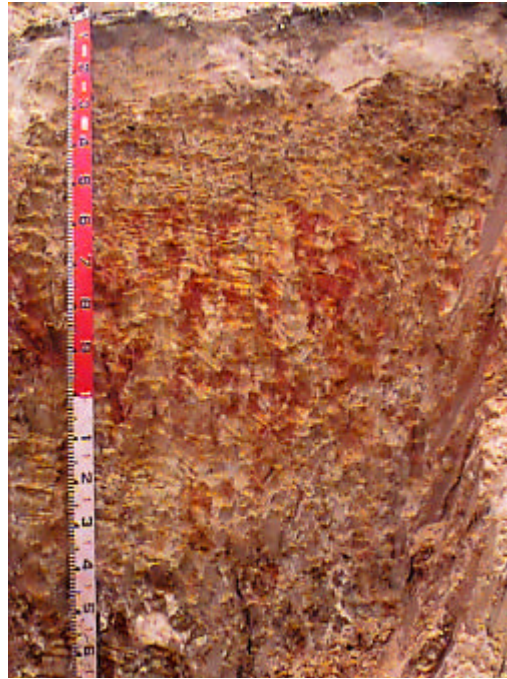


Soil Profile Morphology:

Topsoil

A1 0-10 cm Brown (10YR5/3) *loamy fine sand*, structureless, loose consistence when dry, hydrophobic. pH 6.1. Abrupt and wavy transition to:

A2 10-25 cm Very pale brown (10YR7/4) *sand*, conspicuously bleached when dry. pH 7.2. Sharp and wavy transition to:

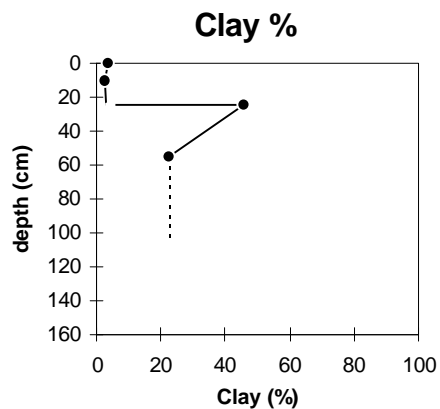
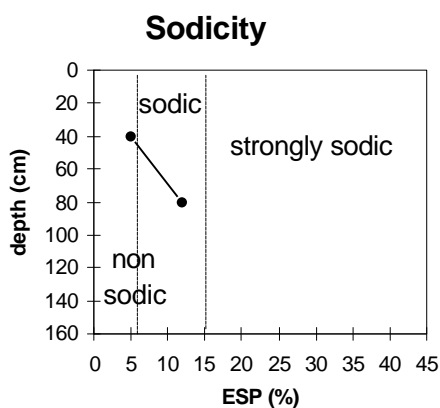
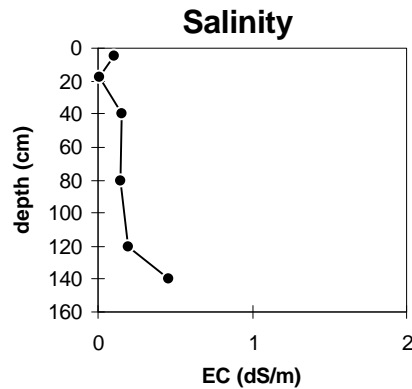
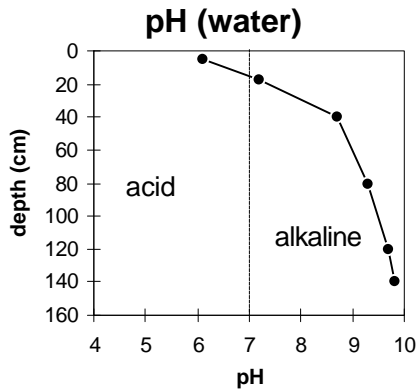


Soil Profile Characteristics:

Horizon	pH	Salinity	Sodicity	Dispersion	Internal Drainage	Hydrophobicity
Surface (A1 horizon)	slightly acid	very low	non-sodic	-		low
Subsoil (B21 horizon)	strongly alkaline	very low	non-sodic	nil ¹	imperfectly drained [#]	
Deeper subsoil (at 1 metre)	extremely alkaline	low	sodic	strong ¹		

1 complete dispersion after remoulding

most impeding horizon of the profile that will affect plant growth



Key Profile Features:

- Sandy topsoil
- Strong textural contrast between the topsoil and subsoil horizons
- Bleached A2 horizon
- Columnar structure with hardsetting bleached capping above
- Mottled subsoil
- Top of subsoil is dispersive following cultivation when wet
- Alkaline subsoil
- As the land tends to have gilgai micro-relief the soil is variable and the horizons are of variable depths.
- All horizons have very wavy boundaries. The grey clay horizon (140-180 cm) can be to within to one metre of the surface in places
- Low nutrient status of surface soil
- Plant Available Water Capacity (PAWC) is considered to be medium (estimated at 107 mm) for this site profile based on an Effective Rooting Depth (ERD) of 55 cm. Rooting depth will be restricted by subsoil conditions, such as strongly sodic (Exchangeable Sodium Percentage >20%), high soluble salt levels (Chloride >0.1%), poor structure (e.g. massive or very coarse, columnar or prismatic), very high carbonate (lime) content (not applicable to all plant species), or hard rock.

Soil Restrictions and Management Prescriptions

Feature	Result	Management Prescription
Sandy topsoil	Poor plant available water holding capacity. Poor nutrient holding capacity. Increased risk of wind erosion. Potential for hydrophobicity.	<i>Dryland cropping</i> - minimum tillage and stubble retention, improve organic matter through maintenance of vegetative cover and growing green manure crops. Establish wind protection barriers. <i>Horticulture</i> - improve organic matter through maintenance of vegetative cover and growing green manure crops. Establish wind protection barriers. Increase frequency of fertiliser (e.g. side dressings) and irrigations.
Strong textural contrast between topsoil and subsoil (duplex)	Strong textural and structural difference between the topsoil and the subsoil. Can result in impeded internal drainage and restricted root growth	Improve organic matter through maintenance of vegetative cover and growing green manure crops. Reduce tillage. Mounding for orchards. Optimise plant growth through regular balanced fertiliser programme. Consider sub-surface drainage (if appropriate).
Bleached A ₂ horizon	Indication of waterlogged condition (impeded internal drainage) within the topsoil. Poor soil structure (often massive). Low organic matter, water holding capacity and nutrition within the horizon.	<i>Dryland cropping</i> - include deep rooted crops in the rotation, minimum tillage and stubble retention. Apply gypsum if the topsoil is sodic. Optimise plant growth through a regular and balanced fertiliser programme. <i>Horticulture</i> - improve organic matter through maintaining optimum plant growth and growing green manure crops between the rows. Minimum tillage and surface vegetative cover. Apply gypsum if the topsoil is sodic. Optimise plant growth through a regular and balanced fertiliser programme. Install subsoil drainage (if appropriate).
Columnar or prismatic subsoil structure	Indication of sodic clay subsoil. Poor water and air movement into the subsoil resulting in waterlogging	Apply gypsum if the subsoil is close to the surface and topsoil textures are light. <i>Dryland cropping</i> - include deep rooted crops in the rotation, minimum tillage and stubble retention.

	(impeded internal drainage). Poor root growth into the subsoil reducing the volume of the soil able to be exploited. Very difficult to cultivate particularly if topsoil is shallow.	<i>Horticulture</i> - deep ripping with gypsum, install tile drainage (if appropriate). These soil are difficult to manage, not suitable for high levels of production unless substantial modification can be achieved.
Mottled subsoil	Indication of periodic waterlogging, particularly if grey and yellow mottles predominate.	Consider sub-surface drainage (if appropriate). Apply gypsum if subsoil is sodic and close to the surface.
Dispersion when reworked	Indication of soil sodicity. Soil structure collapses following tillage and wetting Results in poor soil structure that reduces water movement and plant root growth (see sodic subsoil). Increases water erosion hazard.	Do not cultivate wet soil (cultivate when moist). Apply gypsum if growing high value crops.
Alkaline subsoil	Potential nutrient imbalance. Unsuitable for alkaline intolerant plants. May indicate subsoil sodicity.	Grow shallow rooted species. Grow alkaline tolerant plants.

Land Suitability Rating Table

LAND USE	SUITABILITY CLASS	MAJOR LIMITING COMPONENT
Wheat	2	Climate, soil
Canola	2	Climate, soil
Chickpeas	3	Soil
Lentils	3	Soil
White clover seed	2	Soil
Lucerne for seed production	3	Soil
Viticulture	3	Soil
Apples	2	Climate, soil
Potatoes	3	Soil
Carrots	3	Soil
Onions	3	Soil
Sweet corn	3	Soil
Radiata Pine	3	Climate
Blue Gum	3	Climate

Land Suitability Assessment and Primary Limitations

Wheat	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline pH, slightly impeded internal drainage, hydrophobicity
Canola	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline pH, slightly impeded internal drainage, hydrophobicity
Chickpeas	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Impeded internal drainage
Lentils	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Impeded internal drainage
White clover seed	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, soil salinity, slightly impeded internal drainage, hydrophobicity

Lucerne for seed production	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Impeded internal drainage
Viticulture	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Impeded internal drainage
Apples	<i>Climate</i>	2	Moderate frost risk, slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, impeded internal drainage, hydrophobicity
Potatoes	<i>Climate</i>	2	Slightly high mean maximum January temperature
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Impeded internal drainage
Carrots	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Shallow depth of topsoil, impeded internal drainage
Onions	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Impeded internal drainage
Sweet corn	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Impeded internal drainage
Radiata Pine	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, internal drainage, hydrophobicity
Blue Gum	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	2	Slightly alkaline subsoil pH, internal drainage, hydrophobicity

ASSOCIATED SOIL TYPE FOR THE BIG DESERT TRANSITION - 2 - Pg2 LAND UNIT

MAP UNIT: Pg2

Site No.: L24

Position in Landscape: Crest of Dune

Australian Soil Classification: Eutrophic, Subnatric, Brown SODOSOL (deep sandy)

Northcote Factual Key: Dy 4.41

Great Soil Group: soloth

General Landscape Description:

The landscape consists of low rises (L24) and long gentle slopes (WW1). WW1 is used to represent this land unit on the map as it occurs on the long gentle slopes - the most common land element of this land unit. This soil description is from the crest of a dune.



Soil profile morphology

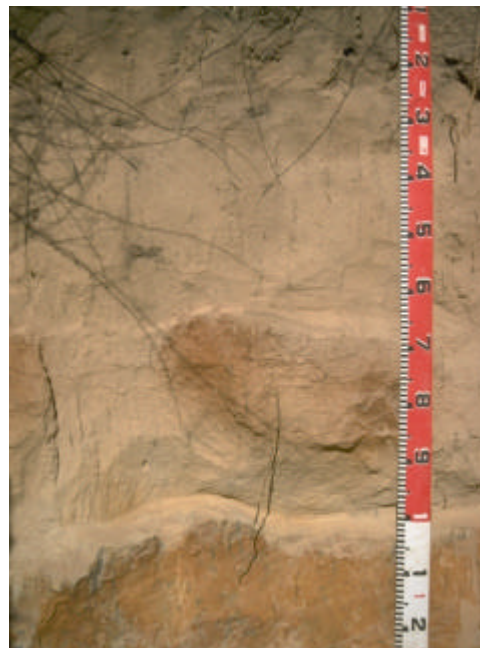
Topsoil

A11 0-15 cm Dark brown (10YR4/3) loamy sand, weakly structured, loose consistence dry. pH 6.7.

A12 15-35 cm Brown (7.5YR4/4) loamy sand, structureless, loose consistence dry.

A2 35-100 cm Brown (7.5YR5/4) sand, (drying out to a bleached colour), structureless, loose consistence dry. pH 6.8.

Within this horizon massive yellowish red (5YR5/8) clayey sand (6% clay) areas occur which are of firm consistence dry. pH 6.1 (referred to as a B1 horizon).



Subsoil

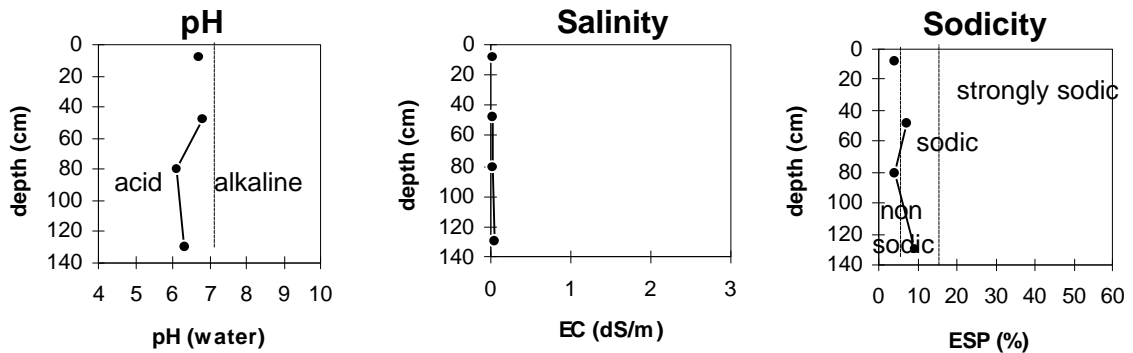
B21 100-160 cm Strong brown (7.5YR5/6) with yellowish brown (10YR5/8) mottled *coarse sandy loam* (16% clay); weak coarse columnar structure and very strong consistence dry, top of columnar structure has hard bleached capping. pH 6.3.

B22 160+ Yellowish brown (10YR5/8) *coarse sandy loam*, massively structured, very strong consistence dry.

Soil Profile Characteristics:

Horizon	pH	Salinity	Sodicity	Dispersion	Internal Drainage	Hydrophobicity
Surface (A1 horizon)	slightly acid	very low	non-sodic	–	well drained	moderate*
Subsoil (B21 horizon)	slightly acid	very low	sodic	–		

* estimate



Key Profile Features:

- Deep sandy A horizons to 1m depth.
- Hydrophobic topsoil
- Sodic subsoil
- Sandy topsoil susceptible to wind erosion

Soil Restrictions and Management Prescriptions

Feature	Result	Management Prescription
Deep sandy profile	Poor plant available water holding capacity. Poor nutrient holding capacity. Increased risk of wind erosion. Potential for hydrophobicity.	<i>Horticulture</i> - grow appropriate species. Improve organic matter through maintenance of vegetative cover and growing green manure crops. Establish wind protection barriers. Increase frequency of fertiliser (e.g. side dressings) and irrigations.
Hydrophobic topsoil	Poor infiltration of water into the soil. Increased risk of water erosion. Poor seed germination.	Maintenance of surface vegetative cover. Claying.
Sodic subsoil	Poor water and air movement into the subsoil resulting in waterlogging (impeded internal drainage). Poor root growth into the subsoil reducing the volume of the soil able to be exploited.	Gypsum applications if the subsoil is close to the surface and topsoil textures are light. <i>Horticulture</i> - deep ripping with gypsum, install tile drainage (if appropriate).

Land Suitability Rating Table

LAND USE	SUITABILITY CLASS	MAJOR LIMITING COMPONENT
Wheat	3	Soil
Canola	3	Soil
Chickpeas	3	Soil
Lentils	3	Soil
White clover seed	3	Soil
Lucerne for seed production	2	Landscape, soil
Viticulture	3	Soil
Apples	3	Soil
Potatoes	2	Climate, landscape, soil
Carrots	2	Landscape, soil
Onions	2	Climate, landscape, soil
Sweet corn	3	Soil

Radiata Pine	3	Climate
Blue Gum	3	Climate

Land Suitability Assessment and Primary Limitations

<i>Wheat</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>Canola</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>Chickpeas</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>Lentils</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>White clover seed</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>Lucerne for seed production</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Slightly impeded internal drainage, hydrophobicity, sandy subsoil texture
<i>Viticulture</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Deep sandy profile
<i>Apples</i>	<i>Climate</i>	2	Moderate frost risk, slightly high mean maximum January temperature
	<i>Landscape</i>	1	No major limitation
	<i>Soil</i>	3	Deep sandy profile
<i>Potatoes</i>	<i>Climate</i>	2	Slightly high mean maximum January temperature
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Slightly impeded internal drainage, hydrophobicity

<i>Carrots</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Slightly impeded internal drainage, hydrophobicity
<i>Onions</i>	<i>Climate</i>	2	Moderate frost risk
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Sandy topsoil texture, topsoil pH, slightly impeded internal drainage, hydrophobicity
<i>Sweet corn</i>	<i>Climate</i>	1	No major limitation
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	3	Deep sandy profile
<i>Radiata Pine</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Subsoil texture, depth to weathered sandstone, hydrophobicity
<i>Blue Gum</i>	<i>Climate</i>	3	Low rainfall
	<i>Landscape</i>	2	Wind erosion hazard
	<i>Soil</i>	2	Subsoil texture, depth to weathered sandstone, hydrophobicity